UNIVERSITY OF CAPE TOWN

Visualising climate change: the case of the Intergovernmental Panel on Climate Change's cover images

Katrine Brink Claassens

CLSKAT002

Minor Dissertation: MPhil Climate Change & Sustainable Development

Supervisors: Ian Rijsdijk and Lorena Pasquini

Table of contents

Plagiarism declaration

Minor dissertation presented for the approval in partial fulfilment of the requirements for the Master of Science degree specializing in Climate Change and Sustainable Development in approved courses and a minor dissertation.

I hereby declare that I have read and understood the regulations governing the submission of MPhil dissertation specialising in Climate Change and Sustainable Development, including those relating length and plagiarism, as contained in the rules of the university, and that this minor dissertation conforms to those regulations. I know the meaning of plagiarism and declare that all of the work in the document, save for that which is properly acknowledged, is my own.

Signature: _____ Date: _____

Katrine Brink Claassens

Acknowledgments

I would like to thank the numerous people who supported me through both this dissertation and the course work of this degree. Acknowledgments go to my classmates at the University of Cape Town, especially Viviane Umlisa, Monica Giermek, Sharon Ramsawmy and Rifqua Hendricks, who provided endless support, love and humour through the long nights. Pippin Anderson and Bradley Rink of the Environmental and Geographical Department have also been instrumental in their support and assistance. I am beholden to my inspiring supervisors Dr. Ian Rijsdijk and Dr. Lorena Pasquini for their guidance, kindness and dedication. I am deeply grateful to my amazing family as well as Lauren Bates, Paul Crafford and Baby Tigerlilly who cheered me on and cheered me up. But most of all, I am thankful to Manndi Schuld who helped awaken me to my deepest purposes in life and who still challenges me to notice.

Abstract

Climate change is an increasingly urgent problem. How it is communicated and represented are of interest to those seeking to understand action or inaction on the issue. There is increasing interest on how it is being communicated visually. This research speaks to the growing body of literature on the visual communication of climate change in order to contribute to the wider critical literature addressing the role of images in the communication of climate change. It does so by considering a neglected site of climate change imagery: the Intergovernmental Panel on Climate Change's (IPCC) report covers. The IPCC's report covers from the first ones in 1990, to the latest ones of 2014, are investigated in this quantitative and qualitative case study where the subject matter, both literal and symbolic of this (hitherto unexamined) body of images, is interrogated. This dissertation sought to identify and investigate what, exactly, the IPCC is using to visually represent and communicate climate change outside the realm of its scientific graphs and diagrams. It sought to compare these findings with the larger lexicon of climate change imagery and look at how the IPCC negotiates the communicational and representational problems inherent in the visual communication of climate change. The question ultimately asked was whether the IPCC's cover images are effective representations of climate change. What was found was that the IPCC images departed significantly from standard climate imagery. The conclusions drawn from the initial content and thematic analysis was that the IPCC images are frequently too banal, bland and decontextualised to be effective representations or communicators of climate change but do offer some potentially effective avenues overlooked in other representations.

List of tables

Table of figures

1. Introduction

Human-induced climate change, brought on by increasing anthropogenic emissions, is profoundly disturbing planetary systems and may cause the global climate to "depart significantly from natural behaviour[1] for many millennia to come" (Crutzen 2002: 23). Since the 19th century, anthropogenic emissions of greenhouse gases have risen as human reliance on fossil fuels has continued to grow. These emissions have contributed to the 'greenhouse effect', which has resulted in climate change, a volatile and unprecedented phenomenon, described as the "definitive" environmental issue of our time (DiFrancesco & Young 2011: 517). Climate change scientists predict a grim future for the planet: as it stands now, the frequency and intensity of heat waves and precipitation events have increased, ice sheets at both poles and glaciers have shrunk, sea levels have risen and ocean acidification is occuring. All these factors are projected to increase in the 21st century and beyond as humans become a geological force that surpasses the confines of natural variability by altering climatic and chemical planetary systems (Rockström et al. 2009). Climate change has no clear, simple or straightforward solution (Levin et al. 2010) and yet our action, or inaction, regarding climate change will define not just the course of human history, but that of the entire biosphere and geology of the planet.

Human-caused climate change was hypothesised as early as the Victorian era, and documented throughout the 20th century. However, it was in the late 20th century when observations of unprecedented rises in atmospheric carbon, sea level and global temperatures caused alarm in the scientific community. The response to these observations was the 1988 establishment of the Intergovernmental Panel on Climate Change (IPCC) by the World Meteorological Organisation and the United Nations Environment Programme. The panel's task was to review and report on the latest international scientific, technical and socio-economic research on climate change.

The IPCC is now the leading international authority on climate change evidence and "the most authoritative scientific voice on the causes, impacts, and effects of climate change" (Doyle 2009: 282). It is a political body as well as a scientific one and, as the existence of its *Summary for Policy Makers* reports indicates, its role is to not just provide scientific evidence of climate change, but to influence the decisions of governments and other decision-makers. The IPCC reports are the

[1] This 'natural behaviour' referred to is the geological epoch of the Holocene in which the Earth's climate has remained relatively stable.

results of the voluntary efforts of thousands of scientists. These labours have meant that since its establishment the IPCC has "solidified a storyline of consensus regarding anthropogenic climate change" (Boykoff 2009: 441) and "forcefully asserted that anthropogenic activities have had a 'discernible' effect on the global climate" (Boykoff & Boykoff 2007: 12).

As part of the dominant "new 'mode' of knowledge production [of climate change] in which the traditional boundaries between science and politics and the borders between the academic and commercial worlds are increasingly transgressed" (Jamison 2010: 819), the IPCC is a dynamic and powerful player in the climate change arena. In its reports the IPCC generates a number of scientific images from graphs, diagrams and climate models that illustrate scientific findings and projects of climate change. However, it is also the source of another, quite different, set of imagery. The IPCC reports each have a cover image, usually a photograph, and these images can contribute to another field of study, that of the visual communication of climate change.

The field of the visual communication of climate change is a small, but growing, research area. Visual communication is "critical" to public discourse, perceptions and action against climate change (DiFrancesco & Young 2011: 517). Visual communication of climate change has been shown to be a significant area of influence in the communication of climate change (and thus action or inaction in response to the problem) but is under-researched. Furthermore, most previous research on the visual communication of climate change has focused primarily on the reception of climate change images and those images used by news media, thus we do not have a well-rounded picture of what is being used to communicate climate change visually. While the IPCC is a central player in the narrative of climate change, and its scientific images have received wide attention, its non-scientific images have not yet been investigated. By investigating the IPCC's non-scientific imagery, an unstudied subject in an understudied field, this dissertation aims to contribute to the growing body of literature on the subject of the visual communication and visual representation of climate change.

2. Aim and Objectives

Aim

This dissertation seeks to gain a deeper understanding of the way climate change is being visually represented and communicated by investigating the cover images of the International Governmental Panel of Climate Change's reports. In documenting, analysing and comparing these unstudied images, it is hoped that a contribution will be made to the discourse regarding the visual communication of climate change.

Objectives

Consistent with the aim outlined above, this dissertation's objectives are:

1. To document and investigate the latent and manifest content of the IPCC cover images.
2. To compare and contrast these images to the larger context of climate change imagery.
3. To examine how the IPCC negotiates the communicational and representational problems inherent in the visual communication and representation of climate change, and whether the images it has used are effective and appropriate to communicate climate change.

3. Literature Review

This literature review starts with an exploration of the literature regarding climate change communication broadly and then the development of literature exploring the visual communication of climate change specifically. In order to address the second aim of this dissertation, it then identifies the visual lexicon of climate change as defined in the literature, constructing a base from which to compare and contrast the IPCC images. The communicational and representational problems of climate change are then outlined, before literature that has specifically concerned the IPCC and visual imagery is addressed. Lastly, gaps in the literature are noted.

3.1 Climate change imagery: an emerging field of study

Scholarly attention has long been paid to the communication of environmental issues, but it was in the 1990s that a field of research specific to climate change communication began to emerge (Trumbo 1996; Anderson 1997) with research on the subject escalating in recent years (e.g. Brossard et al. 2004; Antilla 2005; Carvalho & Burgess, 2005; Boykoff and Boykoff 2007; Boykoff 2007, 2008; Anderson 2009; Billett 2010). These studies were largely news media centric and based on textual analysis, dealing with the visual discourse of climate change only in passing, if at all.

The visual communication of climate change is an emerging field of study, one that is gaining academic interest in accordance with a growing multidisciplinary interest in visual studies (Rose 2012). Pioneers in this area include Bronnimann (2002), Doyle (2007, 2009), Joffe (2008), Hansen and Machin (2009), O'Neill and Nicholson-Cole (2009), Smith and Joffe (2009, 2013) and Manzo (2009, 2010), who have been joined in more recent years by DiFrancesco & Young (2011), Meisner and Takahashi (2013), and Nerlich and Jaspal (2014). Studies on climate change imagery have featured a fairly large (though certainly not all-encompassing) range of media including newspapers and magazines (e.g. Smith & Joffe 2009; DiFrancesco & Young 2011; Meisner and Takahashi[2] 2013), television (Lester & Cottle 2009), NGO campaigns (Doyle 2007; Manzo 2010), film (Salvador & Norton 2011), art (Dunaway 2009; Miles 2010) and advertising (Linder 2006; Hansen & Machin 2008). However, as with textual analysis (e.g. Wilkins 1993; Boykoff & Boykoff

[2] Meisner and Takahashi's (2013) is not exclusively on climate change as it addresses broader representations of environmental issues; however it does have a significant climate change component and is thus included here.

2007; Carvalho & Burgess 2005; Boykoff 2007), the focus is weighted heavily towards news media (eg. Hulme 2009; Smith & Joffe 2009; Meisner & Takahashi 2013; Nerlich & Jaspal 2014).

This emphasis on media should come as no surprise as it is mostly through the news media that climate change is communicated to the public (Antilla 2005). As the "gatekeepers" of climate change information (Billett 2010:2) it is the media who translate "scientific knowledge into popular discourse" (Carvalho & Burgess 2005) and as such help us "make sense of the many complexities relating to environmental science and governance that (un)consciously shape our lives" (Boykoff 2009: 431). To be certain, studies have demonstrated that images from the press have been internalised by people and provide the main source for how climate change is imagined (Nicholson-Cole 2005; Wibeck 2012; Smith & Joffe 2013). While news media may be (debatably) the most primary and influential source of climate change information for the public, it is far from the only one and it is suspected that this focus on news media might be creating an uneven picture of what visually represents climate change[3]. This is because news media have a very specific agenda: one that is commercial, globalized, frequently geared towards sensationalism, drawn to conflict, events-based and time-pressured, not objective nor balanced (Smith 2005; Anderson 2009). The focus on newspapers has come at the neglect of other sources of climate change imagery. O'Neill and Smith (2014) note that other important sources remain understudied, or practically not studied at all. A gap in the research most keenly felt is that of non-news-based internet sources. From social media, to popular climate change campaigns that are mainly based online, to YouTube, this area remains neglected.[4]

While previous text-based studies feed into and inform visual research on the discourse of climate change, they should be treated with caution when being used to understand the visual discourse of climate change. Firstly, this is because the visual raises a different set of questions and methods

[3] While newspapers are not the sole, or perhaps even primary, source of climate change imagery for the public, they are a critical source of climate change information. Höijer (2010) writes that because climate change is imperceptible for most people, "public awareness is strongly dependent on the media" and as such it is of "great importance" to understand how the media constructs climate change (718). As well as providing an interface between scientists and the public, they hold significant influence over public perceptions, behaviour change and awareness of the issue. Mass media function as "powerful agent" with the capacity to "influence political decisions" (Höijer 2010: 718). Because of this power and autocracy, the dominance of the media, particularly news media, voices in climate change communication have been seen as problematic especially considering that their agenda is to sell newpapers and that ownership of newspapers pushes certain agendas. The result of this is that climate change is often reported through the coverage of extreme weather 'events', which creates a stimulating, but limiting frame. Mass media play a large and important role in the communication of climate change (Anderson 2009), as they are the largest sector disseminating ideas of climate change information to the widest audience.

[4] This is also the case in textual analysis where only one significant paper on an internet source (which focused only on English-language blogs) could be found (Fløttum et al. 2014).

and secondly because there is some debate as to whether climate change imagery and text are telling the same story. Smith and Joffe (2009) suggest that they do have a common narrative, while DiFrancesco and Young's (2011) study found evidence that this is not the case. There are few studies on the image/language interactions in climate change discourse but DiFrancesco and Young's (2011) thorough study is enough to warrant restraint in applying the findings of textual studies to those that are visual. As such, this literature review will focus mainly on studies that have focused on the visual aspects of climate change communication and representation. That communication on climate change differs between science, politics and the media (Weingart 2000) is also taken into account in this literature and throughout this dissertation.

The studies on the visual communication of climate change are marked by a plethora of questions and methods. Here the focus will be on the most common debates and findings in the literature. These include work on identifying the iconography of climate change, audience reception of climate change imagery, and the challenges in representing and communicating climate change visually. Because it is such a recent field of study, most research on climate change imagery has at least partly looked at what exactly visually represents climate change and the implications of these manifestations. These representations and implications are first explored after which iconography, fear narratives and representational obstacles are addressed. This literature review concludes with remarks on the literature pertaining to visual imagery and the IPCC and concludes with addressing the gaps in the literature.

With this in mind, studies that have sought to document and understand what has been used to visually represent climate change are now addressed. In an attempt to address the bias towards news-media and create a comprehensive and inclusive picture of how climate change has been visualised, a variety of sources are included: scientific publications, humanitarian and environmental NGO campaigns, advertising, moving images (TV and film), art and simulated landscape visualisations.

3.2 Imaging climate change

In identifying climate change imagery, Braasch (2013) writes that it is "endless smokestacks, blazing suns, and polar bears; astounding time-lapse images of clouds, storms, and glaciers; thousands of people up to their waists in high tides and floods; and ranks of wind turbines and solar panels" that dominate the visual lexicon of climate change (34). Braasch's (2013) list

identifies some of the common tropes in climate change imagery, and is repeated in the findings of many papers across sources of imagery in quantitative and qualitative studies (e.g. Bronnimann 2002; Doyle 2009; Lester & Cole 2009; Manzo 2009; Smith & Joffe 2009; Höijer 2010; Miles 2010; DiFrancesco & Young 2011; Salvador & Norton 2011; Nerlich & Jaspal 2014). Of course, since many of the studies are specific to one country or medium, there are exceptions[5] to the list, but mostly these images are evenly spread across subject matter. From film and television, to art and advertising, a limited number of "features, attributes and landscapes" have come to represent climate change and of these some occupy a more privileged space than others (Hansen & Machin 2008: 787). These have been identified in the literature as polar bears (e.g. O'Neill 2008; Yusoff & Gabrys 2011), ice (e.g. Bronniman 2002; Doyle 2007; Manzo 2009), extreme weather (e.g. Ahchong & Dodds 2012; Nerlich & Jaspal 2014; O'Neill & Smith 2014) and globes (e.g. Doyle 2009; Manzo 2009).

Doyle (2007) tells us that "images of melting glaciers dominate the pictorial language of climate change" (129) and that "polar caps function as privileged signs within the discourse of climate change" (142). For Doyle (2009) Greenpeace's 1997 photograph of the crack in the Larsen B ice shelf was a "pivotal image" in making climate change visible and real: the first recognisable "evidence" of climate change (288). Manzo (2009) agrees and writes that melting ice is one of the "visual fingerprints" and warnings of climate change and its immediate consequences (2).

Associated with the same melting world is the polar bear. Polar bears do not offer 'proof' (nor are they inherently appropriate as climate change icons) of climate change, as melting ice does, but have nonetheless proved to be a "runaway success" as an emotive, charismatic and engaging icon of climate change (Ziser & Sze 2007: 389). Despite the fact that it has been found to be the "least relevant" icon to people (internationally), it is the most recognised and engaging icon of climate change (O'Neill & Hulme 2009: 408).

Images of globes have long dominated the imagery of the environmental movement (Dobrin & Morey 2009), and the case is no different with climate change (it is after all, an environmental issue) where globes have been "routinely" appropriated (Manzo 2009: 1). Like the polar bear and melting ice, globes have history and tradition which go further back than their use as climate

[5] For example DiFrancesco and Young (2011) were surprised to find the polar bear (a powerful and widespread symbol of climate change, and native to Canada) largely absent in Canadian newspapers.

change icons, having being used as environmental icons too (Ziser & Sze 2007; Nerlich & Jaspal 2014). They were used early on in visual climate change communication, as Doyle (2009) notes when she observes that before using melting ice to represent climate change, Greenpeace had used "images of the scorched earth as well as through computer-model simulations of a red-swathed globe to signify a warming world" (Doyle 2009: 288).

Imbued in these images of imperilled polar bears, dangerous extreme weather, diminishing ice, and glowing globes that warn of impending danger, are narratives of fear, alarmism, catastrophe, doom, danger and apocalypse that are common in climate change's visual discourse. Attention is now turned to the significant amount of research conducted in this area.

3.3 Narratives of fear and vulnerability

Lawrence Buell writes that the apocalypse is ''the single most powerful master metaphor that the contemporary environmental imagination has at its disposal'' (1996: 285). This seems to be true of climate change, which is framed as "a terrible, immense, and apocalyptic problem, beyond human control" with danger and vulnerability being dominant signifiers of the issue (O'Neill and Nicholson-Cole 2009: 358). From newspaper headlines that threaten disaster to photographs and films of the planet and people in crisis (for example, vulnerable polar bears, melting ice and victims of floods and drought), studies on both texts and images alike have found the fear narrative pervasive. Even scientific images have been shown to be far from neutral (Sheppard & Cizek 2009; Mahony & Hulme 2012) as they can stimulate a range of emotions from "punishment to impending apocalypse" carrying with them the same "narratives of fear" as other imagery (O'Neill & Smith, 2014: 79).

There are a number of reasons proposed for the widespread employment of fear narratives. The use of fear is often well-intentioned: implicit in the use of visual imagery of dangerous climate change (and one could argue, in text as well) is the objective that it will lead to action (Hulme 2004: 5). Boykoff (2008) makes a simple point curiously overlooked by other authors when he writes that climate change communication uses fear because it *is* a scary matter. For Boykoff (2008: 561) using fear and doom narratives is understandable and unavoidable as "it is hard to put a hopeful tone on headlines like those covering displaced communities from sea level rise". Other, perhaps less well-intentioned, motivations for the use of fear narratives are apparent in newspapers where "scare" stories are privileged because framing stories as such increases their

newsworthiness (Carvalho & Burgess 2005; Boykoff & Boykoff 2007). Debate on the subject of fear narratives mostly surrounds whether it is an effective method for drawing attention to, and ultimately inspiring action regarding climate change or whether it has the opposite effect. The proponents for the use of fear point to the fact that fear-based imagery has brought attention to the issue as a serious and dangerous phenomenon, especially in earlier years (Weber 2006; Doyle 2007). Olausson (2009) argues that showing the frightening effects of climate change is also useful because it adds weight and force to the legitimacy and certainty of climate change and makes the need for action undeniable.

Despite these reasons for using fear-laden images and the fact they are that are attention-grabbing, whether it actually has a positive effect on action, allowing people to make informed decisions concerning climate change risk and taking action, is questionable. There are a number of arguments against its use. In numerous studies fear has not been found to be the most effective medium for action in response to climate change. Firstly, fear can have the effect of desensitising people and secondly, is hard to sustain in the long term (O'Neill & Nicholson-Cole 2009). The effects of the fear messages were shown to be strong but to gradually 'wear off,' as Lowe et al. (2006) found in a study of participants' reactions the days following their watching of the climate change catastrophe movie *The Day After Tomorrow* (Emmerich 2004). It was found that the participants' sense of urgency about climate change decreased as time passed after watching the movie. Lowe et al.'s (2006) findings are in line with what Olausson (2005), O'Neill & Hulme (2009), O'Neill & Nicholson-Cole (2009) found: that the strong original feelings fade and are replaced with apathy or fatigue as "habituation and desensitisation could reduce people's attention to news about impending catastrophes". This fatigue is called "climate change fatigue" (Nerlich et al. 2010: 104). It would seem that people have a "finite pool of worry" (O'Neill & Nicholson-Cole 2009: 362) that once filled, will lead to fear messages being ignored, diminished or transferred to other people. As Moser and Dilling (2004) find, in an attempt to deal with fear and control, people resort to denial and indifference resulting in less action and engagement on climate change issues. Studies by O'Neill and Nicholson-Cole (2009) and O'Neil et al. (2013) have shown that fear-inducing images, while able to capture people's attention, can also act to distance the issue of climate change and alienate people by making them feel overwhelmed and hopeless. Furthermore, O'Neill and Nicholson-Cole (2009) found that the use of fear appeals of a sensationalist or alarmist nature can lead to the diminishment of trust and confidence in the

communicator or in climate change science in general, especially if dramatic predictions do not manifest in a timely manner.

As it has been shown, the use of fear messages – even when well-intended, as Hulme (2006) says they inherently are – can have unintended negative consequences for the plausibility and motivation towards the climate change message (Salvador & Norton 2011; Nerlich et al. 2010; Nisbet 2009; Weber 2006). These unintended consequences include climate change imagery "play[ing] into the hands of climate sceptics" and "creat[ing] a sense of fatalism" (Nisbet 2009: 19). Lowe et al. (2006) found that while people exposed to fear narratives were more concerned that extreme effects of climate change were likely to occur, they were less likely to take action. In addition to this, Hulme (2009) found that the use of fear narratives do not mirror how science portrays climate change. In addition to these findings, Klein (2013) adds a more nuanced suggestion that fear narratives do not inspire terror, but "delicious awe" – another unintended consequence. For this he writes that "it may be always an error, and the sign of an error, to speak apocalyptically about climate change" (Klein 2013: 86).

It would seem that overall, fear messages in climate change communication are an ineffective, and perhaps even dangerous, means to promote climate change action (Moser & Dilling 2004; Lorenzoni et al. 2007; O'Neill & Nicholson-Cole 2009). Apocalyptic framing "ultimately enfeebles environmental advocacy" (Salvador & Norton, 2011: 60) and "decrease[s] issue salience and increase[s] individual feelings of invulnerability" (O'Neill & Nicholson-Cole 2009: 362). Stoekl (2013: 54) calls for the need to move beyond "mere fear or bad-faith embrace of apocalypse". The debate around fear narratives raises questions regarding the other challenges faced in the communication and representation of climate change. These challenges are addressed in the following section.

3.4 Challenges in communicating climate change

The obstacles in communicating climate change are largely defined by, and intertwined with, the complexities of climate change itself: it has many features that make it difficult to communicate and engage with. Some of these obstacles are unique to climate change and not present in the communication of other environmental issues. Moser (2010: 33) asks whether "there is something in the nature of the climate problem itself and how humans interact with the climate

that makes it more challenging to communicate than other environmental, hazard [and] health issues".

The concept of "wicked problems" sheds some light on Moser's (2010) question. Because it is a problem that lacks a straightforward solution, climate change has been described as a 'wicked problem.' As defined by Hulme (2009: 334), a wicked problem is one that eludes definition or solution and where "any resolution generates further issues."

Levin et al. (2010) go further by introducing the term "super wicked" to describe climate change. They argue that this new term is needed to describe the problem of climate change, as it has additional features to other wicked problems. These features of climate change as a super wicked problem are that: time is running out; the central authority needed to address them is weak or non-existent; those who cause the problem also seek to create a solution; and hyperbolic discounting occurs that pushes responses into the future when immediate actions are required to set in train longer-term policy solutions (Levin et al. 2010: 3). Solutions to the climate change problem require urgent action on a considerable scale, yet the answers seem out of reach for the time being.

However, it is not only the physical problem of climate change itself, nor the elusive practical solutions it requires, that make it so 'wicked' and difficult to communicate. Chakrabarty (2009: 197) argues that the crisis of climate change makes conceptualising the future impossible, in that "the current crisis can precipitate a sense of the present that disconnects the future from the past by putting such a future beyond the grasp of historical sensibility". Climate future scenarios are "unimaginable" (Yusoff & Gabrys 2011), not only because events and impacts of the Anthropocene are unprecedented, but because they often require us to imagine an apocalyptic future of a radically different world in which we may not feature as a species (Chakrabarty 2009; Yusoff & Gabrys 2011). In turn, a future which is unimaginable affects our sense of the present (Chakrabarty 2009). Furthermore, in making his original claim that the climate change problem makes the future inaccessible, Chakrabarty (2009) assumes that climate change can be grasped as a concept at all, thus overlooking the difficulties in imagining a problem of such complexity and enormity. For Moser (2010), a comprehensive understanding of climate change is impossible not just because of the complexity of climate change, but because of the scientific uncertainties and

the vast, multi-disciplinary nature of climate change knowledge - no human could possibly process the full implications and reality of climate change.

Other traits of climate change hinder effective communication and representation. These have been identified as invisibility, perceived and real geographical and temporal distance, attribution, scientific evidence and uncertainty, along with problems inherent in human nature (such as short-term thinking) that get aggravated by climate change (e.g. O'Neill & Nicholson-Cole 2009; DiFrancesco & Young 2011; Moser 2010). Human self-interest is a problem as it hampers efforts towards climate justice and ultimately prevents people from "fully grasping that there is no escaping of the future we are creating for ourselves" (Moser 2010: 36). It is hard to motivate people to take action when 'lags' in both climate and social systems make it hard or even impossible to see the benefits of taking action against climate change: there is no obvious gratification, let alone instant gratification (Moser 2010). Also, evolutionarily, our brains are not wired for long-term problems like climate change (Moser 2010). Climate change communication and representation in all its forms is marked by its engagement with the traits of climate change discussed above. However, there are some problems that are image-specific in the communication and representation of climate change to which this dissertation now turns.

3.5 Visual-specific problems in communicating and representing climate change

Images function as both a hindrance and a help to climate change communication. For DiFranceso and Young (2010: 518) visual imagery is "essential for making climate change 'consumable'" that is, easy to understand, because images are "easier to process than verbal or textual information" (Smith & Joffe 2009: 660) and can create an impact where linguistic metaphors cannot. Visual imagery has the potential to play a "strong role" in "public understandings of climate change" (DiFrancesco & Young 2011: 518). Visual imagery has the "potential to concretise risk messages for members of the public" (Smith & Joffe 2009: 648) as well as to evoke emotion. As such it is an "effective medium for the social construction of risk messages" (Smith & Joffe 2009: 648), useful when trying to convince people of the reality and seriousness of climate change. On the basis of these qualities of the visual – that it is emotive, absorbed in a fairly unmediated fashion, vivid and memorable, and 'proves' the authenticity of the event depicted – it is particularly powerful in shaping persuasive messages. However, there are drawbacks to the use of imagery in climate change. For example, the emotions that images can stir can be counterproductive to action in response to climate change, instead making people apathetic. Another drawback is that images

are at once complex and reductive. Images can useful for creating easily remembered multifaceted messages, but have also been accused of 'simplifying' the issue of climate change (DiFrancesco & Young 2011).

While a range of imagery has been used to depict climate change, it has been found that images outside those of the realm of science depict mostly climate change impacts and causes, and that images of mitigation and adaptation are less frequent (O'Neill & Smith 2014). Unsurprisingly, these two types of visual discourses (that of impacts and causes vs mitigation and adaptation) have a different effect on the audiences they are shown to, and also pose distinct problems to the communication of climate change.

The first group of images (that focuses on impacts and causes of climate change) make viewers feel hopeless and overwhelmed (O'Neill et al. 2013; O'Neill & Nicholson-Cole 2009). These images typically include representations of drought, flooding, extreme weather events and animals and people in distress. While these images bring home the magnitude and importance of climate change, they frequently employ fear-laden narratives, which as previously shown, are not always effective to motivate action. The second group of images provide an alternative to the fear narrative, for exampling including images of renewable energy (Manzo 2010). While such images demonstrate actions that can be taken against climate change, they can diminish the seriousness of the problem (O'Neill & Nicholson-Cole 2009). A solution suggested by Nicholson-Cole (2005) has been for media to use images of local impacts or actions against climate change, thus making climate change personal. However, O'Neill & Hulme (2009) found that this solution is ineffective in communicating climate change in that it does not frame climate change as a global problem.

Not all images of climate change are photographic but photography is a medium that has been privileged in climate change imagery (Doyle 2009). For Hansen and Machin (2013) and Doyle (2009) photography occupies this place of honour because in a visually-orientated world, seeing is equated with knowing, and therefore photography makes the impacts of climate change real. Although photographs have a challenged reputation as being impartial portrayers of reality, they still hold a "particular power" and "authenticity" exceeding that of man-made images (O'Neill 2013). They have triumphed over "simulated images" that "failed to alert governments and the public" to climate change (Doyle 2009: 295). Not only does photography have great claims to being an objective witness of truth, it is a powerful and influential medium: a ''determining

influence in shaping what catastrophes and crises we pay attention to'' (Sontag cited in Peeples 2011: 374). Photography is therefore useful in drawing attention to the issue of climate change and providing 'evidence' of its impacts, something useful for organisations such as Greenpeace who seek to provide evidence of climate change. When giving the example of comparative images of melting glaciers used in climate change campaigns Doyle (2009: 294) says that their "evidential force" has made what was an unheeded or disregarded issue of climate change, "real". This quality of authenticity in photography not only lends itself well to providing proof of climate change but also adds an extra jolt to aestheticised images of climate change, that is, images that have been purposely made to be visually striking and beautiful. Peeples (2011) writes that such images heighten awareness of the fragility of ecosystems and the hazards they face. In cases where the use of photography is to motivate action, such as with NGOs, the aesthetics are important to their efficiency. The effect of photography here is that it makes damage due to climate change "all the more shocking" (Doyle 2007: 132).

Despite its power as a communicational tool, photography has significant limitations in the communication and representation of climate change. One of these is the problem of truth and subjectivity that haunts the discourses of photography. In writing on climate change and photography Nicholson-Cole (2005), Doyle (2007, 2009), Joffe (2008), Hansen and Machin (2013), O'Neill (2013) and O'Neill and Smith (2014) all draw attention to the long-standing misgivings regarding photography's claims to objectivity and truth. Although we can recognise that the photographic image is "true in the sense (physical or electronic manipulation aside) that it holds a visual trace of the reality the camera was pointed at" (Harper cited in Prosser 1998), photographs are "normative statements" that should be viewed as portraying "particular version[s] of reality framed in a particular way" (O'Neill & Smith 2014: 83; 74) and not "value-free" (Nicholson-Cole 2005: 261). Perceptions and trust in photography have played out in the arena of climate change both to the advantage and detriment of climate change communication. For example, Ziser and Sze (2007) document such a case in the use of a photograph of hungry-looking polar bears 'stranded' on a piece of ice, which was used to accompany a text on the effects of climate change. The photograph, it turns out, was actually of healthy polar bears using the iceberg as a base for fishing, and had been cropped in such a way that it looked further away from land than it actually was. Even though the "underlying ecological point of the image was… sound" (polar bears are going hungry and drowning due to the effects of climate change on their environment), the photograph was used by climate change denialists to undermine the legitimacy

of climate science because of its inaccurate selection and indiscriminate cropping (Ziser & Sze 2007: 389).

There is also a temporal quandary that undermines the efforts of photography in climate change representation. If the "essence of a photograph, which differentiates it from other forms of representation, is its relationship to time" (Cronin cited in Prosser 1998), then it is worth considering the relationship between time, photography and climate change. For Doyle (2009) the element of time in photography is the medium's biggest obstacle in communicating climate change. She writes that once climate change is photographed, or, as it could be argued, we believe we are looking at photographed climate change, "the future has been made present and authenticated as real while simultaneously being relegated to the past" (Doyle 2009: 289). The danger here is that photography "cannot visualise the future as a present threat" (Doyle 2009: 295) and thus diminishes the urgency of the problem. Nicholson-Cole (2005) agrees with this and questions the validity of using photographs to represent the present and the future. Another issue related to photography is the appropriateness of using photography to represent climate change because photographs as "fixed record[s]" of "particular moment[s]" in time are at odds with the "temporality of climate change as an ongoing and future environmental condition" (Doyle 2009:289). Manzo (2009) provides an opposing viewpoint, arguing that even though there are currently difficulties in representing present climate change, climate futures can, and are being, communicated through photography, providing vital warning signs of what might come to pass.

Despite the problems discussed in this section, photography remains a powerful and useful tool to communicate climate change, providing evidence and memorable imagery. Having discussed many media and methods that channel climate change imagery, attention will now turn to the literature that concerns the visual imagery of the main subject matter of this dissertation: the IPCC.

3.6 Research on the IPCC and Visual Imagery

Research abounds on one area of IPCC imagery: its graphs and diagrams. These are by far the area where the IPCC has generated the most imagery and thus they are included in this literature review. The interest in these scientific images is, understandably, mostly scientific and concerns their accuracy. However, there are studies that look beyond their scientific merit and meaning, seeing them as powerful images with agency beyond the confines of the scientific community,

that have come, through media exposure, to "constitute culturally shared symbols" of the abstract issue of climate change (Nerlich & Jaspal 2014: 268). As Mahony and Hulme (2012) put it, such graphs and diagrams have "material mobility" (75). Certain graphs have gained iconic status and it is these graphs that have gained attention from scholars seeking to explore their cultural meanings. Liverman (2009) identifies two scientific images that have become iconic: the IPCC's (2001) "Burning Embers" and the "Tipping Points" (2001) map. To these can be added Mann's "Hockey Stick" (1999) graph, also published by the IPCC (2001) which has been identified as "iconic" by O'Neill and Smith (2014: 29).

Mahony and Hulme (2012:75) study the IPCC's 2001 diagram 'reasons for concern,' which is more commonly known as "Burning Embers," writing that the attention it has gained has made it a "prominent visual element in the climate change debate". Burning Embers is a "powerful" image that, in red, orange and yellow (the colours that partly give it its name – the other is the simmering danger it warns of), seeks to illustrate the risks of climate change (Liverman 2009: 279). While Mahony and Hulme (2012) acknowledge the clout of photography, they write that graphical representations of climate change are also powerful as they provide tools for understanding climate change and the risks and danger of climate change beyond representations of its impacts.

Turning to the subject of non-scientific imagery and the IPCC, Nerlich and Jaspal (2014) studied the images that an IPCC report generated in newspaper reporting[6]. Their study concerned the visual news reporting and reception on the IPCC's 2011 draft report on extreme weather and climate change adaptation. They found, like others (for example Hulme (2009) in a textual analysis of the same subject), that the reporting of the IPCC was not congruent with what was in the report, with the 'matter-of-fact' IPCC reports being reported on with sensationalist images of fear and vulnerability. Nerlich and Jaspal (2014) come to the conclusion that the use of these images

[6] There is debate on the influence and prevalence of the IPCC in the press. Peters and Heinrichs (2008) stand mostly alone when they claim that climate change is "largely represented in the media in accordance with the basic tone of the IPCC reports" (Peters & Heinrichs 2008: 22). On the opposite end of the scale researchers such as Doulton and Brown (2009) find that with climate change "Scientific papers [such those of IPCC]… are rarely used as the basis for articles" (Doulton & Brown 2009: 200). Pidgeon (2012) agrees, writing that "Politicians, the media [and] major companies…are now often far more prominent today than scientists in communicating with people" (Pidgeon 2012: 943). Indeed, Ziser and Sze also seem to conclude that the influence of the IPCC is minimal when they write "polar bear plush toys are probably as effective at persuading carbon users to change their ways as are copies of the comprehensive report from the International Panel on Climate Change" (Ziser & Sze, 2007: 389). Doyle (2007) on the other hand maintains the scientists have been unusually involved (as compared with other environmental issues) and outspoken in publicising climate change compared with past environmental issues. She maintains that from the beginning scientists have played a crucial and pivotal role firstly in drawing attention to the existence of climate change and then legitimizing and authenticating its risks (Doyle 2007:134). Her evidence shows that the important environmental group, Greenpeace's imagery have development in accordance with evidence published in the IPPC (Doyle 2007)

may be undermining efforts to avoid inaccurate communication of climate change impacts. Nerlich and Jaspal's (2014) study, as well as work on the IPCC's scientific diagrams, highlight a gap in the literature on the non-scientific images created by the IPCC itself. Other gaps in the literature of climate change visualisation are addressed in conclusion of this literature review.

3.7 Gaps in the literature

The broad themes and issues that have been researched in the area of climate change visual discourse have been discussed and already some of the gaps have been identified such as the weighting of studies towards news-media and the lack of attention to the images being generated by the internet. Additionally, there is a lack of cross analysis or synthesis across mediums and regions. Most studies are region specific, looking at only one country, and though there are studies that have attempted to be more cross-national (O'Neill 2013; O'Neill et al. 2013), these have not included developing countries, but have instead focussed mostly on North America, England and Germany[7]. Analyses comparing climate change imagery across mediums is also lacking (the exception being O'Neill and Smith (2014) who provide a more thorough overview). This limited nature of the research has obstructed a comprehensive and balanced picture of how climate change is being represented visually. These gaps are apparent in textual studies of climate change discourse too, but amplified because of the small body of work done in this field. The many calls for more research on the topic have begun to be answered with Hansen and Machin (2013) finding much progress in the field has been made in recent years. However, research in this area remains, if not fragmentary, then scarce.

4. Methods

4.1 Research Site

The research material for this dissertation consists of the cover images of IPCC reports, from first reports in 1990 to the latest ones of 2014. The IPCC has released five assessment reports (2013/4, 2007, 2001, 1995, and 1990) each consisting of the reports from each of the three Working Groups. The first Working Group (WG I) concerns the science of climate change, providing a scientific assessment of the latest climate science. Its topics cover changes in the atmosphere, on

[7] Lester and Cottle 2009 are the exception to this, including the United Kingdom, United States, Australia, South Africa, India, and Singapore in their study on climate change imagery in television, providing a useful coherent global picture.

land and in the ocean. Using modelling, satellites and climate projects, it incorporates historical and paleo-climatic data to provide a comprehensive synthesis of the latest scientific findings on climate change. The second Working Group (WG II) looks at the socio-economic dimensions of climate change, assessing vulnerability and adaptation options. The third Working Group (WG III) looks for short and long term solutions to managing the problems of climate change through economic and policy options. Through the lens of a cost and benefit analysis WG III research investigates mitigation through the prevention of increased greenhouse gas emissions. In addition to the Working Group assessment reports, the IPCC periodically releases Synthesis Reports (that summarise the research of each assessment), Special Reports (that cover specific issues), and Supplementary Reports (that contribute to the assessment reports). Translated versions of the IPCC reports are available on their website in a number of languages. Most of these translations used the same covers as the originals or no cover images at all. Translations with covers that were different to the original report covers were included. The rationale in including the translated reports' covers was that by being on the IPCC website they are sanctioned by the IPCC. The number of covers examined per category of the IPCC reports is demonstrated in Table 1.

Table 1. Number of covers examined per category of IPCC reports.

Report Type	Number of covers
Working Group Reports	17
Synthesis Reports	8
Special Reports and Supplementary Reports	12
Total Cover Images	37

In terms of access, the IPCC reports are available for free downloading on their website. However, access to the report covers is not consistent as the PDFs of reports frequently do not include covers as indicated by the thumbnail images on the website. Sometimes the downloaded versions for printing had the covers available and at other times not, in which case other internet sources were used or covers were scanned from printed versions of the reports to get high-resolution examples. Cover images were requested from the Cambridge University Press, the publishers of the IPCC reports, but they no longer provide cover samples.

While the concept of science, encapsulated by Working Group I, requires little explanation, it is worth briefly considering the central concepts of the other two reports (adaptation, mitigation

and vulnerability) as they are understood in the context of climate change. Adaptation and mitigation are the two central response options for the adverse consequences posed by anthropogenic climate change to humans and the environment (Füssel 2007). Adaptation concerns actions that can be taken to reduce risk (by preparing for risk but also by exploiting any beneficial opportunities to be gained by climate change), while mitigation concerns the actions that will limit further climate change by reducing greenhouse gas emissions, which are the main cause of climate change (Klein et al. 2005). Vulnerability is defined by the IPCC (McCarthy et al. 2001) as the level of susceptibility of social and environmental systems to manage or cope with the effects of climate change. The concepts of adaptation, mitigation and vulnerability are interrelated. For example, one of the ways vulnerability is measured is by the adaptive capacity (Smit & Wandel 2006) and some actions against climate change are not distinctly mitigative and adaptive, but a combination of both.

4.2 Methodologies

To meet the first objective of this dissertation, which was to document and investigate the manifest (denotative) and latent (connotative) content of the IPCC covers images, content and thematic analyses were used. Briefly defined, manifest content is directly observable while latent content requires interpretation to be decoded (Ball & Smith 1992). The second objective was to compare and contrast the IPCC cover images to the larger context of climate change imagery. This was done by consistently comparing the results and observations of this study to the results of others throughout the analysis. Discourse analysis was used in addressing the third objective which concerned the IPCC's negotiation of communicational and representational issues in the visual communication of climate change.

Content analysis provides the most straightforward way to understand a group of images by identifying their denotative (or 'surface') content. At its most basic level it involves counting the "obvious, palpable, self-evident" features of an image according to well-defined categories (Ball & Smith 1992: 3). The use of content analysis allowed for identification of the images used in the IPCC reports and their frequencies. Content analysis has proven to be a popular method in the research relating to images of climate change with most studies intending to identify trends in the visual data. In most studies it was used in combination with another form of analysis such as thematic analysis or critical discourse analysis which allowed for more in-depth analysis (e.g. DiFrancesco & Young 2011; Smith & Joffe 2009; O'Neill et al. 2013).

There are a number of concerns with content analysis which is why few researchers have used it as their sole method. Rose (2012) and Bell (2001) identify some of these problems. Firstly, creating "exhaustive", "exclusive" and "coherent" coding categories needed for content analysis is exceptionally difficult (Rose 2012: 91). Secondly, it has a tendency to overlook subtle or unexpected categories, and has no way of dealing with what is left out of the picture[8]. Thirdly, there is a tendency in content analysis to find significance in numbers, with researchers making conclusions that higher frequencies of certain categories imply greater importance. In addition to these problems is the fact that content analysis does not allow for understandings of how images interact and construct visual narratives beyond their surface content, and does not leave space for the manner of the presentation and context of the counted objects, which can significantly alter meanings (Scott 1994). While it is not necessarily problematic, it must also be noted that even though content analysis makes the claim to be a quantitative method, there are value judgements taken at each step of the method and it thus frequently lends itself to a qualitative research approach (Rose 2012; Bell 2001). With this subjectivity, and the other theoretical constraints inherent in content analysis outlined in this paragraph in mind, the exacting process of content analysis as outlined by Bell (2001) and Rose (2012) was adapted and modified to this study. This included using an inductive coding scheme, where further categories could be defined and subdivided as the content analysis progressed (following the reasoning of Smith & Joffe 2009). This allowed for unanticipated themes to materialise and reduced some of constraints of content analysis, allowing for a point of departure for the subsequent qualitative research that followed.

A visual thematic analysis followed the content analysis to explore patterns and themes found within the data as identified by content analysis. This qualitative research method allowed for a comprehensive evaluation of the connotative (especially symbolic) content of the images. Many of the other studies on the visualisation of climate change had large amounts of data, yet the quantity of images in this study was smaller. Joffe and Yardely (2004) raise questions as to the legitimacy of results gained through smaller data samples and suggest thematic analysis as a solution to the problems arising from this. The themes decided upon were defined by the different themes explored by the three Working Groups.

[8] For example, DiFrancesco and Young (2011) found that polar bears (an icon of climate change they expected come across often) appeared rarely in the images they were studying but when they did appear, were more powerful and prominent images.

Content and thematic analysis do not strictly allow for discussion of what is not present in the data and intertextuality.

In reaching the second and third objectives discourse analysis was used. Discourse analysis allows for investigation, which concerns text (or image in this case), intertextuality and context (Rose 2012). Based on the theories of Foucault (1972), discourse analysis fosters understanding in the way meanings are connected in certain discourses (such as the visual discourse of climate change) and their power relationships.

4.2.1 Content Analysis: Coding Categories and subcategories

Six coding categories were decided upon in. Some were divided into further groups when necessary for the thematic analysis. The results were also tabulated to show the total for each category. Totals were also calculated under three themes: science; divided into themes of science, 'impacts, adaptation and vulnerability' and 'mitigation' of climate change. Unlike other studies of this type that had to create codes for identifying which images represented issues such as vulnerability or climate impacts, the IPCC reports were already defined by the IPCC Working Group themes. All the covers were grouped according to which Working Group topic the subject of the report aligned with. The supplementary and special reports were grouped along with working groups under these themes. For example, the Special Report "*Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*" (2012) was grouped with the Working Group II themes of 'impacts, adaptation and vulnerability.' The synthesis reports were grouped separately. The medium of the images was also coded under three codes: photography, collage and illustration. The codes of photography and illustration are self-evident. Collage was defined as two or more images appearing together on a cover.

4.2.2 Definitions of Coding Categories

a) The whole world

These images included cartological (illustrated) world maps and images of the earth from space. Two extra categories were devised to accommodate 'collaged globes' (as seen in Fig. 1) where more than one picture of the earth was made (or insinuated) and 'composite globes' where collage was used to create an obvious representation of a globe (as seen in Fig. 2).

Figure 1. Examples of collaged globes: (left to right) Working Group I: The Physical Science Basis (2007); Supplementary Report: The IPCC 1990 and 1992 Assessments (1992)

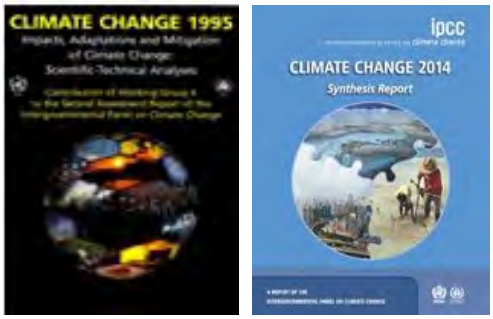

Figure 2. Examples of Composite globes: (left to right): Working Group II: Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses (1995); Synthesis Report (2014).

b) Adaptation, Mitigation and Renewable Energy

This category was defined by images that showed mitigative and adaptive measures or technologies taken to moderate climate change such as renewable energy or sustainable farming.

c) People

People were coded for whether they were represented as wealthy and western or poor and from an undeveloped country. They were also coded for the types of activities they were performing of which three were identified: 'leisure', 'farming' and 'carrying water'.

d) Weather

It was not difficult to discern the presence of weather in many of the pictures, which almost always featured outdoor scenes. However, weather was only coded for when it was the main subject of the image. For example, as seen in Fig. 3 WG I (1995) was included in the weather code as the dramatic storm in WG I (1995) makes weather the main subject of the picture. It was therefore coded as 'storm'. Whereas the flat sea and sky in *The Supplementary Report to The IPCC Impacts Assessment* (1992) meant it was coded as 'calm.' Flooding images were defined by images where water had obviously risen. Another category was coded for drought and heat. This included images of desert and cracked earth such as *Special Report: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (2012) and WG II (1990).

Figure 3. Coding for Weather (from left to right): Working Group I: The Science of Climate Change (1995); The Supplementary Report to The IPCC Impacts Assessment (1992); Special Report: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (2012); Working Group II: Impacts Assessment of Climate Change (1990)

e) Landscapes

Landscapes can be defined as much by geographical as by sociocultural phenomena (Greider & Garkovich 1994). While keeping in mind the symbolic nature of environments, landscapes in this study are defined by their geographical characteristics and were divided between physically different types of landscapes such as cityscapes or polar regions.

f) Symbols of nature: wildlife and the environment

The concept of nature is a complex and constructed one (Hitt 1999) but for the purposes of this analysis nature was defined as that which was living but non-human, such as animals and plants.

4.3 Limitations and Ethical Considerations

The case study approach is useful for "exploratory, descriptive or explanatory" research strategies (Schell 1992: 11), and as such is fitting for this research in describing and interpreting the IPCC cover images. However, the use of a case study could seem to contradict the aim which is to make some generalisations of the IPCC as a whole: the cover images are not by any means exhaustive of the visual imagery generated by the IPCC beyond the graphs and other scientific images found in its reports. It has also recently added videos and slideshows to its visual repertoire. A preliminary study of these videos and slideshows demonstrate that they are quite different to the images found on the IPCC covers, and as such this dissertation cannot make generalisations about the IPCC's non-scientific visual imagery solely by its report covers.

There are numerous studies on the ethical use of photographs. Mostly these are concerned with the taking of photographs and the photography of human subjects and have an anthropological slant (Crowe 2003; Wiles et al. 2008). As this study did not require taking photographs but rather used secondary sources, this was not considered to be an ethical concern. Rose (2008) also questions the wisdom of reproducing examples of images that repeat negative views of people and places. While the research did find problematic images of inequality, these were reproduced with explanations of these inequalities and discerned to not be of such an extreme nature so as to warrant their not being reproduced.

Williams (1992) raises questions as to the role of graphic design in publications, asking whether it can be part of the message or is mere decoration. His conclusion is that graphic design does influence the way in which documents are received and they are an important means of communication. While this study considered the images used on the covers and the meanings of the text, it did not consider other elements of graphic design, which a preliminary investigation showed to become sophisticated in terms of consistency and branding. Thus it is acknowledged that important elements of unity, balance and colour as well as subtle power dynamics and meaning-making introduced by graphic design decisions are beyond the scope of this mini-dissertation.

A final note to conclude this methodology section is a point raised by Rose (2008) concerning the presentation of research that mainly refers to the visual is whether to include images in the text. It was found that most of the studies on the visualisation of climate change did not include images, but that they were valuable additions to the text when they were included. While this study is in no way a visual essay (in the manner of say, Berger's 'Ways of Seeing' (1977)), and images do not stand alone without explanation, further than simply providing an image of the cover being discussed visual arguments are made and emphasise those made in the text through juxtaposing images.

All covers referred to can be found in Appendix A.

5. Analysis and Results

The IPCC covers were found to have used a variety of mostly photographic imagery. The content analysis (The findings of which are illustrated in Table 2) showed that it was mainly through pictures of the world and human imagery that the story of climate change was being told. This study commences by describing the challenges in the analysis and how they were proceeded upon. Then the findings regarding subjects, themes and mediums of the data base are discussed. Next, two thematic areas identified in the analysis are further investigated. Most striking was the absence or infrequency of familiar subjects in climate change visual discourse such as the celebrated melting icebergs and polar bears, two common and powerful tropes in climate change imagery (Doyle 2007). Ice appeared as a main feature on only two covers, and one polar bear made a minor appearance as part of a collage. As will be explored later, even when images had the same denotative content as commonly identified climate change imagery, their connotative content was different. This is discussed in the final chapter.

Numerous challenges were presented during the content analysis. One was the requirement for coding categories to be exclusive. As many subjects and mediums overlapped, this was hard to achieve. The presence of collages created the biggest complications in this regard as they brought together many subjects and mediums. Thus a decision was taken that multiple categories could be applied to single images. For example, a collage might include photographs and illustrations and as such was coded as collage, photography and illustration. Collages also represented a challenge in that a decision needed to be made regarding whether to count the images they comprised into categories or whether to simply view them as part of a collective. The question was whether small images in the collages should be awarded equal importance in categories as the same images that took up a whole page. The decision was made to include them in the coding as separate images but to mention in the text when an image of a collage was being referenced or included. This question of 'weight' or importance of the issue was also raised when considering the translated versions of the covers. The question was whether they should be seen as secondary to the original versions. It was decided that they would be given equal importance as they were included on the IPCC website and therefore can be considered to be IPCC 'sanctioned.' Lastly, the problem already identified in the literature on content analysis (Rose 2012), that it does not allow for analysis of what is not presented, was encountered with the significant absence of conventional climate change imagery, though this is dealt with in the discourse analysis

discussion. Overall, the process of analysis in this study emphasised the "messy" nature of visual research where data defies classification and impartial interpretation (Lynn & Lea 2005: 213; Pink 2001). This exploration now turns to the findings of the content analysis as illustrated in Table 2.

Table 2. Content Analysis of Images

Image subject		Science	Impacts, Adaptation & Vulnerability	Mitigation	Synthesis Reports	Total
Globes		3(27.3%)	3(33.33%)	0	6(75%)	**12(32.4%)**
	Earth from Space	2(18.2%)	1(11.1%)	0	3(37.5%)	**6(16.2%)**
	Collage	1(9%)	1(11.1%)	0	3(37.5%)	**5(32.4%)**
	Composite globes	0	1(11.1%)	0	1(12.5%)	**2(5.4%)**
	World Map	1(9%)	0	0	2(25%)	**3(8.1%)**
Adaptation and Mitigation		2(18.2%)	2(22.2%)	5(55.6%)	0	**9 (24.3)**
People		3(27.3%)	5(55.6%)	3(33.3%)	2(25%)	**13(35.1%)**
	Western/Developed Countries	2(18.2%)	1(11.1%)	2(22.2%)	1(12.5%)	**6(16.2%)**
	Undeveloped Countries	1(9%)	3(33.33%)	1(11.1%)	1(12.5%)	**6(16.2%)**
	Activity: Farming	1(9%)	2(22.2%)	1(11.1%)	0	**4(10.8%)**
	Activity: Leisure	1(9%)	1(11.1%)	2(22.2%)	0	**4(10.8%)**
	Activity: Water carrying	1(9%)	1(11.1%)	0	1(12.5%)	**3(8.1%)**
Weather		6(54.6%)	5(55.6%)	1(11.1%)	3(37.5%)	**16(43.2%)**
	Calm	4(36.4%)	1(11.1%)	1(11.1%)	1(12.5%)	**8(21.6%)**
	Storm	2(18.2%)	2(22.2%)	0	0	**4(10.8%)**
	Flood	1(9%)	0	0	1(12.5%)	**2(5.4%)**
	Drought/heat	2(18.2%)	2(22.2%)	0	1(12.5%)	**5(13.5%)**
Landscapes		5(45.5)	4(44.4%)	2(22.2%)	3(37.5%)	**13(35.1%)**
	Ice/Polar	3(27.3%)	1(11.1%)	0	2(25%)	**5(13.5%)**
	Tropical/ Warm	1(9%)	1(11.1%)	0	0	**2(5.4%)**
	City	1(9%)	0	2(22.2%)	0	**3(8.1%)**
	Sea	2(18.2%)	2(22.2%)	0	0	**4(10.8%)**
Symbols of nature: Wildlife and the Environment		2(18.2%)	1(11.1%)	2(22.2%)	2(25%)	**7(18.9%)**

As seen in Table 2 the themes ('Science', 'Impacts, Adaptation and Vulnerability', 'Mitigation' and 'Synthesis Reports') showed that there were differences in the spread of content in the groups. For example, 'Mitigation' had a literal pictorial range, showing mostly images directly related to mitigation such as renewable technologies, while in the 'Science' group more metaphorical images were used, with the frequent use of images of globes. Some covers seemed misplaced in terms of these groups. For example, the dramatic storm over a city in the 1995's WGI, which covers the science of climate change, might be better understood in terms of climate change if delegated to the group which covers impacts, adaptations and vulnerability. Despite examples such as this, these groupings do give an indication of how the IPCC understands these matters and allows for study of image/language interactions.

Table 2 shows that in the science group there was frequent use made of images of globes, specifically images of the earth from space. There was also an emphasis on the atmosphere in this group, as it includes three sunsets, a storm, a bright blue sky (Aviation and the Global Atmosphere: 1999) and in one of its globes the curve of the earth from space is detailed with the angle being such that there is an emphasis on its thin blue atmosphere. The images on these covers seem to be engaged in the effort of providing a location for climate change (and climate change science perhaps), indicating its 'ground zero,' the atmosphere. In the discussion of the thematic analysis it is argued that these globes, which are also shown to be prevalent in 'Impacts, Adaptation and Vulnerability' (though in composite and collage form) and the Synthesis reports denote notions of globalism and international unity.

The second grouping on impacts, adaptation and vulnerability frames the issue as a human one and indicates to the viewer that it is mostly poor from undeveloped countries that will be impacted by climate change. It made reference to vulnerable and threatening (or threatened) environments such as desiccated landscapes. There was also a departure from the fear narrative so pervasive in other climate change imagery. Blatant images of vulnerability as identified in the literature were largely absent. Images of flooding, extreme weather and animals or people in distress only made minor appearances in the collages. More subtle images of vulnerability were detected, but these required tacit knowledge to be interpreted as such. The choice was made to use people, not polar or melting landscapes to represent potential victims of climate change, explaining the lack of 'nature' images. Reports on and relating to, "Mitigation of Climate Change" were mostly literal illustrations of mitigation efforts and solutions such as examples of renewable

energy, while the synthesis reports mainly comprised images of the whole world (globes and world maps) and collage, creating visual summary of the various facets of the reports.

In all these groupings there were images that not only did not fit in easily with the themes of the groupings, but were not understandable representations of climate change, for example the peaceful city in WGIII 2014. DiFranceso and Young (2010) found that when in conjunction text and images on climate change often did not relate to each other instead "presenting multiple and sometimes even competing narratives" (532). The IPCC text-image relations do not show strong clashes, yet nonetheless are not in complete agreement. The dampener on blatant competing narratives is the banality of the IPCC images (that are safe and non-controversial choices) leading to more subtle competing narratives. This can be seen in the *Supplementary Report to The IPCC Impacts Assessment* (1992) where a tourist suntans in a pleasant tropical scene. The image is not offensive yet does raise questions about how it relates to the impacts mentioned in the title. As this example suggests, more often than not, it is not so much a conflicting narrative as a confusing one. To illustrate, in WG III (2014) we see a non-descript city. Nothing about the city speaks to the subject of the report (mitigation), but neither would it be much more apt with any other report. It is impossible to know what the image is suggesting about mitigation. Is it saying that cities are part of mitigation? Or perhaps is it saying that cities are the cause of the problems that now need mitigating? The image gives us no answers either way. It signifies 'city' but is otherwise non-descript and the reasoning behind its choice remains unclear.

Table 3: Content Analysis of Mediums

Medium	Science	Impacts, Adaptation & Vulnerability	Mitigation	Synthesis Reports	Total
Medium: Photography	10(90.9%)	8(88.9%)	8(88.9%)	6(75%)	**33(89.2%)**
Medium: Collage	2(18.2%)	2(22.2%)	2(22.2%)	5(62.5%)	**11 (29.7%)**
Medium: Illustration	1(9%)	1(11.1%)	1(11.1%)	3(37.5%)	**5 (13.5%)**

As seen in Table 3 in terms of medium, the covers were mostly photographic. Most of the covers featured one photograph, while others featured collages made up of multiple photographs. There were only three covers that were purely illustrative. The dominant use of this medium is in line

with the identification of photography as a significant medium in the visual communication of climate change. In this use of photography, the IPCC is presented with several representational problems. Scientific graphs and diagrams on climate change can be powerful images showing the risks and consequences of climate change. However, these are not used on the IPCC covers in this way. The IPCC only turns to one image where such data is applied (albeit presented without an explanation for what it illustrates, stripping it of meaning) on the Second Assessment Synthesis report of (1995). Another cover that could potentially be understood as a scientific image illustrates the process of carbon capture and storage. This process would be impossible to physically photograph or represent photographically as much of the process happens underground and happens in many complicated steps. It is used not to indicate danger but to provide a literal illustration of something that is hard to photograph. Graphs and diagrams have been salient in the communication of climate change, demonstrating the cumulative nature of these phenomena as evidence and sometimes used quite powerfully. They can, however, be hard to understand, inaccessible to the lay person, and scientifically abstract or distancing (O'Neill & Nicholson-Cole 2009; DiFrancesco & Young 2011). Perhaps the absence of these potentially powerful scientific images can be explained by this, but due to the scientific audience of the IPCC this is unlikely.

6. Discussion

Two broad and competing themes emerged through the analysis. The first analysis engages the use of images that show the entire world and the values that these images promote. The second analysis demonstrates how images of people challenge these values. The exploration of these themes goes beyond the fact that images of the whole planet and people were the categories that had the highest frequencies - the categories of 'collage' and 'adaptation and mitigation' are integrated and understood in the context of these themes.

6.1 One Earth, Whole Earth and 'Banal Globalism'?

There appears to be a strong dedication to images of global unity on the IPCC covers. This is suggested by the proliferation of images that depict the whole earth: globes, world maps and composite globes appear on 31.5% of the covers. Another sign that shows commitment to an incorporative stance is the use of collage, which can be seen on 28.9% of the covers. Given the international standing of the IPCC and the long history of such images in the environmental

movement (Cosgrove 1994), the presence of such images is not unexpected and may seem to be self-evident, with these seemingly neutral and inclusive images fulfilling the obligations of the IPCC to be representative. However, many studies have shown (e.g. Cosgrove 1994; Lester & Cottle 2009; Manzo 2009; O'Neill & Smith 2014) that images of these types are subject to multiple, if not opposing, understandings. This section engages with these understandings.

Cosgrove (1994) writes that there are two ways of understanding images of globes. The first is a "One World" reading in which the image is understood as a "geo-political" conception that represents the "spread of specific socio-economic order across space" (Cosgrove 1994: 289; O'Neill & Smith 2014: 74). The second is the "Whole-Earth" reading, widely taken up by the environmental movement, which views the images as symbols of spirituality and interconnectedness. As shall be demonstrated, the IPCC covers exhibit examples of both the "Whole-Earth" and the "One World" phenomena.

An example of the "One World" phenomena can be found at play on the cover of WGII (2001) which uses NASA's "Black Marble" image. As its name suggests, it is a photograph akin to Blue Marble but instead shows the earth at night. Showing an impossible view of a cloudless Earth, Black Marble is a composite of photographs, aimed at showing the lights of human inhabited areas. Unlike the Blue Marble (a photograph of the Earth from space taken during the day), where borders are erased and the striking natural features of Earth are accentuated, in the Black Marble, humans take visual priority. Countries' borders can almost be discerned with the condensed radiance of the lights marking out a richer, more developed west with the poorer south that is all but obscured in darkness (the underdevelopment of Africa, the proverbial 'Dark Continent,' is especially marked).

The image illuminates a world of dramatic inequality. Another 'one-world' reading can be had of the *IPCC Second Assessment Synthesis Report* (1995) which features a map of the world in which areas of the continents are shaded in different colours. It is not clear what is being demonstrated (one could guess at vulnerability, land-surface temperature or perhaps differentiations in vegetation cover), but what is clear is that we are looking at a world that is geologically, environmentally, socially and/or politically divided. We are seeing the entire Earth but we are not seeing it as 'whole.' We now turn those IPCC covers that promote the 'Whole-Earth' sentiment.

The 'Whole-Earth' use of the globe is readily apparent in many of the IPCC cover images. Despite the variety presented in the globes they all speak back to two iconic photographs: "Earthrise" (NASA 1968) and "The Blue Marble" (NASA 1972), taken on the Apollo 8 and 17 missions respectively. The impact, power and early (and still relevant) understanding of these first[9] images of the Earth from space are written about in the Brundlandt Report (1987), a pivotal environmental text:

> In the middle of the 20th century, we saw our planet from space for the first time. Historians may eventually find that this vision had a greater impact on thought than did the Copernican revolution of the 16th century, which upset the human self-image by revealing that the Earth is not the centre of the universe. From space, we see a small and fragile ball dominated not by human activity and edifice but by a pattern of clouds, oceans, greenery, and soils. Humanity's inability to fit its activities into that pattern is changing planetary systems, fundamentally. Many such changes are accompanied by life-threatening hazards. This new reality, from which there is no escape, must be recognized - and managed.
>
> Brundlandt Report (1987: 11)

It is easy to understand the appeal of the globe as portrayed in Blue Marble (and subsequent images like it[10]) for international organisations like the IPCC as it provides an "incorporative vision of global human mission" and a reference to "universal peace and human goodwill" rather than of territorial control (Cosgrove 1994: 281, 284). It is the epitome of global equality and unity. However, not one cover of the IPCC features this simple and powerful version of unity. Instead, when 'blue marbles' do appear, they are part of collages and never appear singularly as the lone Earth from space. It would seem that the image of The Blue Marble, renowned as it is for being powerfully inclusive, is not enough. As seen in Fig. 1 instead of the singular globe, globes showing different angles of the Earth are presented, each showing a different continent. This symbol of unity is escalated to a new level through duplication revealing a highly incorporative agenda. This

[9] The NASA photographs are among the first images of the Earth from space, but not the very first. They are certainly the most striking and widely disseminated with earlier images (largely unknown to this day) being blurry and mostly in black and white.

[10] Only one, the Catalonian translation of Synthesis report (IPCC 2007) features NASA's famous original photograph of the Earth from space, identifiable from the tell-tale Nike-like swoosh of clouds under the African continent, though in a modified version, positioning it as an object sitting on a surface like a ball, casting a reflection. The others use more recent images of the earth from space.

escalation occurs similarly in the composite globes, previously identified, that invoke the unity and shape of the globe from space and in addition provide a kaleidoscopic variety of images that show the Earth as seen from Earth. This amalgamation also occurs in the 2001 Synthesis Report where four circles overlap, each one showing a different image: two women walking in a desert, a waterfall, a river delta from space and a small blue marble at the centre of the page.

The aspiration to global representation and inclusion is also evident in the use of (non-globe related) collage on other covers. As seen in the examples of the collages in Fig. 5 the images are either overlaid or neatly side by side.

Figure 5: Details of collaged covers: from left to right: *WG II (1995); Special Report:* ***Emissions Scenarios (2000);*** *Ukrainian Translation of WGI (2007*)

In these collages we see a mix of the causes (signified by traffic, dense crowds of people and industry), impacts (hurricanes, extreme weather, flooding, fires and drought) and solutions (windfarms). Occasionally they include images that could broadly stand for nature (butterflies, forests, snow-capped mountains). In all the collages the pictures used support each other as the idea is not to create contrast or controversy but to create a comprehensive whole. The use of collage supports the argument that the IPCC is aiming for a representative and inclusive visual angle on its covers. The use of collage also solves a representational problem in that it avoids the problem of reducing climate change to one issue or icon. Instead, it speaks to multiple aspects of the problem providing a balanced, integrated and inclusive picture, escalating the 'Whole Earth' in the same way as the collaged images of the globes discussed previously. This is further extended in the images where collage is used to compose globes (as seen in figure 2) as they demonstrate an additional layer of inclusion by moving between specific, earthly, practical concerns of climate change while also framing it as a global issue. Collage has not been put forward before as a possibly useful way to represent climate change but it shows promise in this

regard if used thoughtfully (DiFrancesco and Young (2011) highlighted a problematic collage that used irrelevant and decontextualised images).

7.2 Global Inequalities

The intention to be all-inclusive is betrayed by racial and socio-economic inequalities evident on the covers. The content analysis indicated that of the people represented on the covers there was an equal representation of western people and people from undeveloped countries. The content analysis also showed a roughly equal spread between the activities the people are performing, which were identified as farming, leisure and water carrying. A closer content analysis revealed that these activities were not equally spread. White westerners were shown to be at leisure: milling around and enjoying the sun (WGIII: 1995), relaxing on a beach (*The Supplementary Report to The IPCC Impacts Assessment:* 1992) or canoeing (*The Supplementary Report to The IPCC Scientific Assessment:* 1992). People from undeveloped countries were shown hard at work, either collecting water or farming. Their labour, performed without modern machinery or infrastructure is unsophisticated and unforgiving: a man hacks at a vast ground of cracked earth with a hoe (*Special Report: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation:* 2012), another ploughs a field with oxen (WG III: 1990). People carrying water are shown to have vast distances to cover through forbidding deserts (Ukrainian translation WGI (2007) and Synthesis Report 2001), or are weighed down by this hard task (WG II: 2007). To point out the problems in these representations, two cover images will be compared in the following analysis. These are the covers of WG III (2001) and WG II (Vol. 1 2014) (See Fig. 6).

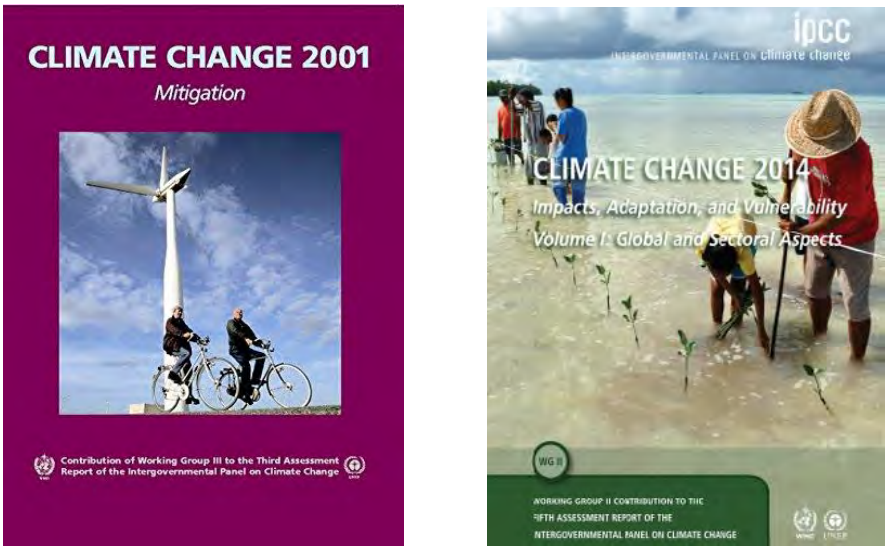

Figure 6. Comparison of western and developing world people: Working Group III: Mitigation (2001); Working Group II, Volume 1: Impacts, Adaptation, and Vulnerability (2014)

On WG III (2001) a white, western couple ride bicycles (it is the inclusion of the wind turbine behind them that directs us to understand their activity as a contribution to renewable energy and mitigation). On WG II (Vol. 1 2014) a small group of people stand ankle-deep in water as they plant mangrove seedlings (a technique used to strengthen natural sea defences against the effects of climate change). Both these images are meant to show people engaged in efforts to combat or adapt to climate change but do so in very different ways.

Although the turbine and the context of the cover of the mitigation Working Group direct us to read the couple's cycling as a mitigative activity, it instead reads as leisure as the couple are grey-haired, perhaps retired and carrying nothing with them (i.e. this is not a commute to work). We are more likely seeing a pleasure ride than an active choice to not use a carbon-based form of transport. WG II (Vol. 1 2014) could be seen in a positive light as an example of people taking active measures to protect themselves in a beautiful environment. It is argued here that while that is partly the case, the image lends itself to a more negative interpretation especially in comparison to WG III (2001) and in the context of other IPCC cover images like it. In WG II (Vol. 1 2014) we see hard labour and can imagine the back-breaking nature of the task from looking at the man and women who demonstrate it in the foreground, focusing and bending over as they do so. That they are standing ankle deep in water suggests that there is less of a choice in their task as they are already at risk to climate-change induced sea-level rise. This element of risk is also indicated by the storm clouds behind the workers, while a gentler sky features in WG III (2001). Looking at these images together suggests that mitigation is a choice for the rich and a necessity for the poor. The camera angles in these two pictures also promote unequal power dynamics. WG III (2001) is shot from below so we have to look up at the couple. A higher camera angle means that the viewer looks directly down on people on WG II (Vol. 1 2014). These camera angles directly relate to power dynamics. A low camera angle gives the subject more authority, whilst a higher angle of the subject can make the subject look more vulnerable.

These images are not alone in their depictions of inequality, which manifest various forms throughout the covers (see Fig. 7). Working Group II (Vol. 1 2014) seems to show the most positive image of non-western people. In other images they are shown to be more vulnerable or disadvantaged, such as the small child dwarfed by the load of water he carries in WG II (2007), the man doing the brave but daunting task of breaking the earth of a large area (*Special Report:*

Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation 2012) or women carrying pots of water in the 2001 Synthesis Report.

Figure 7. The poor at work: (from left to right) *Working Group II: Impacts, Adaptation and Vulnerability* (2007); *Synthesis Report* (2001) (detail); *Special Report: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (2012)

Figure 8. The developed world at leisure: (from left to right) Detail from *Working Group III: Economic and Social Dimensions of Climate Change* (1995); detail from *The Supplementary Report to The IPCC Impacts Assessment* (1992)

Although all the westerners pictured are depicted at leisure (see examples in Fig. 8) their role in the construction of this narrative is not a passive one. They provide not just contrast but promote and contribute to the images of inequality with other narratives of western superiority. An example of this can be seen on *The Supplementary Report to The IPCC Scientific Assessment* (1992) cover (a detail of which can be seen in Fig. 9). We see figures in a canoe so small that their age, gender, race and financial status could only be speculated. However, there is something about the figure and the image as a whole that speaks to a 'type:' the heroic, white, male, polar,

scientist-adventurer (Bloom 2010). It certainly shares a visual DNA with images that explicitly show such images as illustrated in Fig. 10 by images from taken from Doyle (2007) and Nerlich and Jaspal's (2014) papers.

Figure 9. Detail of the canoeing figure in *The Supplementary Report to The IPCC Scientific Assessment* (1992)

Figure 10. The heroic, white, male, polar, scientist-adventurer: (left to right) Scientist looks over a glacier (taken from Doyle 2007, figure 4 (140)). Scientists work on melting glaciers (taken from Nerlich & Jaspal 2014 Figure 5 (269))

More than indicating the vulnerability of the poor and the power of the west, the covers show what Nixon (2011) calls 'slow violence' where the conditions for sustaining human life and tolerable environments are in slow decline. The way people are portrayed on covers has shown to be a subversive counterpart to the 'whole earth' agenda present on so many other covers as racial, social and economic inequalities are highlighted. While the IPCC covers correctly identify

the poor as those who are most vulnerable to climate change, the way they are illustrated betrays deeper inequalities and promotes westerners as superior and immune to the effects of climate change.

6.3 Absences and Issues of Representation

This section addresses how the IPCC (dis)engages with established visual tropes of climate change. It addresses the unexpected finding that many common visual icons of climate change were not present, or present but manifesting different meanings to what they do usually. Apart from globes, the IPCC occasionally used the images of climate change found in other sources, though these were few and far between. The most apparent examples were the dramatic storm in WGI (1995), examples of mitigation in WG III (2001), WG III (2007) and *Special Report: Renewable Energy Sources and Climate Change Mitigation* (2011) and smokestacks in *Special Report Radiative Forcing of Climate Change and An Evaluation of the IPCC IS92 Scenarios* (1994). Many of the covers provided literal and straightforward illustrations of the subjects that they cover. For example, WGIII: Mitigation (2001) demonstrated two examples of mitigation, a wind turbine and the use of bicycles, while *Special Report: Renewable Energy Sources and Climate Change Mitigation* (2011) featured an example of photovoltaic power. It is not always the case, however, that familiar or literal images were used.

The IPCC images mostly did not subscribe to the same themes or subject matter found in these other sources of climate change imagery. They occasionally featured the more established visual discourse of the environmental movement (most notably the globe of Earth from space) but not those images which have become associated with climate change specifically. Apart from those featuring alternative energy solutions, the dramatic images of climate change typically used by the press i.e. disintegrating icecaps, flood and storm aftermaths, polar bears and desertification, were almost all but absent from the IPCC covers: only one polar bear appeared (in miniature) (Ukrainian translation of WG1 2007). Ice appeared on three of the covers. Extreme weather is used twice as main cover images as a storm (Working Group I: The Science of Climate Change 1995) and drought (Special Report: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation 2012) but for the remainder they were relegated to miniatures in collages. A coal-powered station appeared once (*Special Report Radiative Forcing of Climate Change* and *An Evaluation of the IPCC IS92 Scenarios* 1994). As it shall be demonstrated,

without these images, the narratives of fear, risk and vulnerability that so often frame climate change were largely absent.

There were, however, other factors that may point to a reading of the images as representing climate change other than the fact that they were on the covers of publications about climate change. So far the images have been analysed without consideration of the context of the reports, that is, without the text that is also on the covers. The covers are not purely photographic or illustrative but also have a textual dimension. The title of the report (that is, its subject), the subtitle "Intergovernmental Panel on Climate Change" as well as logos of the WMO and UNEP were on each report. Additional text that the images occasionally have claim to include cover-image acknowledgments (which give the source of the image) on the back covers or second pages of the reports (though there is uneven diligence in providing this information as it is missing or left blank in many of the reports). This additional text contributes to a better understanding of the photographs, providing context and a subject through which a viewer could understand these images, filling in the gaps the images alone do not.

Occasionally, the IPCC covers depicted content that contained similar icons to climate change imagery from other sources, but, as it soon became clear, its latent content was not the same. That is, even when subjects that are familiar were used, they were not used in the typical way. A salient example of this can be seen in the *Supplementary Report to The IPCC Impacts Assessment* (1992) (Fig. 11). The cover features a clear blue sky and sea, a white sandy beach, palm trees, and a distant, small figure reclining on a deck chair, a small canoe beside him. It does, to some degree, use motifs found in the climate change visual lexicon: palm trees, the ocean, a tropical location and islands. It is no wonder that these motifs appear and that they have been used visually to indicate vulnerability to climate change (Bronnimann 2002; Lester & Cottle 2009; Nerlich & Jaspal 2014) as islands and coastal regions are highly vulnerable to climate change, with sea levels rising and extreme weather events, to which they are particularly prone, undermining their resilience (Adger 2006: 269). The IPCC identifies the following risks for tropical small island developing states: shore erosion, saltwater intrusion and impacts on populations and economies. Unsurprisingly then, islands and coastlines being submerged have been used as metaphors for climatic disaster (Doulton & Brown 2009: 196). Palm trees, plants that are iconic of islands and coastal regions, have also functioned in this arena.

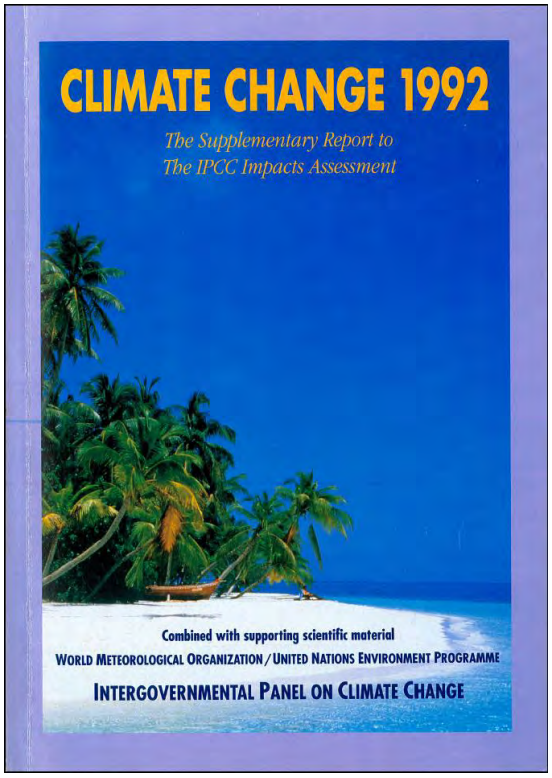

Figure 11. The Supplementary Report to The IPCC Impacts Assessment (1992)

The motif of palm trees in images pertaining to climate change has been well documented by Bronnimann (2002). He traces the origins of the use of the palm tree in climate change imagery back to the 19th century, identifying it as one of the earliest motifs used to represent the phenomenon. While Bronnimann (2002) found that the palm/glacier juxtaposition originally had some undertones of opportunity and exoticism (being used in advertising for Alpine holidays, for example), mostly the combination of palms and glaciers reveals feelings of climate change as a threat[11]. Bronnimann (2002) notes a decline in the combination of palm/glaciers juxtaposition to represent climate change and find that it is images of extreme weather that now dominate climate change imagery. The habitat of palm trees in places sensitive to extreme weather events (islands and other coastal regions) means that their presence has continued through to the present day (as noted by Nerlich and Jaspal (2014) and Lester and Cottle (2009)). Lester and Cottle (2009: 928) find palms "bent almost to the ground by the wind" to be linked with the extreme weather associated with the impacts of climate change. Bronnimann found that palm trees were used in conjunction with glaciers, with palms representing heat, glaciers cold, and in juxtaposition, climate change. In contemporary use, Nerlich and Jaspal (2014: 266; 268) also find palms used as

[11] O'Neill and Nicholson-Cole (2009) found that awareness of climate change impacts could also stir more ambivalent or hopeful feelings. They cite the example of a European envisaging a new outdoor café in their country as a result of warmer weather.

a metaphor for heat, noting their presence in images that represent sublime “apocalyptic” heat and threats of “submergence” (due to climate change caused sea-level rise).

However, in the IPCC image, this vulnerability is not apparent. Most obviously, it does not depict the vulnerability of coastal regions as defined by the IPCC, nor does it use the images of extreme weather so often found in combination with depictions of tropical coastal areas and populations under threat. Instead the sea is calm, the sky is clear and the environment looks pristine. Instead of a threatened and vulnerable landscape, the image speaks the language of holiday brochures, with an idealised tropical paradise (see Pocock 2005). One of the impacts of climate change on small islands is expected to be a decline in tourism, but the presence of a man (who, in his complete leisure, can be understood as a tourist) doesn’t allude to this.

It is possible for tranquil island scenes such as this one to depict vulnerability. Nerlich and Jaspal (2014: 268) describe an image that sounds uncannily like the IPCC one. They describe a scene of “a small islet abundant in life and nature; it shows visibly fertile land and swaying palm trees concentrated in a small space. The green colour palette is contrasted with the deep blue of the surrounding ocean.” Through this image humans are not shown as a threat to nature. Nerlich and Jaspal (2014) could be describing the IPCC image. However, in their image there is a subtle but crucial difference to the IPCC image. In their image, threat is constructed by the angle/composition of the picture, which shows the island as being depicted as small and isolated, surrounded by a large ocean. It is this that establishes “power relations” with the ocean positioned as overwhelming and vast and the island as threatened and gradually being engulfed (Nerlich & Jaspal 2014: 286). In the IPCC image, picture-cropping and composition impedes such a reading: the landscape we are looking at ‘reads’ as an island because of the palm trees, white sand and sea, but may be part of a greater landmass. The ocean does not overwhelm the composition; it is neither wild nor threatening. The presence of a small canoe, presumably used for local sea-faring, suggests that it is, in fact, quite the opposite. The image shows neither the impacts of climate change, nor the vulnerability to it. If anything it merely ‘locates’ an area vulnerable to the impacts of climate change, which the viewer is led to understand as such through the title of the report. Manzo (2010) also came across an image of a sunbather relaxing on a tropical beach in a news article on climate change. Manzo argued that the iconography of relaxation when used in conjunction with the relevant text of the news article that it accompanied (which warned of the dangers of sea level rise) actually functioned to heighten and draw attention

to vulnerability and danger of coastal sea level rise. Manzo acknowledges that it is not the image alone that generates this understanding, but the accompanying text. However, the text on the cover of the IPCC report ("The Supplementary Report to The IPCC Impacts Assessment") does not function in the same way as the more sensationalist news text quoted by Manzo.

It would be easy to dismiss the cover as an ineffective image, where palm trees perform weakly as a metaphor for heat or 'nature' and islands as a locator for the type of area made vulnerable by climate change, but beyond that, little is communicated. The tourist brochure aesthetic and lack of a clear indicator of vulnerability eclipses any other reading of the image.

A more nuanced reading of this image would need to be accompanied by in-depth knowledge of climate change and the determination to construct relevant meanings. In their interpretation of the alternate island image described above, Nerlich and Jaspal (2014) suggest that the absence of human presence and industry imply that climate change is due to natural causes. Although there is a human presence in the IPCC image, the subject is so seemingly benign and passive that Nerlich and Jaspal's observation could apply in the same way. Reading even deeper into the picture, the reclining figure of the man may not be as neutral to his environment as it may seem at first. True, the sun-tanning figure is not seemingly engaged in any industrial activity harmful to the environment. However, it is this very repose that betrays that he actually is. The exotic (and hence presumably remote) location of the island gives away the use of air-travel and subsequently references the carbon-intensive western lifestyle as westerners are accountable for the vast majority of carbon emissions released to date (Steffen et al. 2007).

There were other covers that used images that had what seemed to be only a passing reference to issues of climate change. On WG II's (1990) cover, a dune of orange sand dominates. As a desert it could be simply a metaphor for both heat and drought, both identified as "already-seen" impacts of climate change (Doyle 2007). However, this desert tells us little about climate change. Deserts are natural and ancient ecosystems. There was nothing to suggest that this desert is the result of human-caused desertification other than the title of the report. We see a similar situation in *The Supplementary Report to The IPCC Scientific Assessment 1992* and the WG1 (2013) which depicted ice, but says little about how it relates to climate change. As with *Supplementary Report to The IPCC Impacts Assessment* (1992) we are shown an area that is famously vulnerable but did not clearly read as vulnerable. All the ingredients for depictions for representing vulnerability

were there: a small, lone figure paddles a canoe through an iceberg littered sea. Images in other media have shown scientists set small against vast disintegrating icescapes or polar bears hungry and exhausted, clinging to shards of melting ice, as identified in Doyle (2007), Ziser & Sze (2007) and Nerlich & Jaspal (2014). The figure canoeing through the icebergs in the IPCC image is not in this vast and forbidding landscape as the foreground of tundra and distant mountains contain and limit the scene. In other media, ice is in crisis, melting, retreating and crashing into the ocean. Again, as with the *Supplementary Report to The IPCC Impacts Assessment* (1992) we need external information to understand this ice as being a symbol of vulnerability. On the cover of WG I (2013) a glacier is depicted. It communicates nothing about the state of the ice or how it relates to climate change. Are we looking at ice that is retreating, or is it increasing? Or maybe we are meant to be paying attention to the dusting of black on the ice, depicting the soot from distant fires that has been shown to decrease albedo which warms the climate (Ramanathan & Carmichael 2008). The image perhaps provides a location for climate impacts, but tells us little else about the matter.

The narratives of vulnerability and fear were also largely absent on the IPCC covers. Examples of it on the covers include *Special Report: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (2012) where a lone man hacks away at cracked earth. The cropping is such that we see no horizon and hence no end to the cracked earth. Vulnerability is indicated by the small size of the figure, that he is alone and that his surroundings indicate a mammoth task. He is without machinery, indicating poverty. The drought-stricken landscape specifies that it is not only the man but the environment which is vulnerable. The women and children carrying water in Synthesis Report (2001), the Ukrainian Translation of Summary for Policymakers of WG I contribution to the fourth assessment report (2007) and WG II (2007) also indicate vulnerability and hardship in the face of drought. The violent storm on the cover of WG I (1995) also points to vulnerability (though not to the same degree as storms in other contexts where the storms are located in vulnerable island areas or threatening cities by the sea (Nerlich & Jaspal 2014). Apart from other miniature moments found in the collages (high waves, the polar bear, drought), indicators of vulnerability, risk and fear were largely absent. It is as if the common parlance of climate change visual discourse is spoken as a second language on the IPCC covers, one shade removed from what we are used to. The question remains whether this ‘second language’ should be seen as a representational failure or a novel tongue that reveals a different vision of what climate change can look like when coming from a non-commercial and scientific source.

While the visual signifiers are not always specifically or clearly about climate change, they do sketch out broader themes of environment (a butterfly[12], a waterfall[13]), unity (the globes) and development (poorer people farming or collecting water). However, not all of the covers are easy to accept as images of climate change, not just because they do not use the visual imagery that has become associated with climate change, but because they signify little. For example, WG III (1990) (the topic of which is mitigation, or as it was called at the time "Response Strategies") featured four images, namely: ducks in a lake; an Italianate harbour city; a man farming with cattle and another man tending to a (smelting) furnace. None of these speak directly to response strategies for climate change, especially the peaceful scenes of the ducks on the lake and the equally peaceful Italianate city, both of which seem out of context. In a similar way WGIII (2014) featured a sterile, generic city, which, apart from its context on an IPCC report cover and its title, can barely be understood in terms of mitigation, the topic of the report. Only because of their placement on the IPCC covers could these be associated with climate change. In these kinds of images, this second language appears to be representational failure more than there appears to be a novel tongue. On the IPCC covers what we see is a struggle with the issues of representation and climate change.

[12] Danish Translation: The Fourth Assessment Synthesis Report (2007);

[13] Synthesis Report (2001)

7. Conclusion

Through a study of the Intergovernmental Panel on Climate Change's cover images this dissertation sought to contribute to the literature on the visual discourse of climate change. There were three objectives. The first objective was to document and investigate the latent and manifest content of the IPPC cover images. This was done through content and thematic analyses. Results showed that the IPCC used a range of imagery on its report covers but mostly used global and human imagery to represent climate change. The second objective was to then contextualise IPCC images within the lexicon of climate change imagery as identified in other sources. This was done by comparing the results of this study with that of others. It was found many of the subjects used in other climate change imagery (for example polar bears) were absent and that even when similar subject matter was used, it was used in such a way that it came to mean something different. It was also shown that the fear narratives found in other sources of climate change imagery were not used by the IPCC as a way to represent climate change, even when explicitly representing vulnerability.

The third objective was to consider how the IPCC negotiates the communicational and representation problems inherent in the visual communication and representation of climate change and how, or whether, the images used are effective as representations of climate change and as images that could potentially motivate action. The use of fear-based images in the broader discourse of climate communication has been criticised but there have been few suggestions of what to use in their place. Whether the IPCC offers a viable alternative in the absence of these images is debatable. It was shown through an in-depth analysis that the IPCC covers use universal and inclusive imagery with the aim to be representative and non-divisive. One effect was that climate change was visually framed as a global issue. It was argued that another result was a tendency to use banal images that sometimes said very little about climate change, or, in more extreme examples, seem almost completely unrelated to the issue. The IPCC could more effectively negotiate the path of using images that demonstrate their dedication to global unity. Consideration could also be turned to how people (especially those undeveloped countries) are being portrayed.

The IPCC images certainly do not offer a comprehensive, consistent and strong alternative visual narrative for climate change. A substantial amount of external knowledge is needed to be able

interpret many of the images as being about climate change and its attendant issues. They can be understood to be largely unsuccessful as images that are meant to represent climate change in that they were found to be frequently obscure, vague and inconsistent. Lawrence Buell (2001) writes that addressing environmental problems such as climate change requires more than just political, economic and scientific solutions but a change in a state of mind that can be achieved through "attitudes, feelings and images." (Buell 2001:1). In using banal images, an opportunity is missed to provide images that could compel such a change in a state of mind.

Potential for further research lies in considering collage as an effective way to visually represent the complexities of climate change. In the scope of this study the IPCC covers were not examined temporally to look for development of imagery over time, while they present a small sample of images, they do offer some potential for this. Lastly, the IPCC is now including videos and slideshows on its website, an investigation into these might give an even broader picture of how climate change is being visually represented and communicated by the IPCC.

In conclusion, this dissertation has contributed to the emerging literature on the visual discourse of climate change by demonstrating how the IPCC, a key player in international climate change science and policy-making, has attempted to visually frame climate change as a global and human issue, to limited success.

8. Bibliography

Ahchong, K. & Dodds, R. 2012, "Anthropogenic climate change coverage in two Canadian newspapers, the Toronto Star and the Globe and Mail, from 1988 to 2007", *Environmental Science & Policy,* vol. 15, no. 1, pp. 48-59.

Anderson, A. 2009, "Media, politics and climate change: Towards a new research agenda", *Sociology Compass,* vol. 3, no. 2, pp. 166-182.

Antilla, L. 2005, "Climate of scepticism: US newspaper coverage of the science of climate change", *Global Environmental Change,* vol. 15, no. 4, pp. 338-352.

Ball, M.S. & Smith, G.W. 1992, *Analyzing visual data,* Sage Publications.

Bell, P. 2001, "Content analysis of visual images", *Handbook of visual analysis,* Sage Publications pp. 10-34.

Berger, J., 1973, *Ways of seeing;* Viking Press, New York.

Bernstein, L., Bosch, P., Canziani, O., Chen, Z., Christ, R., Davidson, O., Hare, W., Huq, S., Karoly, D. & Kattsov, V. 2007, "Climate change 2007: Synthesis report. Contribution of Working Groups I, II and III to the fourth assessment report of the Intergovernmental Panel on Climate Change", IPCC: Geneva, Switzerland.

Bernthal, F. 1990, *Intergovernmental Panel on Climate Change.* Climate Change: The IPCC Response Strategies.

Billett, S. 2010, "Dividing climate change: global warming in the Indian mass media", *Climatic Change,* vol. 99, no. 1-2, pp. 1-16.

Bloom, L.E. 2010, "Arctic Spaces: Politics and Aesthetics in True North and Gender on Ice", *Nka Journal of Contemporary African Art,* vol. 2010, no. 26, pp. 30-37.

Boykoff, M.T. 2009, "We speak for the trees: Media reporting on the environment", *Annual Review of Environment and Resources,* vol. 34, pp. 431-457.

Boykoff, M.T. 2008, "The cultural politics of climate change discourse in UK tabloids", *Political geography,* vol. 27, no. 5, pp. 549-569.

Boykoff, M.T. 2007, "From convergence to contention: United States mass media representations of anthropogenic climate change science", *Transactions of the Institute of British Geographers,* vol. 32, no. 4, pp. 477-489.

Boykoff, M.T. & Boykoff, J.M. 2007, "Climate change and journalistic norms: A case-study of US mass-media coverage", *Geoforum,* vol. 38, no. 6, pp. 1190-1204.

Braasch, G. 2013, "Climate change: Is seeing believing?", *Bulletin of the Atomic Scientists,* vol. 69, no. 6, pp. 33-41.

Bronnimann, S. 2002, "Picturing climate change", *Climate Research,* vol. 22, no. 1, pp. 87-95.

Brossard, D., Shanahan, J. & McComas, K. 2004, "Are issue-cycles culturally constructed? A comparison of French and American coverage of global climate change", *Mass communication & Society,* vol. 7, no. 3, pp. 359-377.

Bruce, J.P., Yi, H. & Haites, E.F. 1995, *Climate change 1995: Economic and social dimensions of climate change: Contribution of Working Group III to the second assessment report of the Intergovernmental Panel on Climate Change,* Cambridge University Press: Cambridge.

World Commission on Environment and Development. 1987, *Our common future,* Oxford University Press, Oxford; New York.

Buell, L. 2009, *Writing for an endangered world: Literature, culture, and environment in the US and beyond,* Harvard University Press.

Buell, L. 1996, *The environmental imagination: Thoreau, nature writing, and the formation of American culture,* Harvard University Press.

Carvalho, A. & Burgess, J. 2005, "Cultural circuits of climate change in UK broadsheet newspapers, 1985–2003", *Risk analysis,* vol. 25, no. 6, pp. 1457-1469.

Chakrabarty, D. 2009, "The climate of history: Four theses", *Critical Inquiry,* vol. 35, no. 2, pp. 197-222.

Cosgrove, D. 1994, "Contested global visions: one-world, whole-earth, and the Apollo space photographs", *Annals of the Association of American Geographers,* vol. 84, no. 2, pp. 270-294.

Crowe, D. 2003, "Objectivity, photography, and ethnography", *Cultural Studie, Critical Methodologies,* vol. 3, no. 4, pp. 470-485.

Crutzen, P.J. 2002, "Geology of mankind", *Nature,* vol. 415, no. 6867, pp. 23-23.

de Jager, D., Manning, M. & Kuijpers, L. 2005, "Safeguarding the ozone layer and the global climate system: issues related to hydrofluorocarbons and perfluorocarbons", *IPCC/TEAP Special Report Technical Summary*.

DiFrancesco, D.A. & Young, N. 2011, "Seeing climate change: The visual construction of global warming in Canadian national print media", *Cultural Geographies,* vol. 18, no. 4, pp. 517-536.

Dobrin, S.I. & Morey, S. 2009, *Ecosee: Image, rhetoric, nature,* SUNY Press.

Doulton, H. & Brown, K. 2009, "Ten years to prevent catastrophe?: Discourses of climate change and international development in the UK press", *Global Environmental Change,* vol. 19, no. 2, pp. 191-202.

Doyle, J. 2009, "Seeing the Climate?", *Ecosee: Image, Rhetoric, Nature,* pp. 279- 298.

Doyle, J. 2007, "Picturing the clima (c) tic: Greenpeace and the representational politics of climate change communication", *Science as culture,* vol. 16, no. 2, pp. 129-150.

Dunaway, F. 2009, "Seeing global warming: contemporary art and the fate of the planet", *Environmental History,* vol. 14, no. 1, pp. 9-31.

Edenhofer, O., Pichs-Madruga, R., Sokona, Y., Seyboth, K., Kadner, S., Zwickel, T., Eickemeier, P., Hansen, G., Schlömer, S. & von Stechow, C. 2011, *Renewable energy sources and climate change mitigation: Special report of the intergovernmental panel on climate change,* Cambridge University Press: Cambridge.

Emmerich, R. 2004, *The Day After Tomorrow,* USA.

Field, C. B. & Barros V.R. Intergovernmental Panel on Climate Change, Working Group II, 2014, *Climate change 2014 : impacts, adaptation, and vulnerability. Part A.* Cambridge University Press: Cambridge.

Field, C. B. & Barros V.R. Intergovernmental Panel on Climate Change, Working Group II, 2014, *Climate change 2014: impacts, adaptation, and vulnerability. Part B.* Cambridge University Press: Cambridge.

Field, C.B. 2012, *Managing the risks of extreme events and disasters to advance climate change adaptation: special report of the intergovernmental panel on climate change,* Cambridge University Press: Cambridge.

Foucault, M. 1972, *The Archaeology of Knowledge: Translated from the French by AM Sheridan Smith,* Pantheon Books.

Füssel, H. 2007, "Adaptation planning for climate change: concepts, assessment approaches, and key lessons", *Sustainability science,* vol. 2, no. 2, pp. 265-275.

Greider, T. & Garkovich, L. 1994, "Landscapes: The social construction of nature and the environment", *Rural Sociology,* vol. 59, pp. 1-24.

Hansen, A. & Machin, D. 2013, "Researching visual environmental communication", *Environmental Communication: A Journal of Nature and Culture,* vol. 7, no. 2, pp. 151-168.

Hansen, A. & Machin, D. 2008, "Visually branding the environment: Climate change as a marketing opportunity", *Discourse Studies,* vol. 10, no. 6, pp. 777-794.

Hitt, C. 1999, "Toward an ecological sublime", *New Literary History,* vol. 30, no. 3, pp. 603-623.

Höijer, B. 2010, "Emotional anchoring and objectification in the media reporting on climate change.", *Public understanding of science (Bristol, England),* vol. 19, no. 6, pp. 717-731.

Houghton, J. T., Intergovernmental Panel on Climate Change, Working Group I., 2001, *Climate change 2001 : the scientific basis : contribution of Working Group I to the third assessment report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge; New York.

Houghton, J. T., Intergovernmental Panel on Climate Change., 1996, *Climate change 1995: the science of climate change,* Cambridge University Press, Cambridge.

Houghton, J.T. 1995, *Climate change, 1994: Radiative forcing of climate change and an evaluation of the IPCC IS92 emission scenarios,* Cambridge University Press, Cambridge.

Houghton, J.T., Callander, B. & Varney, S. 1992, "Climate change 1992. The supplementary report to the IPCC scientific assessment. Intergovernmental Panel on Climate Change", *Report prepared for IPCC by Working Group I.* Cambridge University Press, New York.

Hulme, M. 2009, "Mediated messages about climate change: Reporting the IPCC fourth assessment in the UK print media", *Media and Climate Change.* pp.1–24.

Hulme, M. 2004 “Pictures, Scenarios or Probabilities: How Should We Portray Dangerous Climate Change?,” Paper presented at the conference “Perspectives on Dangerous Climate Change,” 28–29 June, University of East Anglia, Norwich, UK.

Hulme, P.E. 2006, "Beyond control: wider implications for the management of biological invasions", *Journal of Applied Ecology,* vol. 43, no. 5, pp. 835-847.

Intergovernmental Panel on Climate Change, Working Group I., 2007, *Climate change 2007: the physical science basis : summary for policymakers,* Intergovernmental Panel on Climate Change Secretariat, Geneva, Switzerland.

Intergovernmental Panel on Climate Change, Houghton, J. T., Jenkins, G. J., Ephraums, J. J., Intergovernmental Panel on Climate Change, Working Group I., 1990, *Climate change : the IPCC scientific assessment,* Cambridge University Press, Cambridge.

Intergovernmental Panel on Climate Change., Working Group III., World Meteorological Organization, United Nations Environment Programme., 2001, *Climate change 2001 : mitigation : summary for policymakers,* World Meteorological Organization, [Geneva].

Intergovernmental Panel on Climate Change, Working Group III., 2000, *Emissions scenarios. a special report of IPCC Working Group III,* Intergovernmental Panel on Climate Change, [Geneva].

Intergovernmental Panel on Climate Change.1992, "The IPCC 1990 and 1992 Assessments", *IPCC First Assessment Report. Overview and Policymakers’ Summaries.*

Jamison, A. 2010, "Climate change knowledge and social movement theory", *Wiley Interdisciplinary Reviews: Climate Change,* vol. 1, no. 6, pp. 811-823.

Joffe, H. 2008, "The power of visual material: Persuasion, emotion and identification", *Diogenes,* vol. 55, no. 1, pp. 84-93.

Joffe, H., and L. Yardley. 2004. Content and thematic analysis. In Research methods for clinical and health psychology, ed. D.F. Marks and L. Yardley, 56–68. London: Sage.

Klein, R. 2013, "Climate Change through the Lens of Nuclear Criticism", *diacritics,* vol. 41, no. 3, pp. 82-87.

Lester, L. & Cottle, S. 2009, "Visualizing climate change: Television news and ecological citizenship", *International journal of communication,* vol. 3, pp. 920-936.

Levin, K., Cashore, B., Berstein, S. & Auld, G. 2010, "Playing it Forward: Path Dependency, Progressive Incrementalism, and the “Super Wicked” Problem of Global Climate Change”, Conference Paper.

Linder, S.H. 2006, "Cashing-in on Risk Claims: On the For-profit Inversion of Signifiers for Global Warming", *Social Semiotics,* vol. 16, no. 1, pp. 103 – 132.

Liverman, D.M. 2009, "Conventions of climate change: constructions of danger and the dispossession of the atmosphere", *Journal of historical geography,* vol. 35, no. 2, pp. 279-296.

Lorenzoni, I., Jones, M. & Turnpenny, J.R. 2007, "Climate change, human genetics, and post-normality in the UK", *Futures,* vol. 39, no. 1, pp. 65-82.

Lowe, T., Brown, K., Dessai, S., de França Doria, M., Haynes, K. & Vincent, K. 2006, "Does tomorrow ever come? Disaster narrative and public perceptions of climate change", *Public understanding of science,* vol. 15, no. 4, pp. 435-457.

Mahony, M. & Hulme, M. 2012, "The Colour of Risk: An Exploration of the IPCC's "Burning Embers" Diagram", *Spontaneous Generations: A Journal for the History and Philosophy of Science,* vol. 6, no. 1, pp. 75-89.

Mann, M.E., Bradley, R.S. & Hughes, M.K. 1999, "Northern hemisphere temperatures during the past millennium: Inferences, uncertainties, and limitations", *Geophysical Research Letters,* vol. 26, pp. 759-762.

Manzo, K. 2010, "Beyond polar bears? Re-envisioning climate change", *Meteorological Applications,* vol. 17, no. 2, pp. 196-208.

Manzo, K. 2009, "Imaging vulnerability: the iconography of climate change", *Area,* vol. 42, no. 1, pp. 96-107.

McCarthy, J. J., 2001 Intergovernmental Panel on Climate Change.,Working Group II, *Climate change 2001: impacts, adaptation, and vulnerability: contribution of Working Group II to the third assessment report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge.

Meisner, M.S. & Takahashi, B. 2013, "The nature of Time: How the covers of the world's most widely read weekly news magazine visualize environmental affairs", *Environmental Communication: A Journal of Nature and Culture,* vol. 7, no. 2, pp. 255-276.

Metz, B. 2007, Intergovernmental Panel on Climate Change, Intergovernmental Panel on Climate Change, Working Group III. *Climate change 2007: mitigation of climate change. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge.

Metz, B., Davidson, O., De Coninck, H., Loos, M. & Meyer, L. 2005, "IPCC special report on carbon dioxide capture and storage. Prepared by Working Group III of the Intergovernmental Panel on Climate Change", Cambridge University Press, Cambridge.

Metz, B. 2001 Climate change 2001: mitigation: contribution of Working Group III to the third assessment report of the Intergovernmental Panel on Climate Change. Vol. 3. Cambridge University Press, Cambridge.

Metz, B., Davidson, O.R., Martens, J., van Rooijen, S.N. & van Wie McGrory, L. 2000, "Methodological and Technological Issues in Technology Transfer", *Methodological and Technological Issues in Technology Transfer,* Cambridge University Press, Cambridge.

Miles, M. 2010, "Representing nature: art and climate change", *Cultural Geographies,* vol. 17, no. 1, pp. 19-35.

Moser, S.C. 2010, "Communicating climate change: history, challenges, process and future directions", *Wiley Interdisciplinary Reviews: Climate Change,* vol. 1, no. 1, pp. 31-53.

Moser, S.C. & Dilling, L. 2004, "Making climate hot", *Environment: Science and Policy for Sustainable Development,* vol. 46, no. 10, pp. 32-46.

Nakicenovic, N., Alcamo, J., Davis, G., De Vries, B., Fenhann, J., Gaffin, S., Gregory, K., Grübler, A., Jung, T.Y. & Kram, T. 2000, "Special report on emissions scenarios, working group III, Intergovernmental Panel on Climate Change (IPCC)", Cambridge University Press: Cambridge.

Nerlich, B. & Jaspal, R. 2014, "Images of extreme weather: symbolising human responses to climate change", *Science as Culture,* vol. 23, no. 2, pp. 253-276.

Nerlich, B., Koteyko, N. & Brown, B. 2010, "Theory and language of climate change communication", *Wiley Interdisciplinary Reviews: Climate Change,* vol. 1, no. 1, pp. 97-110.

Nicholson-Cole, S.A. 2005, "Representing climate change futures: a critique on the use of images for visual communication", *Computers, Environment and Urban Systems,* vol. 29, no. 3, pp. 255-273.

Nisbet, M.C. 2009, "Communicating climate change: Why frames matter for public engagement", *Environment: Science and Policy for Sustainable Development,* vol. 51, no. 2, pp. 12-23.

Nixon, R. 2011 *Slow Violence and the Environmentalism of the Poor*. Harvard University Press.

O'Neill, S.J., Boykoff, M., Niemeyer, S. & Day, S.A. 2013, "On the use of imagery for climate change engagement", *Global Environmental Change,* vol. 23, no. 2, pp. 413-421.

O'Neill, S.J. & Hulme, M. 2009, "An iconic approach for representing climate change", *Global Environmental Change,* vol. 19, no. 4, pp. 402-410.

Olausson, U. 2009, "Global warming—global responsibility? Media frames of collective action and scientific certainty", *Public understanding of science,* vol. 18, no. 4, pp. 421-436.

O'Neill, S.J. & Smith, N. 2014, "Climate change and visual imagery", *Wiley Interdisciplinary Reviews: Climate Change,* vol. 5, no. 1, pp. 73-87.

O'Neill, S. & Nicholson-Cole, S. 2009, "'"Fear Won't Do It" Promoting Positive Engagement With Climate Change Through Visual and Iconic Representations", *Science Communication,* vol. 30, no. 3, pp. 355-379.

Pachauri, R.K., Allen, M., Barros, V., Broome, J., Cramer, W., Christ, R., Church, J., Clarke, L., Dahe, Q. & Dasgupta, P. 2014, "Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change", Cambridge University Press, Cambridge.

Parry, M. L., Intergovernmental Panel on Climate Change.,Working Group II., 2007, *Climate change 2007 : impacts, adaptation and vulnerability : contribution of Working Group II to the fourth assessment report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge.

Peeples, J. 2011, "Toxic sublime: Imaging contaminated landscapes", *Environmental Communication: A Journal of Nature and Culture,* vol. 5, no. 4, pp. 373-392.

Penner, J., Lister, D., Griggs, D., Dokken, D. & McFarland, M. 1999, Intergovernmental Panel on Climate Change., Working Group I., Intergovernmental Panel on Climate Change.,Working Group III., 1999, *Aviation and the global atmosphere: a special report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer,* Cambridge University Press, Cambridge.

Peters, H.P. & Heinrichs, H. 2008, "Legitimizing Climate Policy. The 'Risk Construct'of Global Climate Change in the German Mass Media", *International Journal of Sustainability Communication,* vol. 3, no. 1, pp. 14-36.

Pidgeon, N. 2012, "Climate change risk perception and communication: addressing a critical moment?", *Risk Analysis,* vol. 32, no. 6, pp. 951-956.

Pink, S., 2001, *Doing visual ethnography: images, media, and representation in research,* Sage, London.

Pocock, C. 2005, "Blue Lagoons and Coconut Palms: The Creation of a Tropical Idyll in Australia", *The Australian journal of anthropology,* vol. 16, no. 3, pp. 335-349.

Prosser, J. 1998, *Image-based research: A sourcebook for qualitative researchers,* Falmer Press, London.

Ramanathan, V. & Carmichael, G. 2008, "Global and regional climate changes due to black carbon", *Nature geoscience,* vol. 1, no. 4, pp. 221-227.

Rockstrom, J., W. Steffen, K. Noone, A. Persson, F. S. Chapin, III, E. Lambin, T. M. Lenton, M. Scheffer, C. Folke, H. Schellnhuber, B. Nykvist, C. A. De Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sorlin, P. K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R. W. Corell, V. J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J. Foley. 2009. Planetary boundaries: exploring the safe operating space for humanity. Ecology and Society 14(2): 32. [online] URL:http://www.ecologyandsociety.org/vol14/iss2/art32/.

Rose, G. 2012, *Visual methodologies: An introduction to researching with visual materials,* Sage Publications, Los Angeles.

Rose, G. 2008, "Using photographs as illustrations in human geography", *Journal of Geography in Higher Education,* vol. 32, no. 1, pp. 151-160.

Salvador, M. & Norton, T. 2011, "The flood myth in the age of global climate change", *Environmental Communication,* vol. 5, no. 1, pp. 45-61.

Schell, C. 1992, "The value of the case study as a research strategy", *Manchester, UK: University of Manchester, Manchester Business School*, pp. 1-15.

Scott, L.M. 1994, "Images in advertising: The need for a theory of visual rhetoric", *Journal of consumer research*, pp. 252-273.

Sheppard, S.R. & Cizek, P. 2009, "The ethics of Google Earth: Crossing thresholds from spatial data to landscape visualisation", *Journal of environmental management,* vol. 90, no. 6, pp. 2102-2117.

Smit, B. & Wandel, J. 2006, "Adaptation, adaptive capacity and vulnerability", *Global Environmental Change,* vol. 16, no. 3, pp. 282-292.

Smith, J. 2005, "Dangerous news: Media decision making about climate change risk", *Risk Analysis,* vol. 25, no. 6, pp. 1471-1482.

Smith, N.W. & Joffe, H. 2009, "Climate change in the British press: The role of the visual", *Journal of Risk Research,* vol. 12, no. 5, pp. 647-663.

Smith, N. & Joffe, H. 2013, "How the public engages with global warming: A social representations approach", *Public understanding of science (Bristol, England),* vol. 22, no. 1, pp. 16-32.

Solomon, S. 2007, Intergovernmental Panel on Climate Change, Working Group I, *Climate Change 2007 : the physical science basis: contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge.

Steffen, W., Crutzen, P.J. & McNeill, J.R. 2007, "The Anthropocene: are humans now overwhelming the great forces of nature", *AMBIO: A Journal of the Human Environment,* vol. 36, no. 8, pp. 614-621.

Stocker, T., Qin, D., Plattner, G., Tignor, M., Allen, S.K., Boschung, J., Nauels, A., Xia, Y., Bex, V. & Midgley, P.M. 2014, *Climate change 2013: The physical science basis,* Cambridge University Press Cambridge, Cambridge.

Stoekl, A. 2013, "" After the Sublime," after the Apocalypse: Two Versions of Sustainability in Light of Climate Change", *diacritics,* vol. 41, no. 3, pp. 40-57.

Tegart, WJ. McG., Sheldon, G.W. & Griffiths, D.C. 1990, The IPCC Impacts Assessment, Australian Government Publishing Service, Canberra.

Trumbo, C. 1996, "Constructing climate change: claims and frames in US news coverage of an environmental issue", *Public Understanding of Science,* vol. 5, no. 3, pp. 269-283.

Watson, R.T. & Albritton, D.L. 2001, *Climate change 2001: Synthesis report: Third assessment report of the Intergovernmental Panel on Climate Change,* Cambridge University Press.

Watson, R.T., Noble, I.R., Bolin, B., Ravindranath, N., Verardo, D.J. & Dokken, D.J. 2000, *Land use, land-use change and forestry: a special report of the Intergovernmental Panel on Climate Change.* Cambridge University Press, Cambridge

Watson, R. T., Zinyowera, Marufu C., Moss, Richard H., Intergovernmental Panel on Climate Change.,Working Group II., 1998, *The regional impacts of climate change : an assessment of vulnerability,* Cambridge University Press, Cambridge.

Watson, R. T., Zinyowera, Marufu C., Moss, Richard H., Intergovernmental Panel on Climate Change., 1995, Working Group II, *Climate change, 1995 : impacts, adaptations, and mitigation of climate change: scientific-technical analyses : contribution of working group II to the second assessment report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge.

Weber, E.U. 2006, "Experience-based and description-based perceptions of long-term risk: Why global warming does not scare us (yet)", *Climatic Change,* vol. 77, no. 1-2, pp. 103-120.

Weingart, P., Engels, A. & Pansegrau, P. 2000, "Risks of communication: discourses on climate change in science, politics, and the mass media", *Public understanding of science,* vol. 9, no. 3, pp. 261-283.

Wibeck, V. 2014, "Social representations of climate change in Swedish lay focus groups: local or distant, gradual or catastrophic?", *Public understanding of science (Bristol, England),* vol. 23, no. 2, pp. 204-219.

Wiles, R., Prosser, J., Bagnoli, A., Clark, A., Davies, K., Holland, S. & Renold, E. 2008, "Visual ethics: Ethical issues in visual research", ESRC National Centre for Research Methods Review Paper, National Centre for Research Methods.

Wilkins, L. 1993, "Between facts and values: Print media coverage of the greenhouse effect, 1987-1990", *Public understanding of science,* vol. 2, no. 1, pp. 71-84.

Yusoff, K. & Gabrys, J. 2011, "Climate change and the imagination", *Wiley Interdisciplinary Reviews: Climate Change,* vol. 2, no. 4, pp. 516-534.

Ziser, M. & Sze, J. 2007, "Climate change, environmental aesthetics, and global environmental justice cultural studies", *Discourse,* vol. 29, no. 2, pp. 384-410.

9. Appendix A: All IPCC cover images

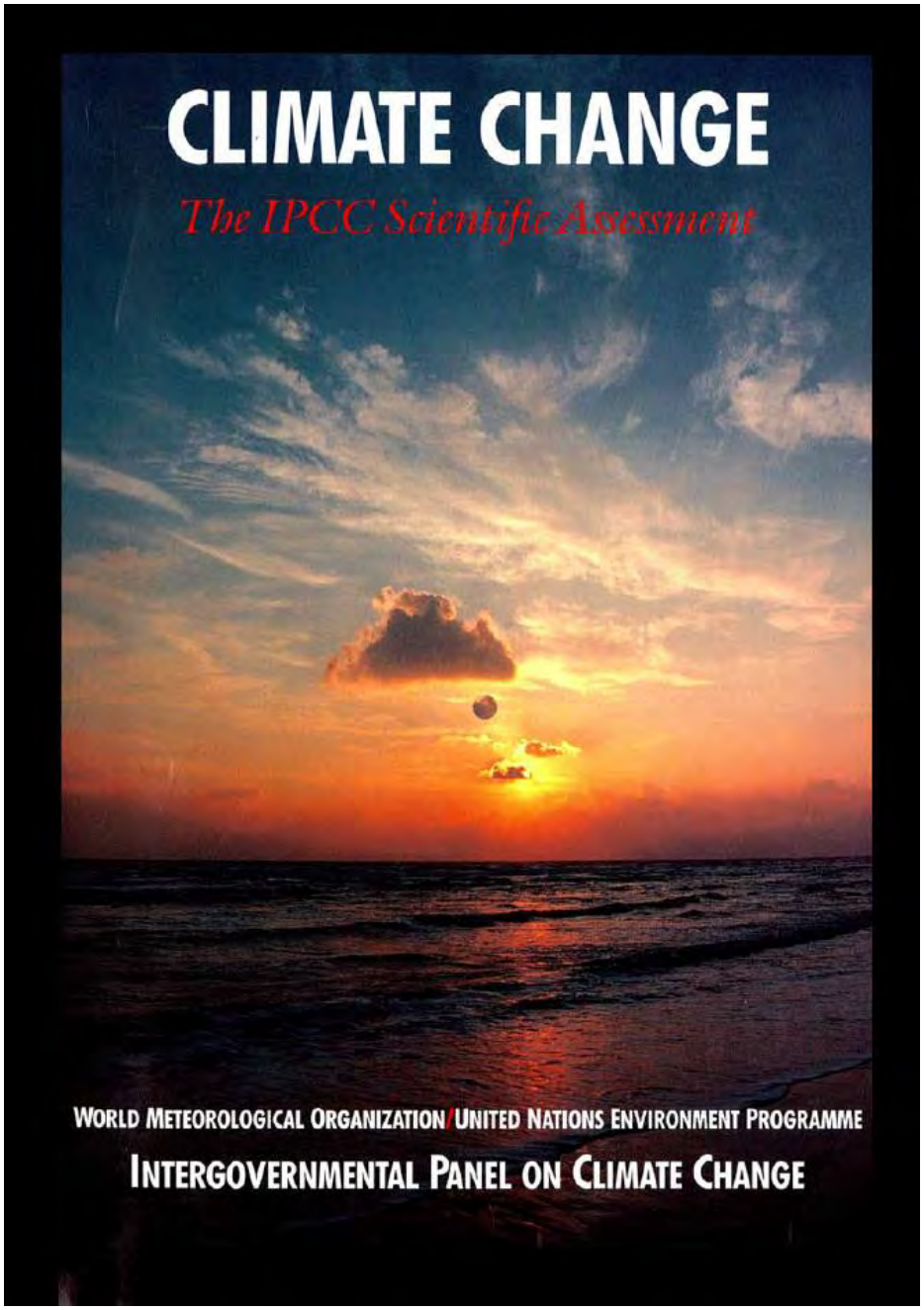

Figure 1. Working Group I: Scientific Assessment of Climate (Houghton et al. 1990)

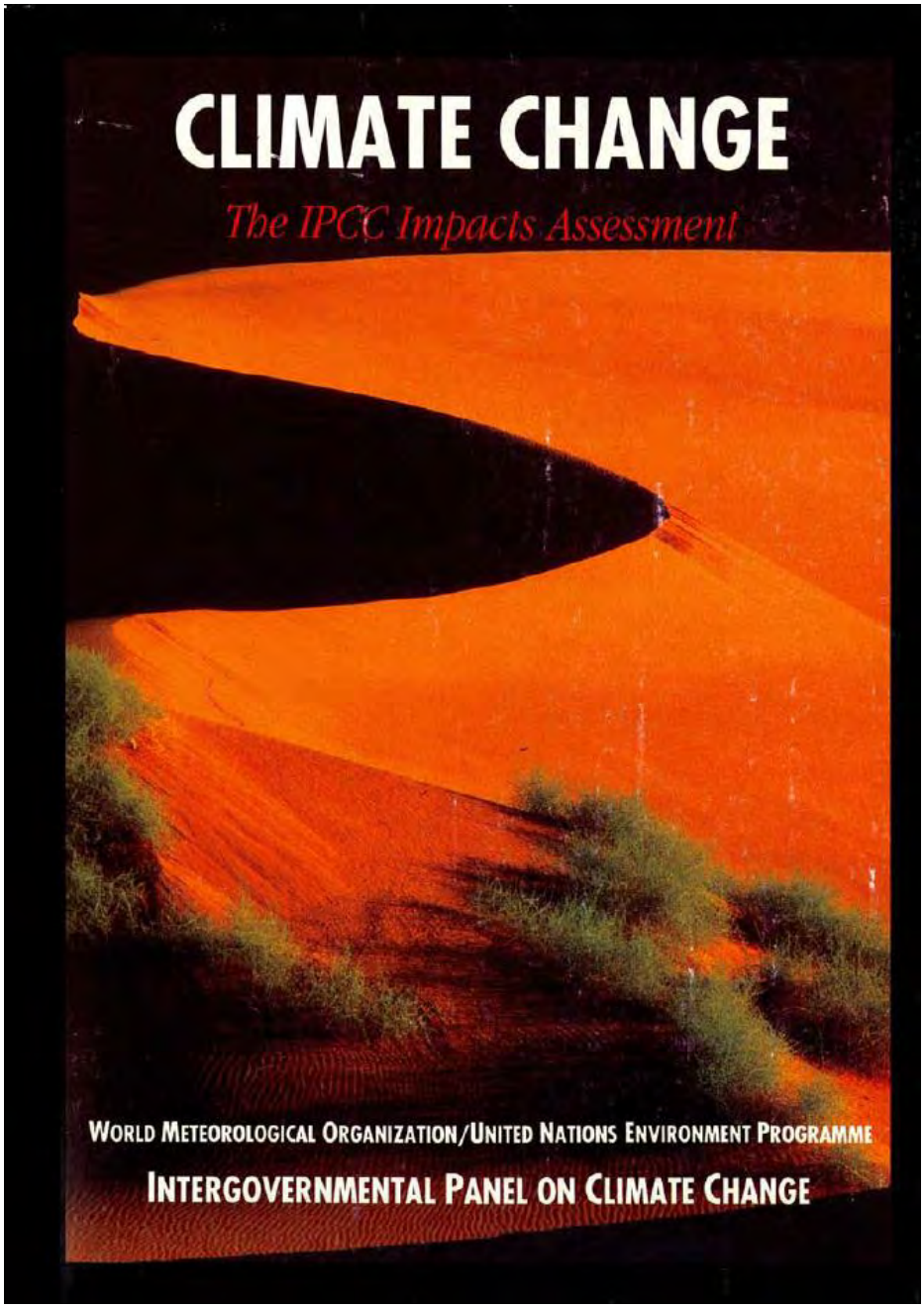

Figure 2. Working Group II: Impacts Assessment of Climate Change (Tegart et al.1990)

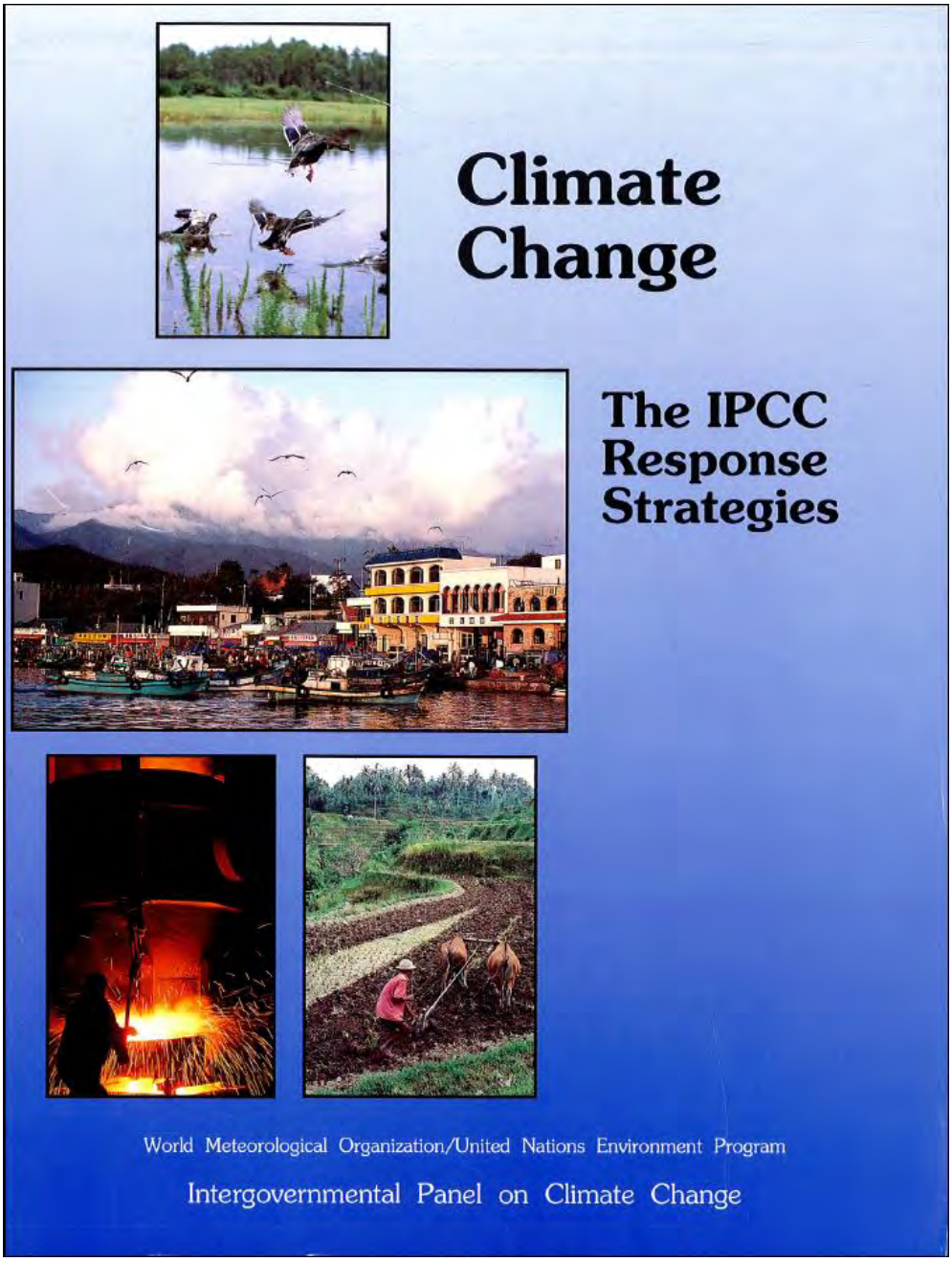

Figure 3. Working Group III: The IPCC Response Strategies (Bernthal 1990)

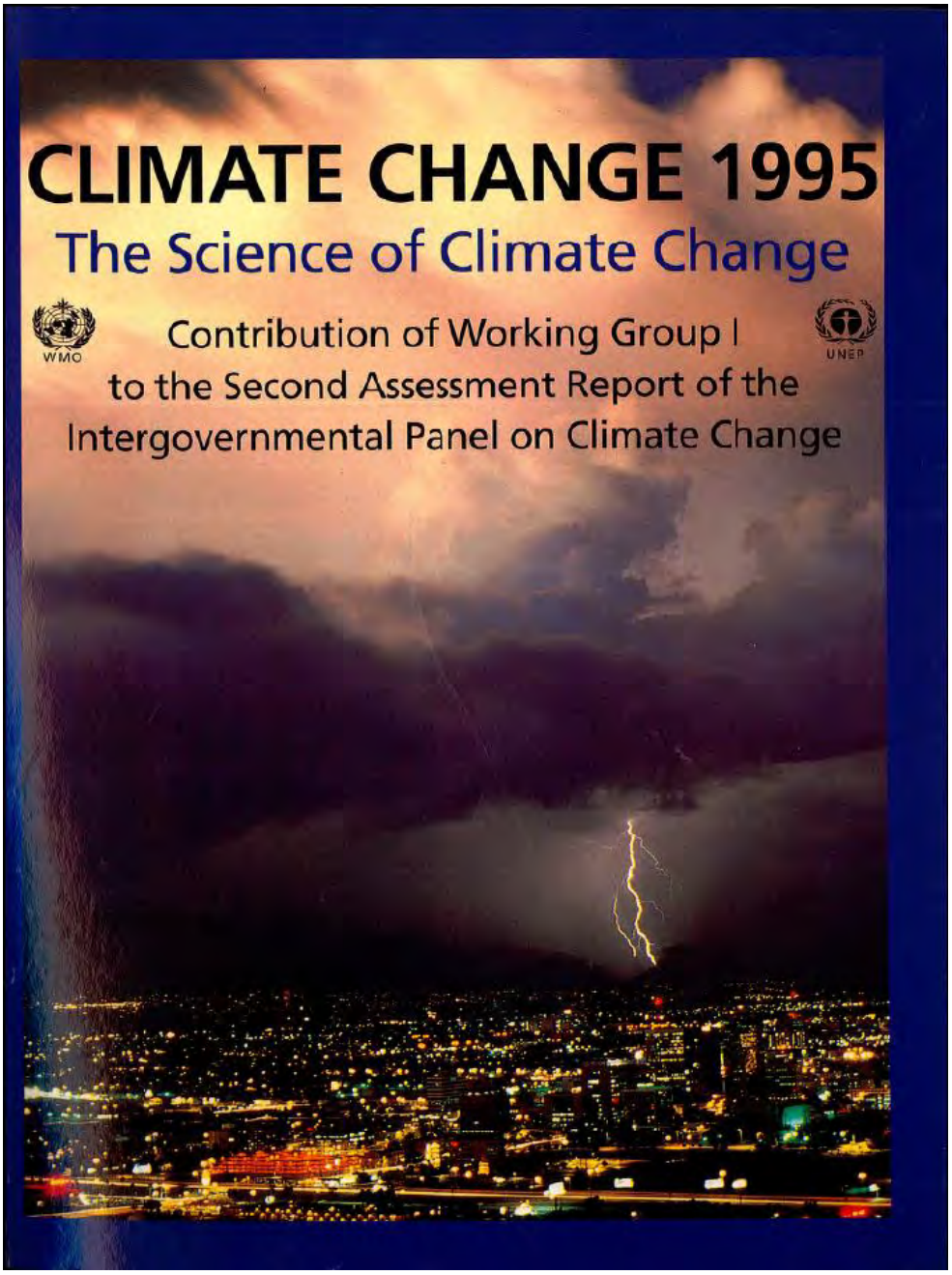

Figure 4. Working Group I: The Science of Climate Change (Houghton et al. 1995)

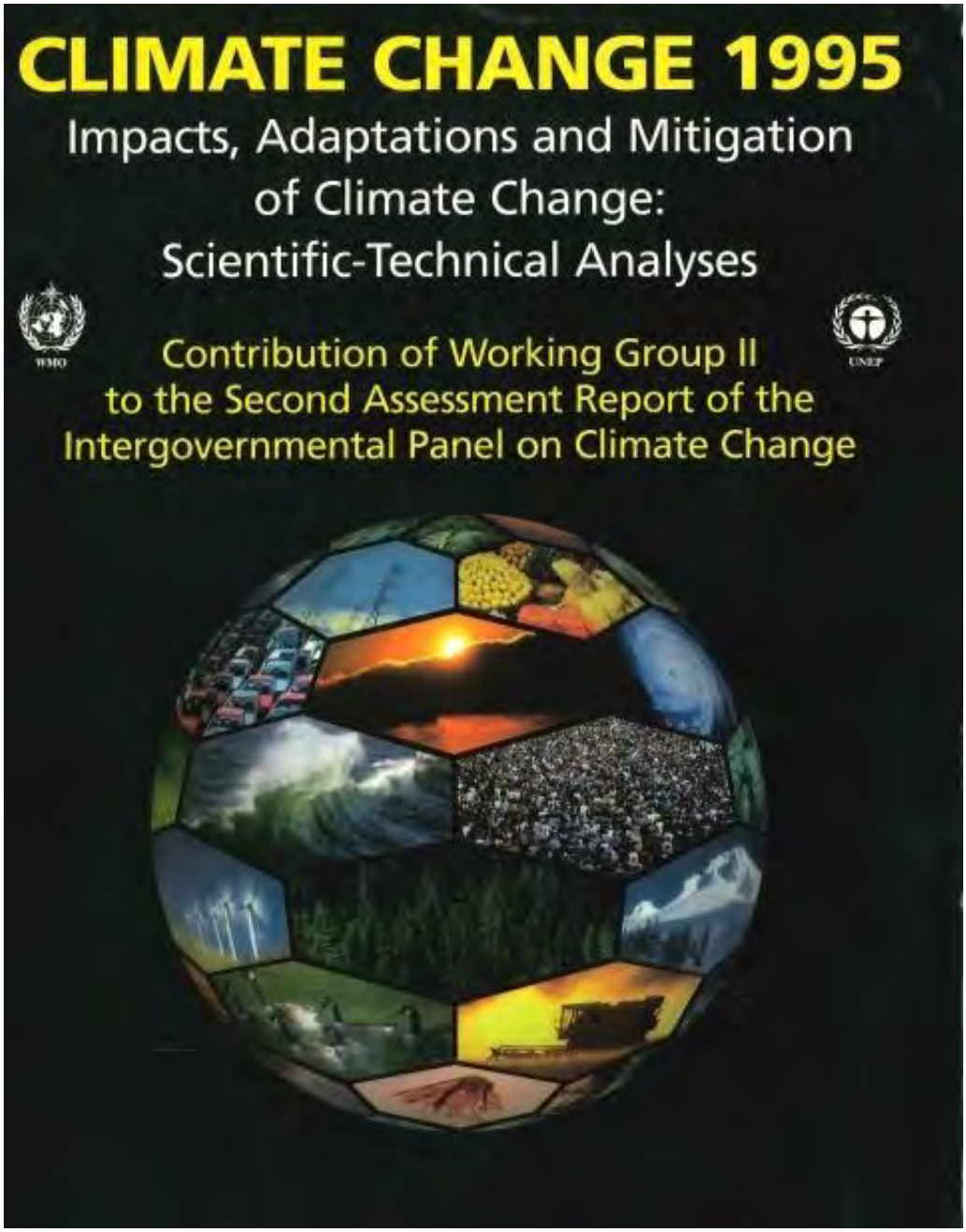

Figure 5. Working Group II: Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses (Watson et al. 1995)

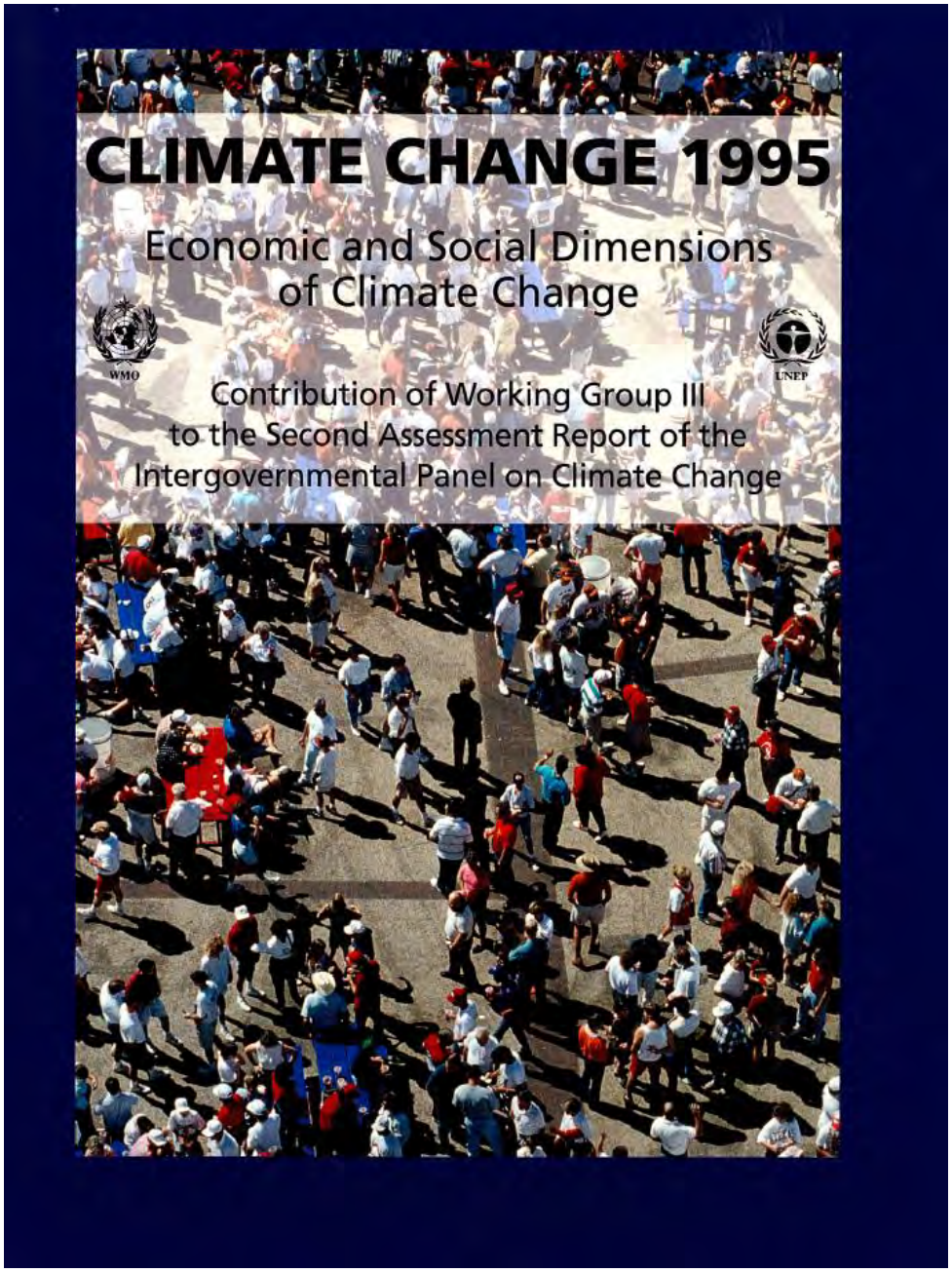

Figure 6. Working Group III: Economic and Social Dimensions of Climate Change (Bruce et al. 1995)

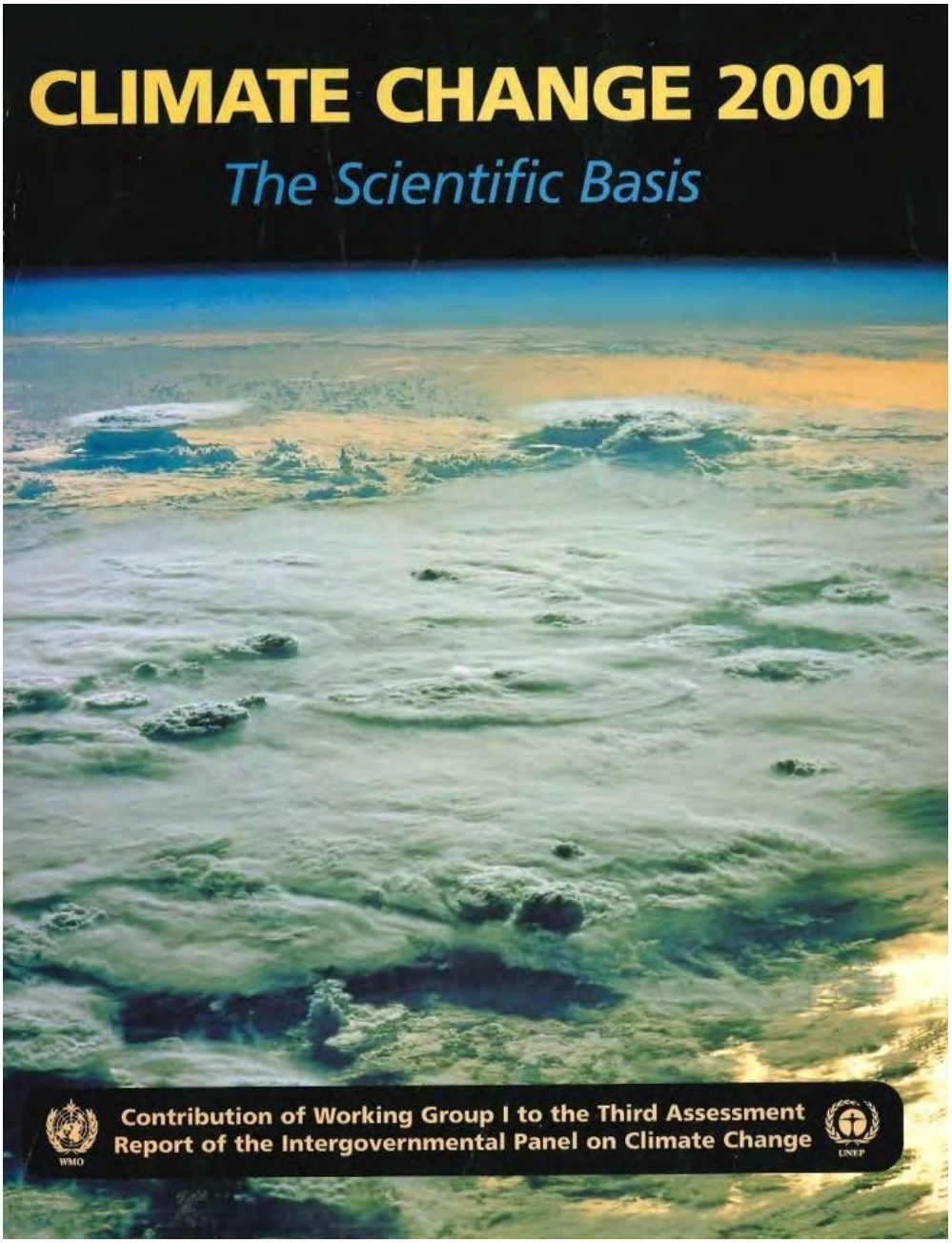

Figure 7. Working Group I: The Scientific Basis (Houghton et al. 2001)

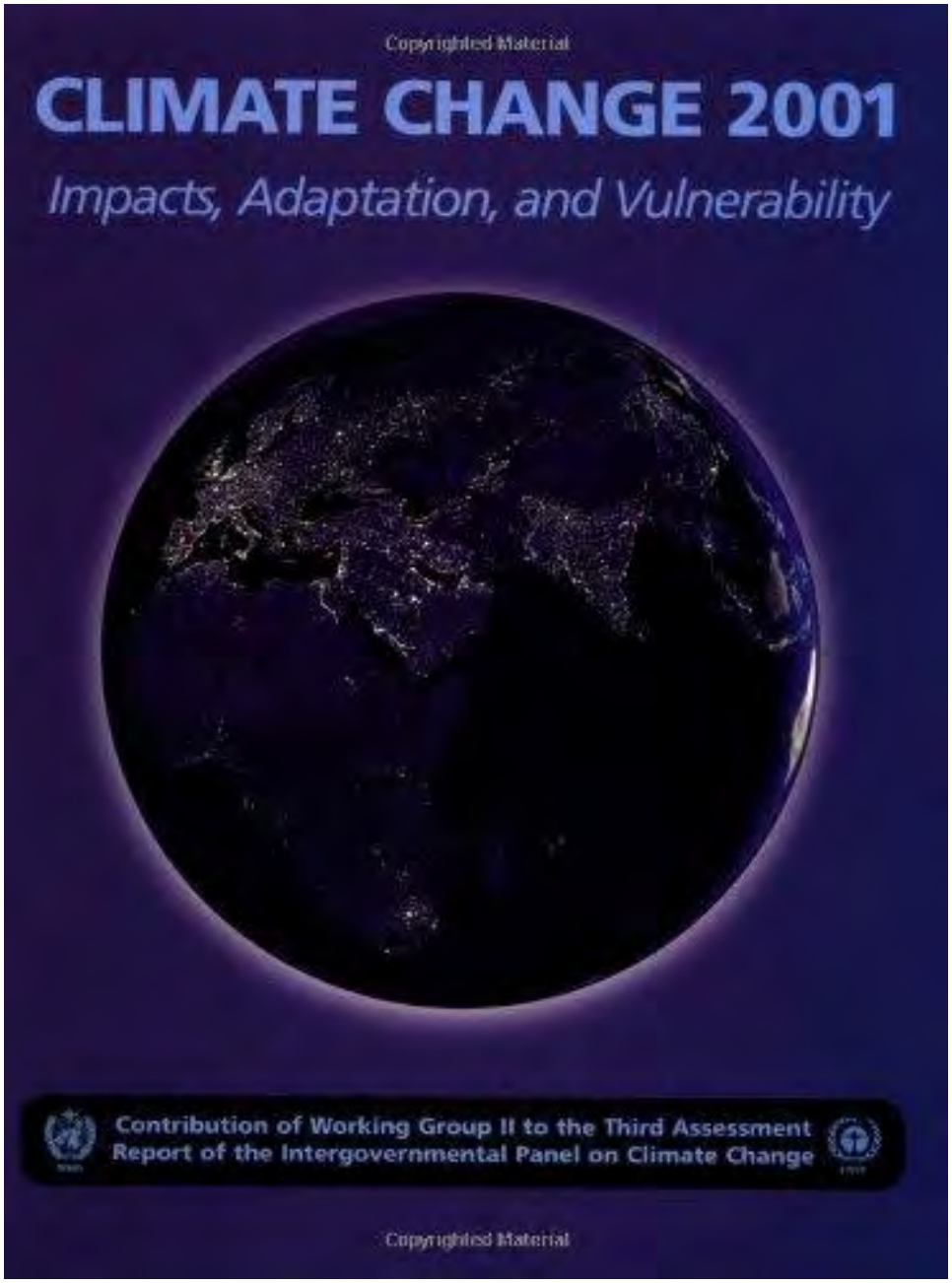

Figure 8. Working Group II: Impacts, Adaptation and Vulnerability (McCarthy 2001)

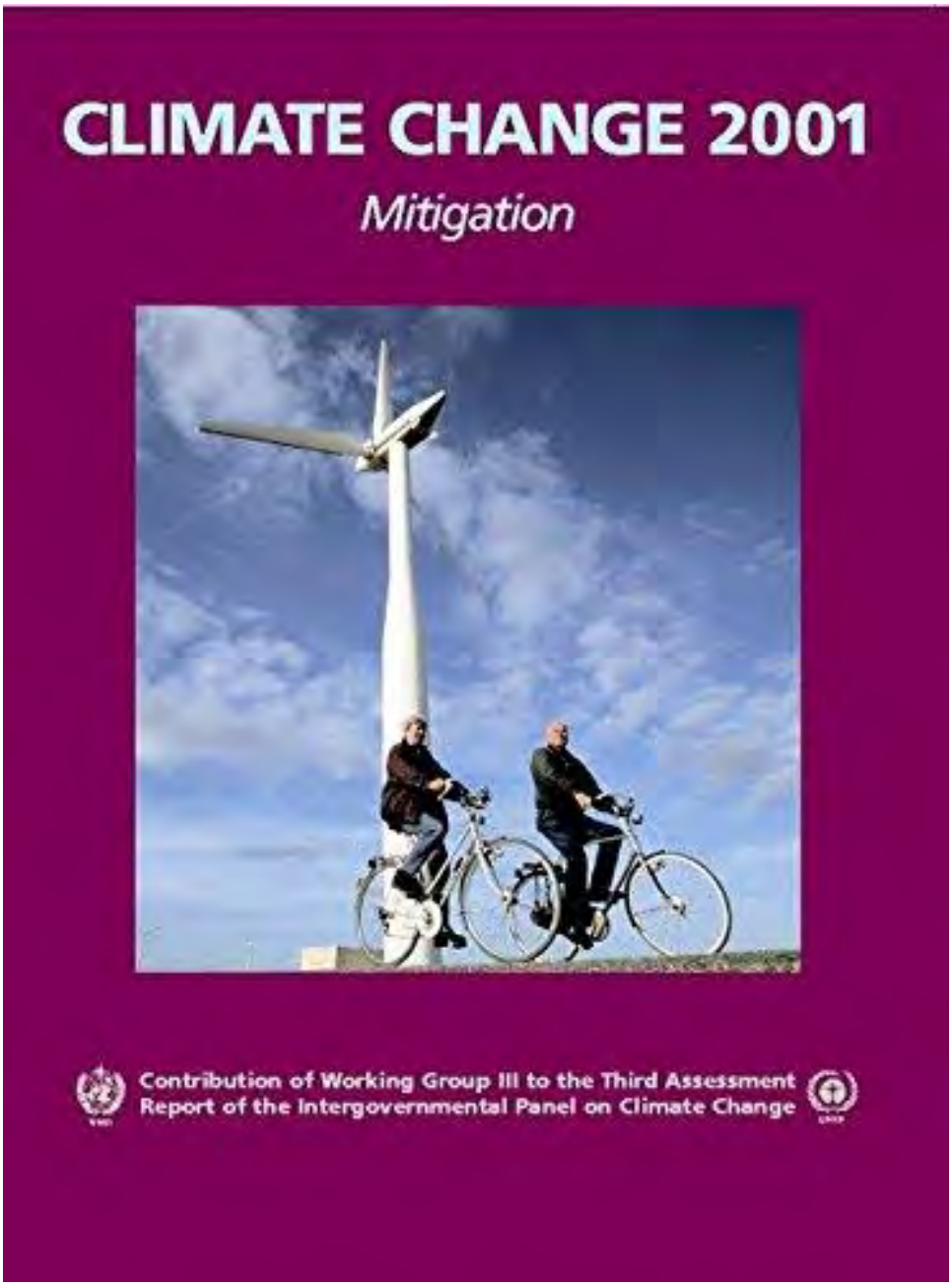

Figure 9. Working Group III: Mitigation (Metz 2001)

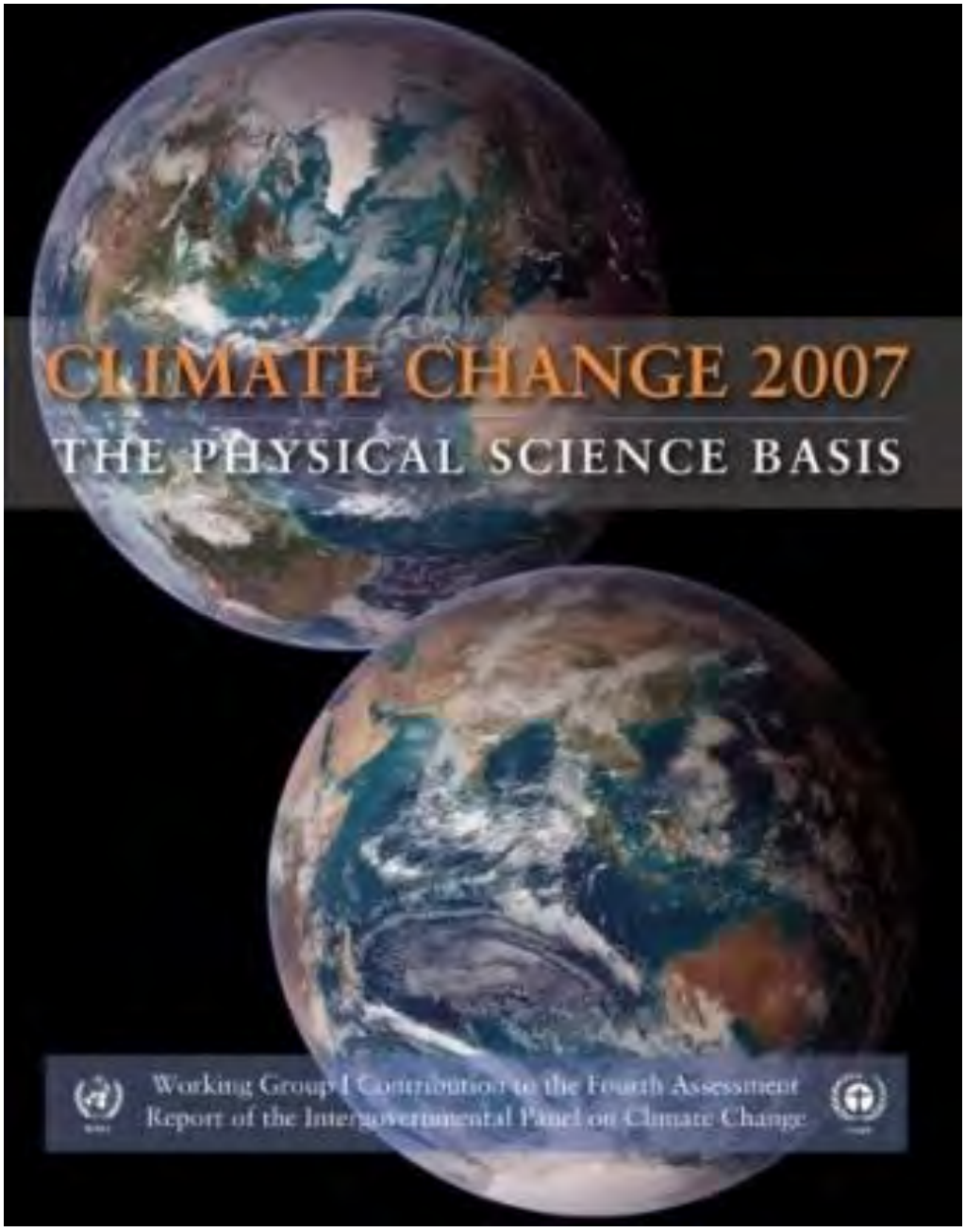

Figure 10. Working Group I: The Physical Science Basis (Solomon et al. 2007)

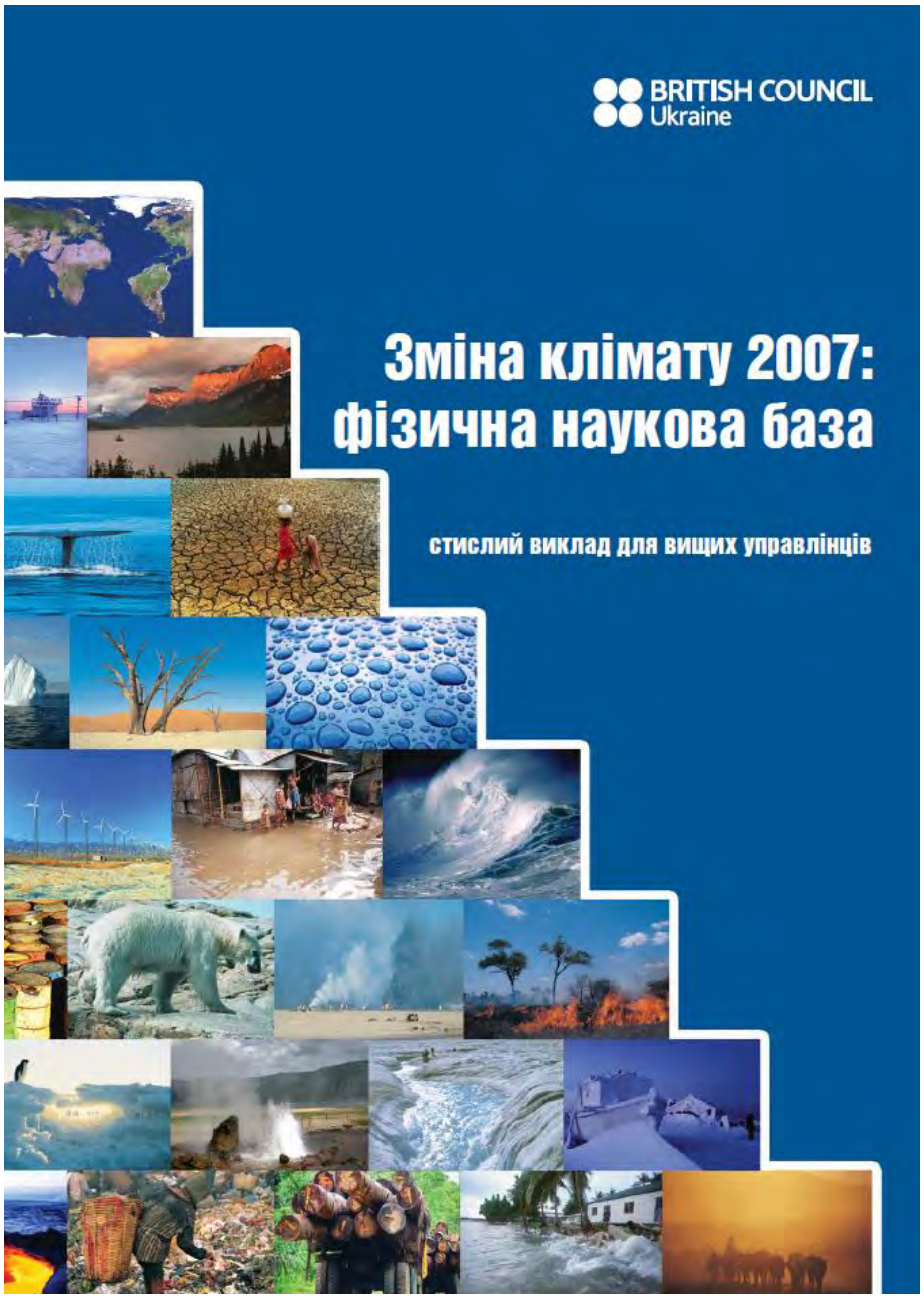

Figure 11. Ukrainian Translation: Summary for Policymakers of WG I contribution to AR4 (2007)

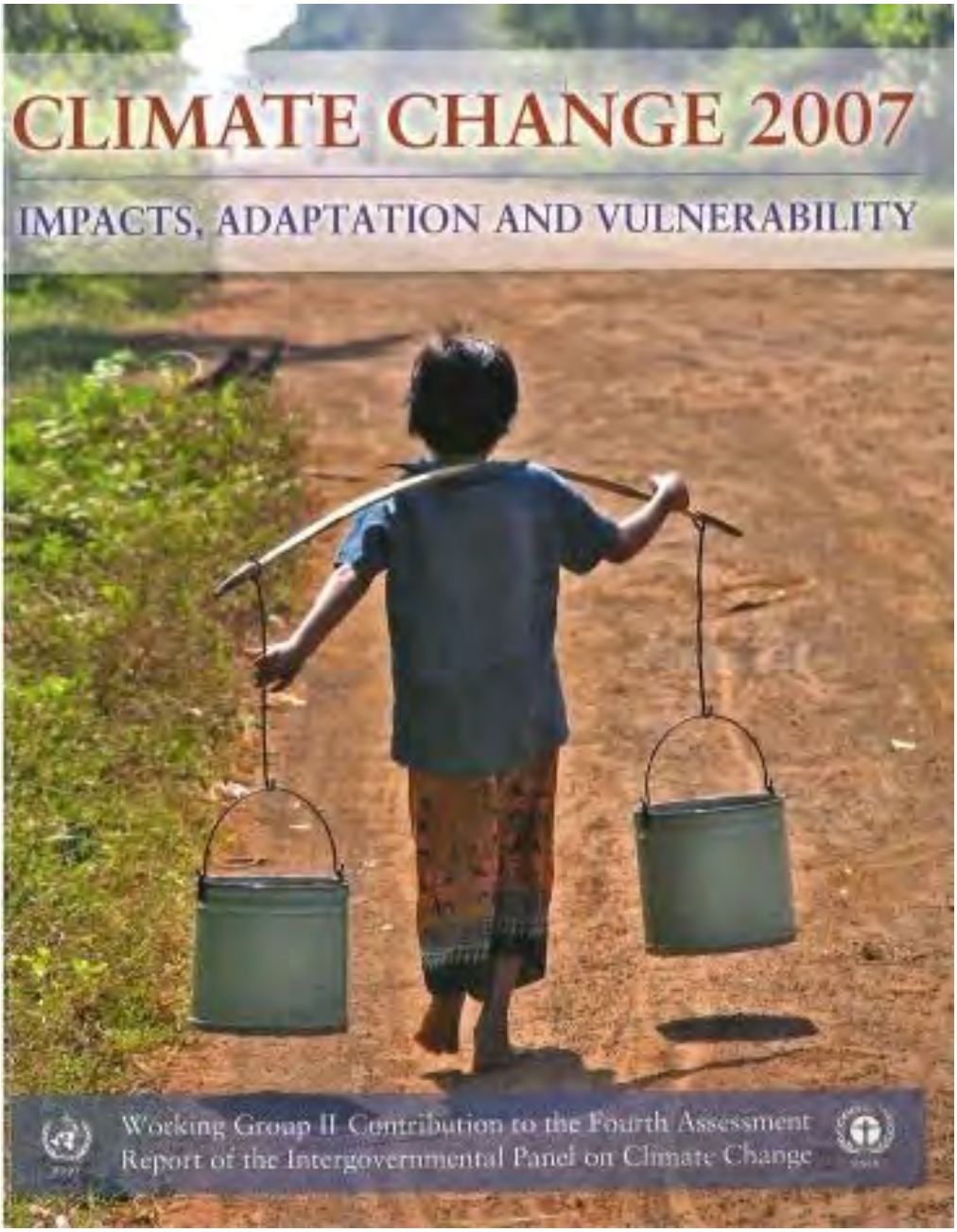

Figure l2. Working Group II: Impacts, Adaptation and Vulnerability (Parry et al. 2007)

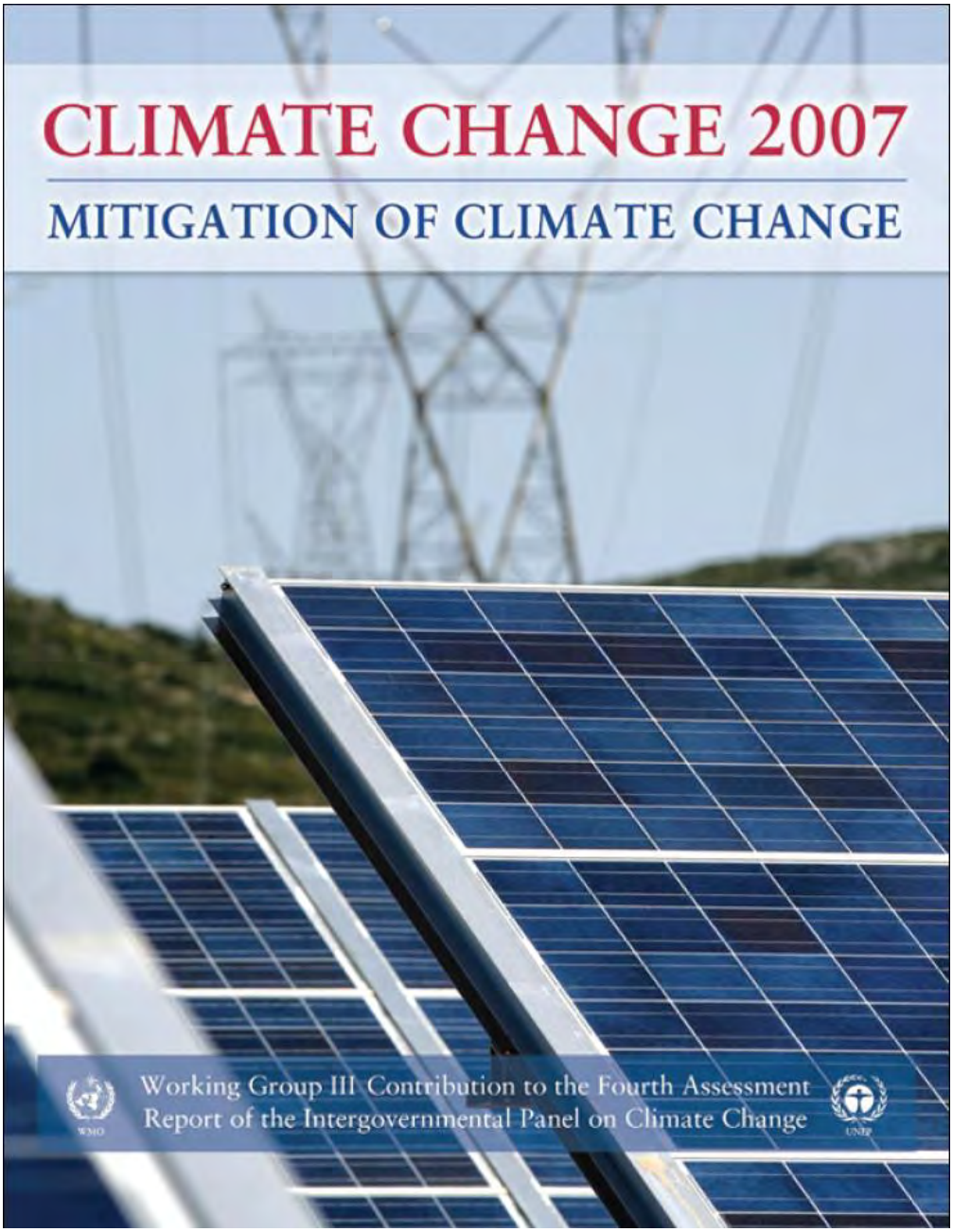

Figure 13. Working Group III: Mitigation of Climate Change (Metz et al. 2007)

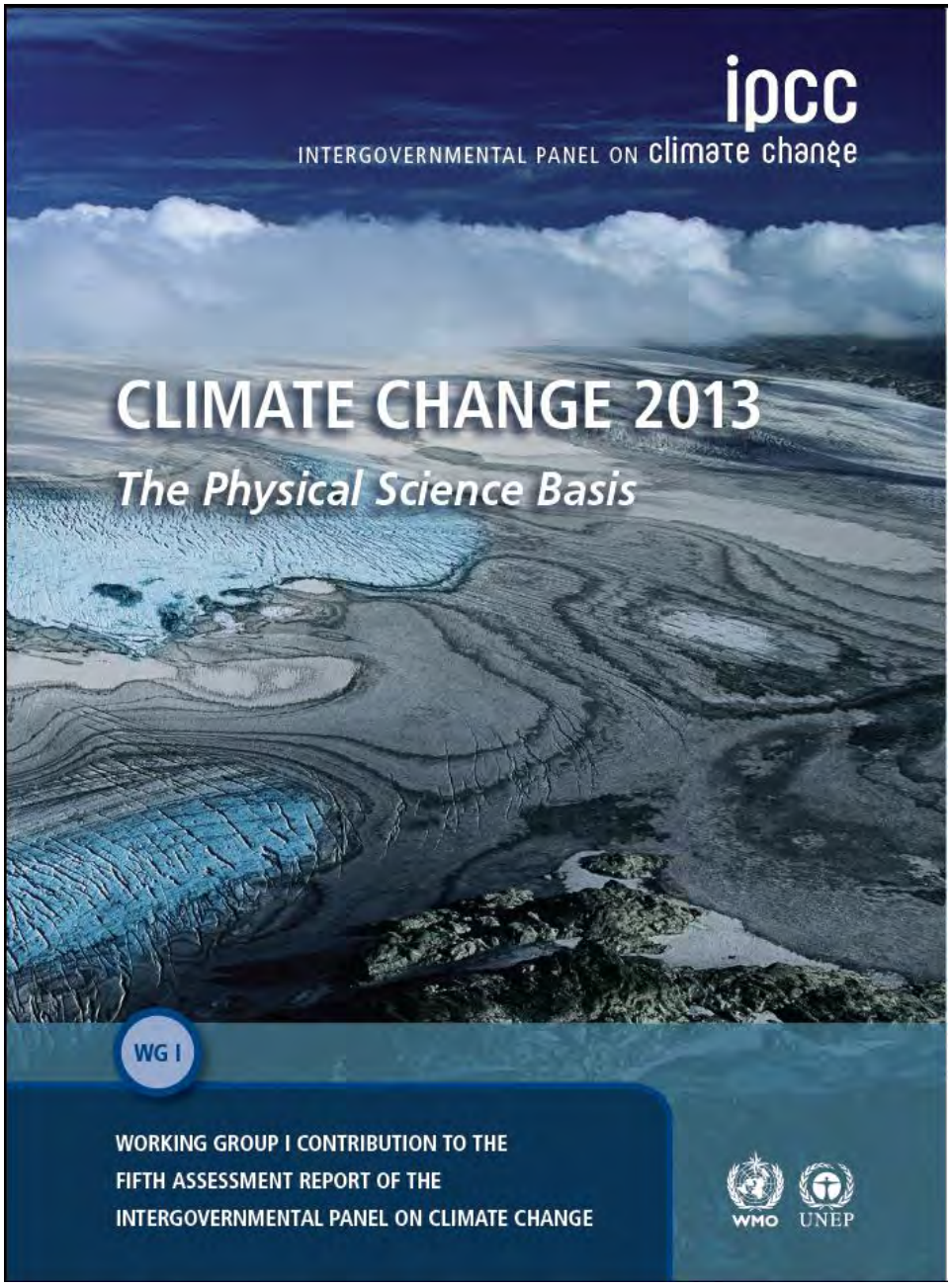

Figure 14. Working Group I: The Physical Science Basis (Stocker et al. 2013)

Figure 15. Working Group II, Volume 1: Impacts, Adaptation, and Vulnerability (Field et al. 2014)

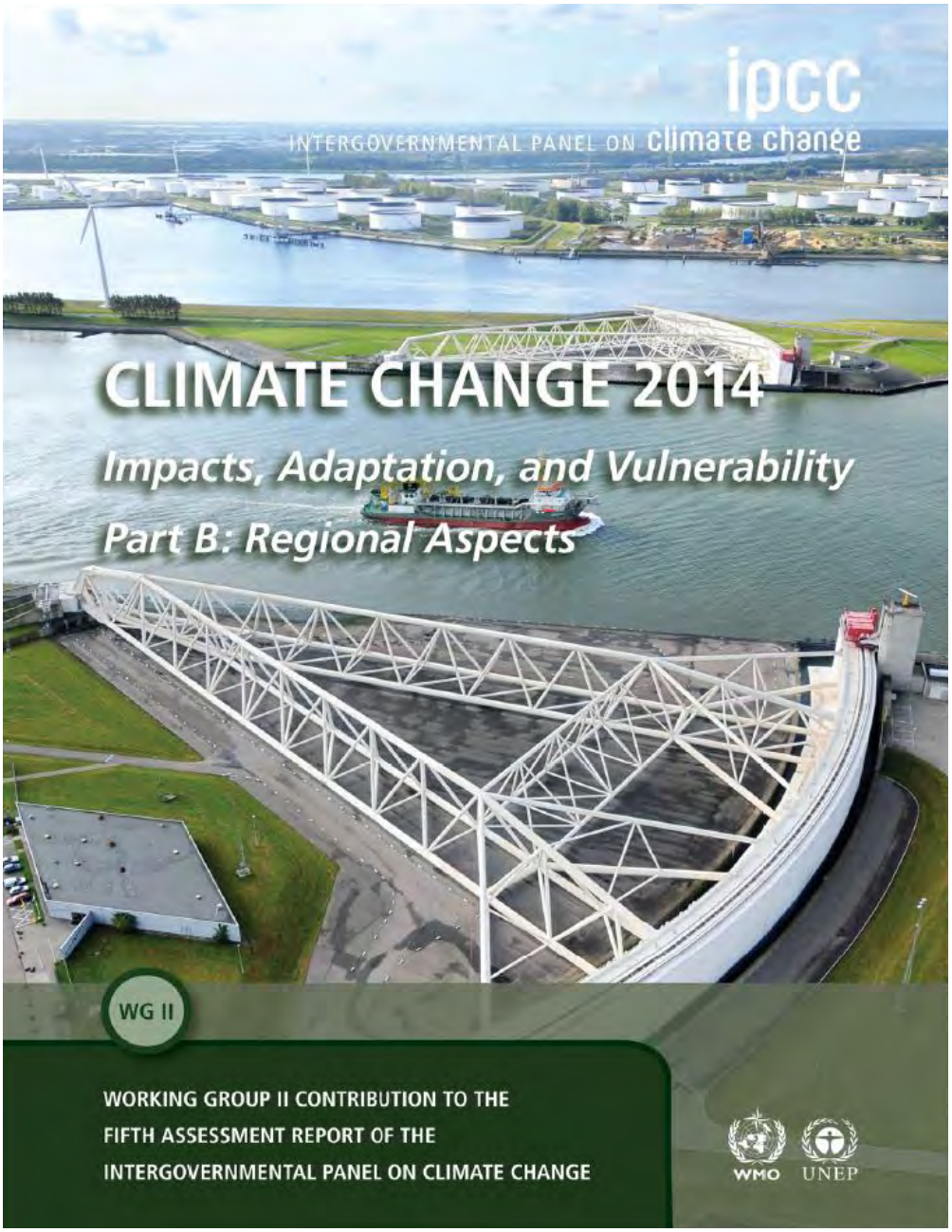

Figure 16. Working Group II, Volume II: Regional Aspects: Impacts, Adaptation and Vulnerability. (Field et al. 2014)

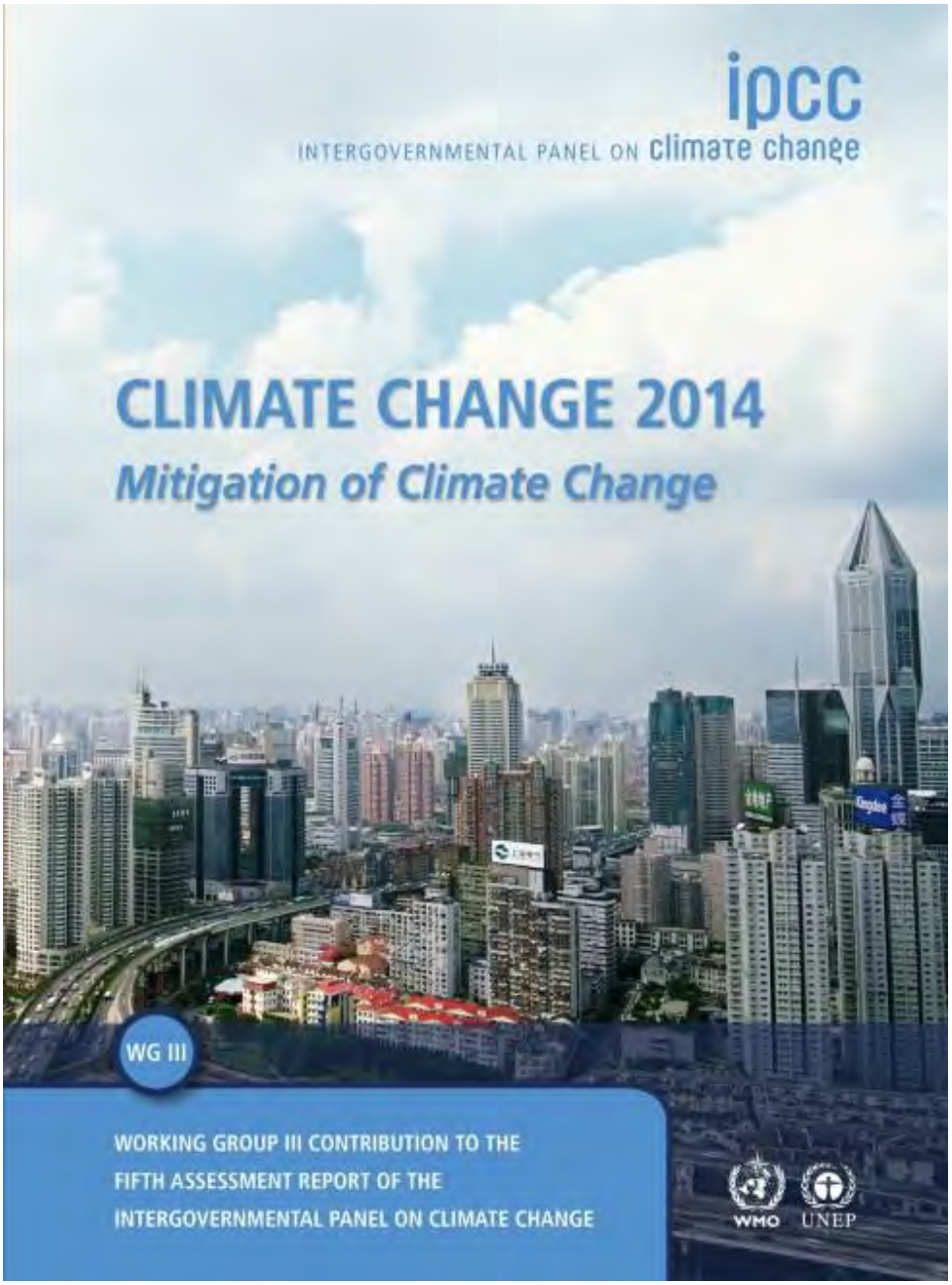

Figure 17. Working Group III: Mitigation of Climate Change (Pachauri: 2014)

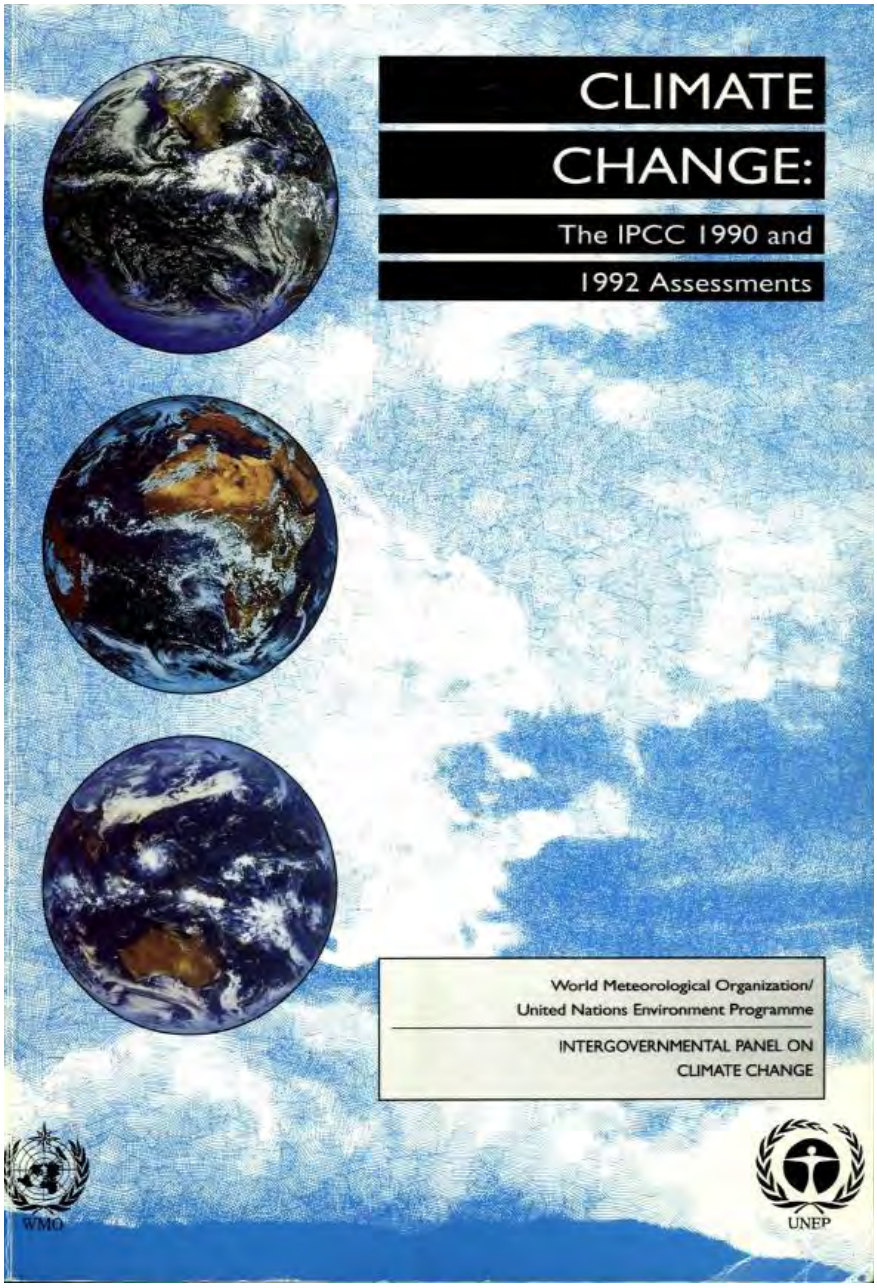

Figure 18. Supplementary Report: The IPCC 1990 and 1992 Assessments (IPCC 1992)

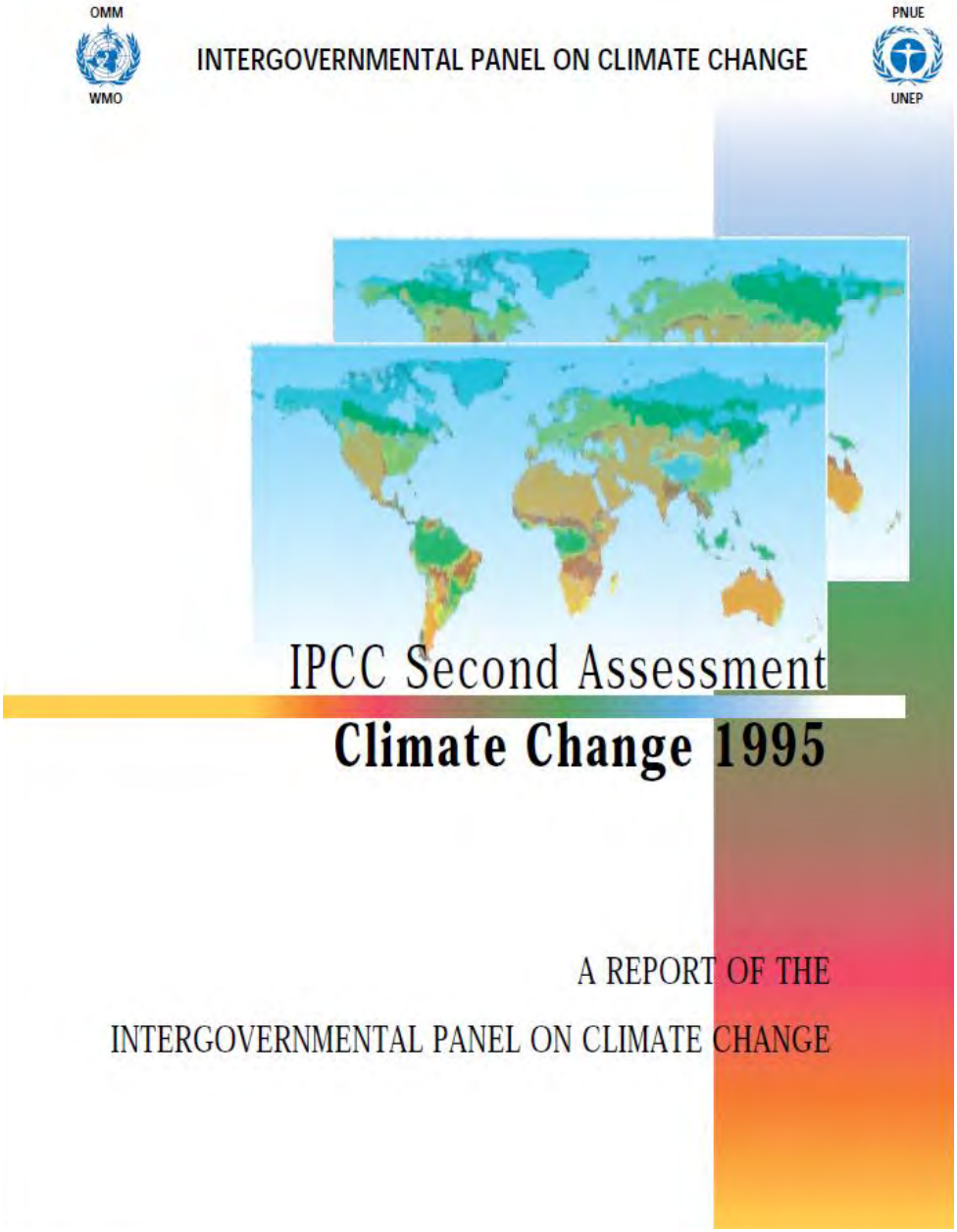

Figure 19. Synthesis Report: IPCC Second Assessment (IPCC 1995)

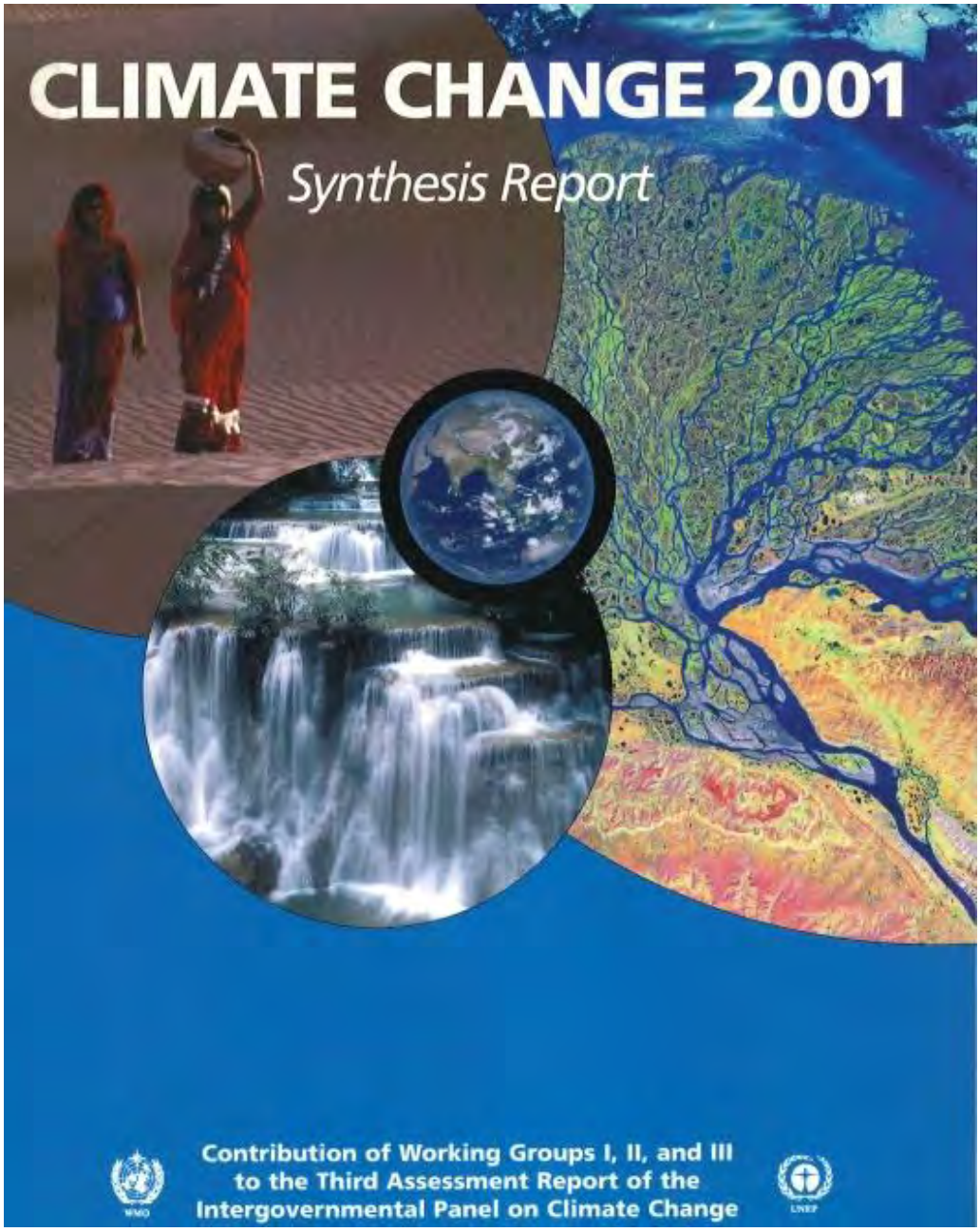

Figure 20. Synthesis Report (Watson et al. 2001)

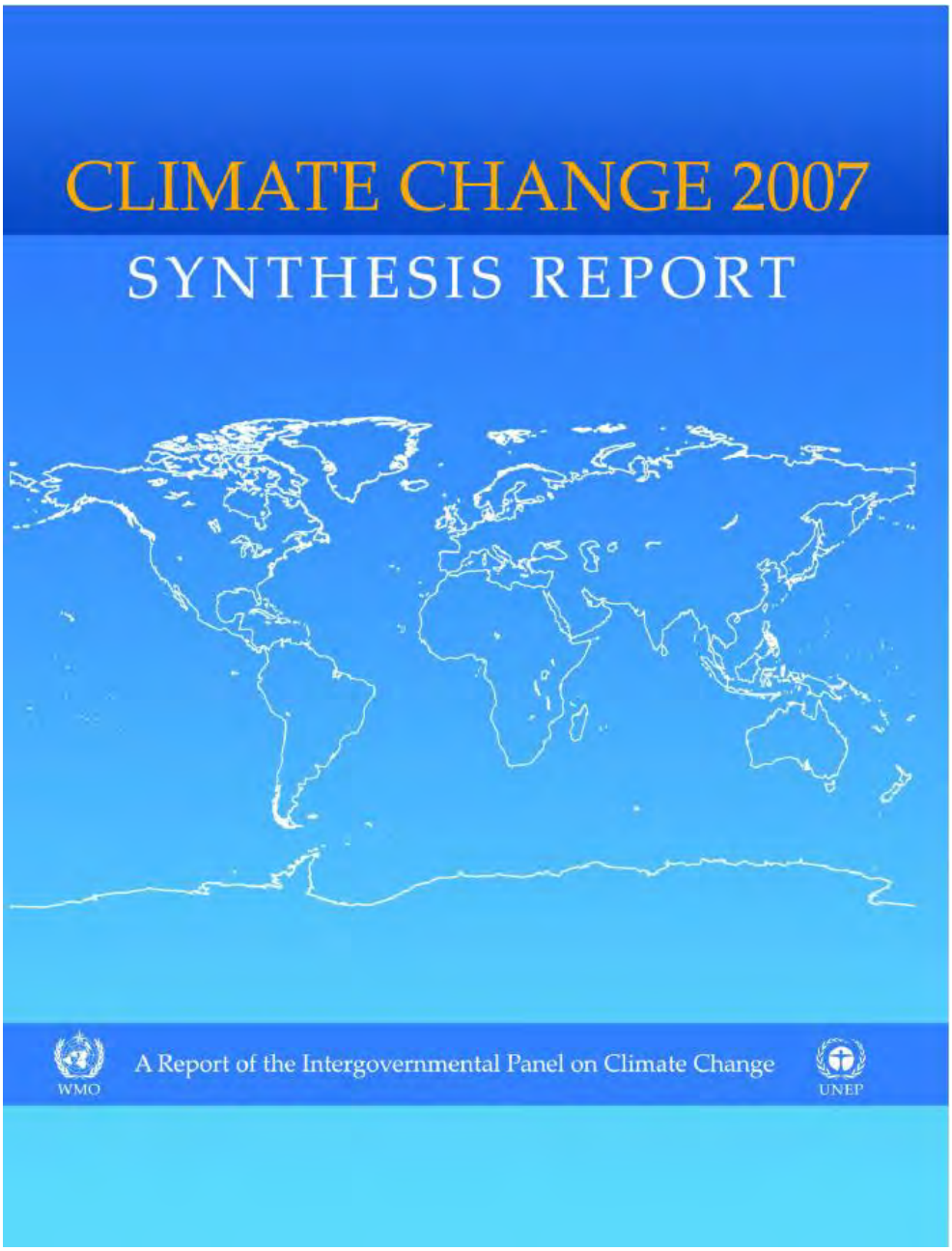

Figure 21. Synthesis Report (Bernstein et al. 2007)

Figure 22. Danish Translation: Synthesis Report (Pachauri et al.2007)

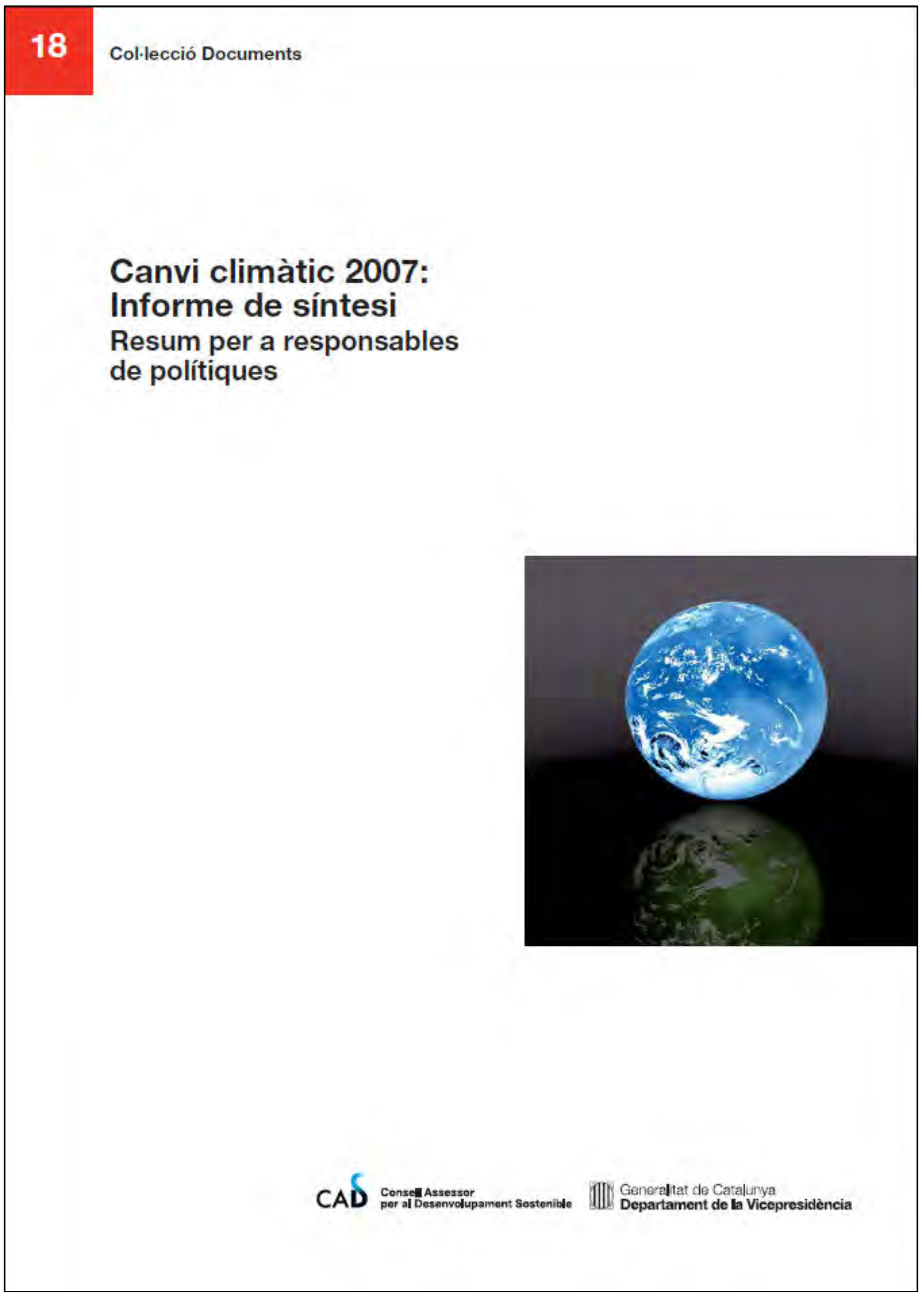

Figure 23. Catalan Translation: Synthesis Report (Pachauri et al. 2007) (Generalitat de Catalunya)

Figure 24. Swedish translation: Synthesis Report (Pachauri et al. 2007) (Swedish Environmental Protection Agency)

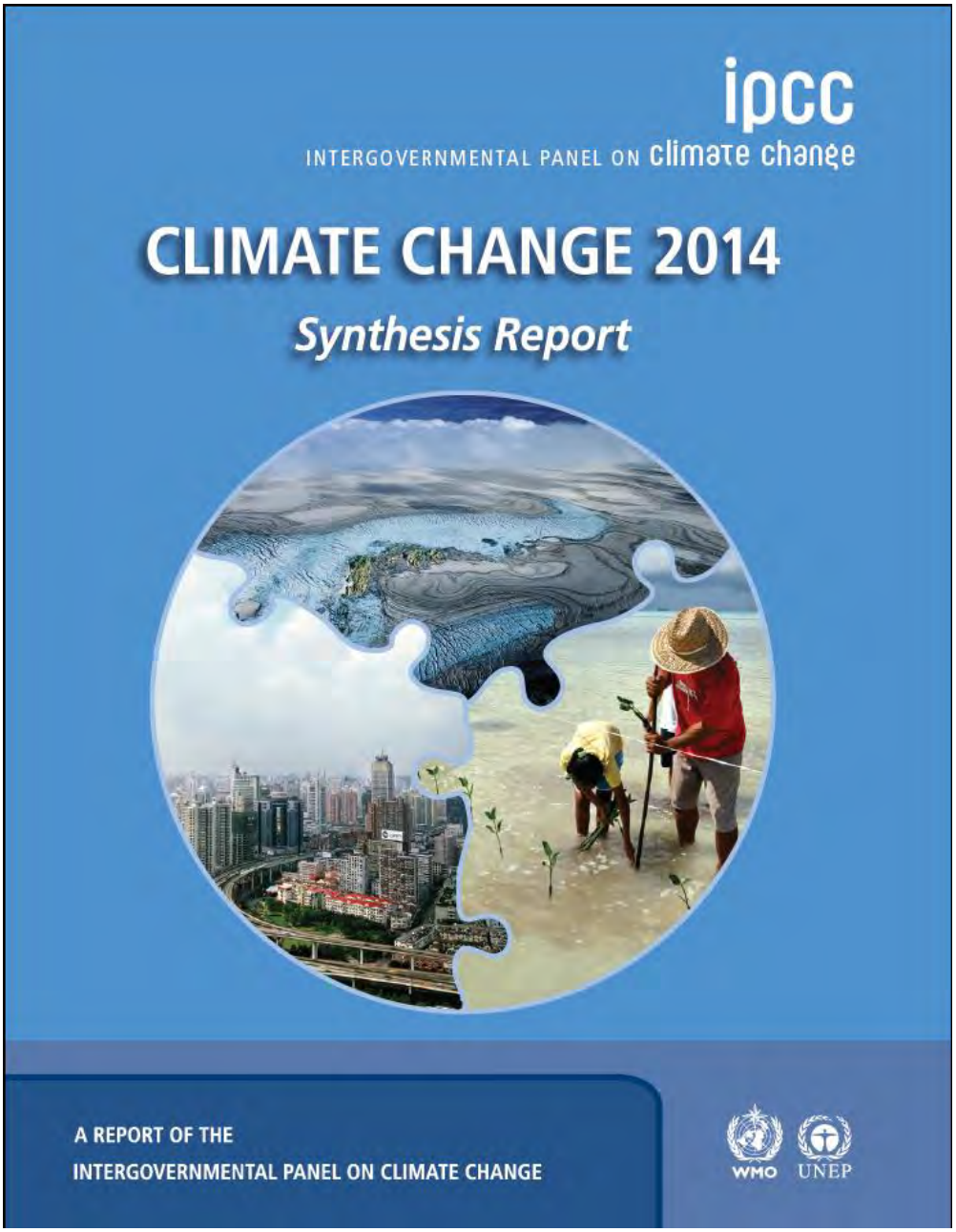

Figure 25. Synthesis Report (Pachauri et al.2014)

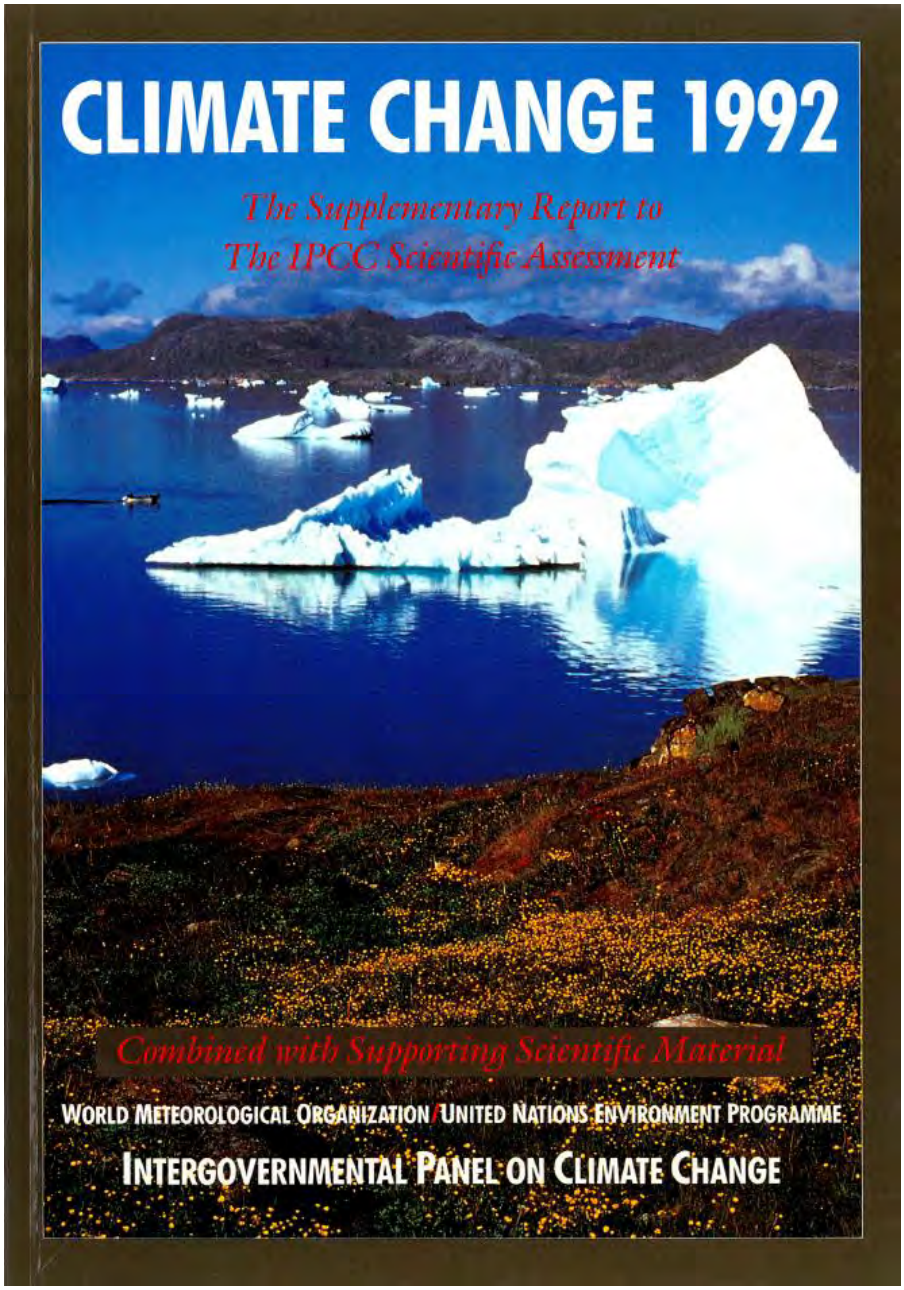

Figure 26. The Supplementary Report to The IPCC Scientific Assessment (Houghton et al. 1992)

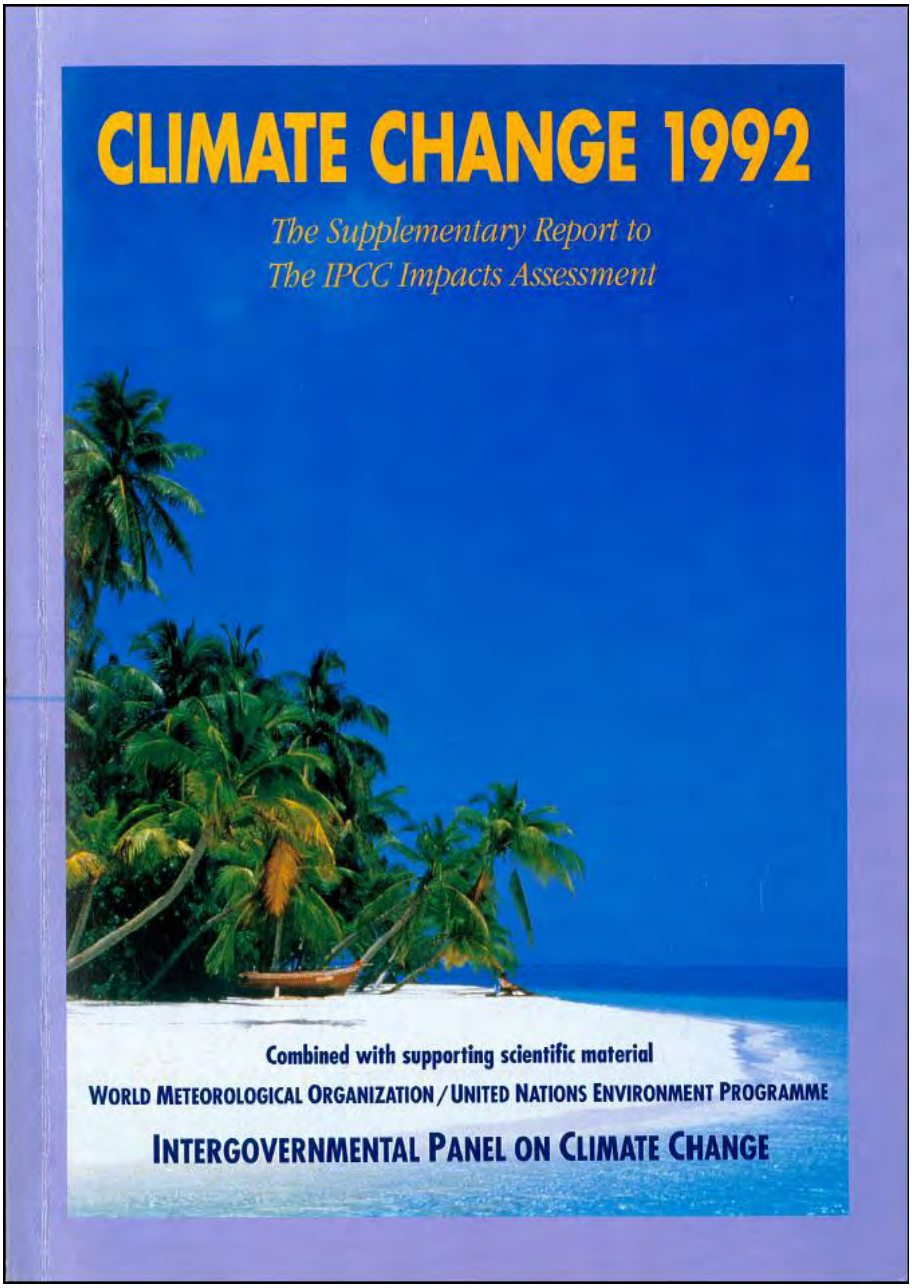

Figure 27. The Supplementary Report to The IPCC Impacts Assessment (Houghton & Callander 1992)

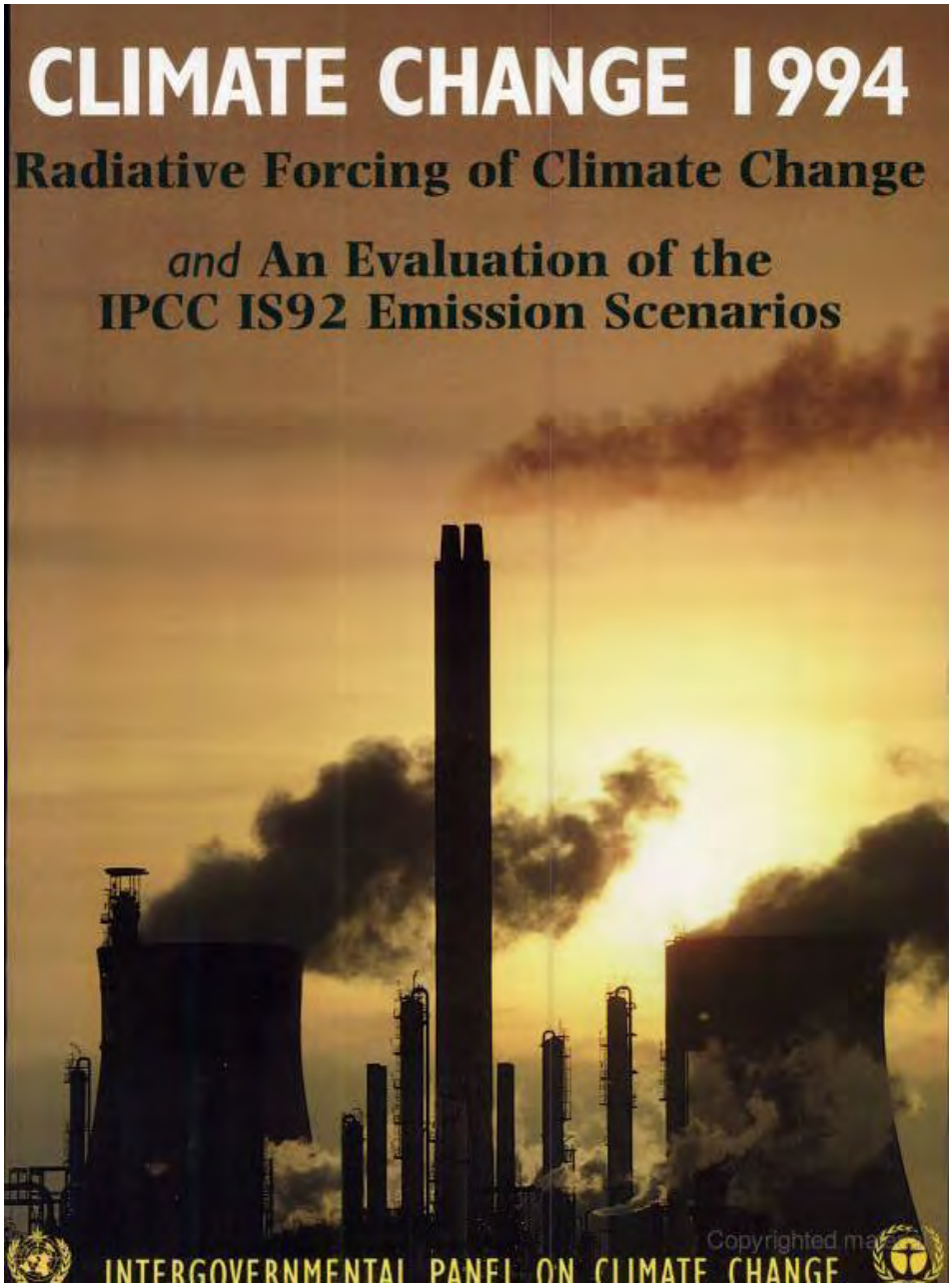

Figure 28. Special Report Radiative Forcing of Climate Change *and* An Evaluation of the IPCC IS92 Scenarios (Houghton et al. 1994)

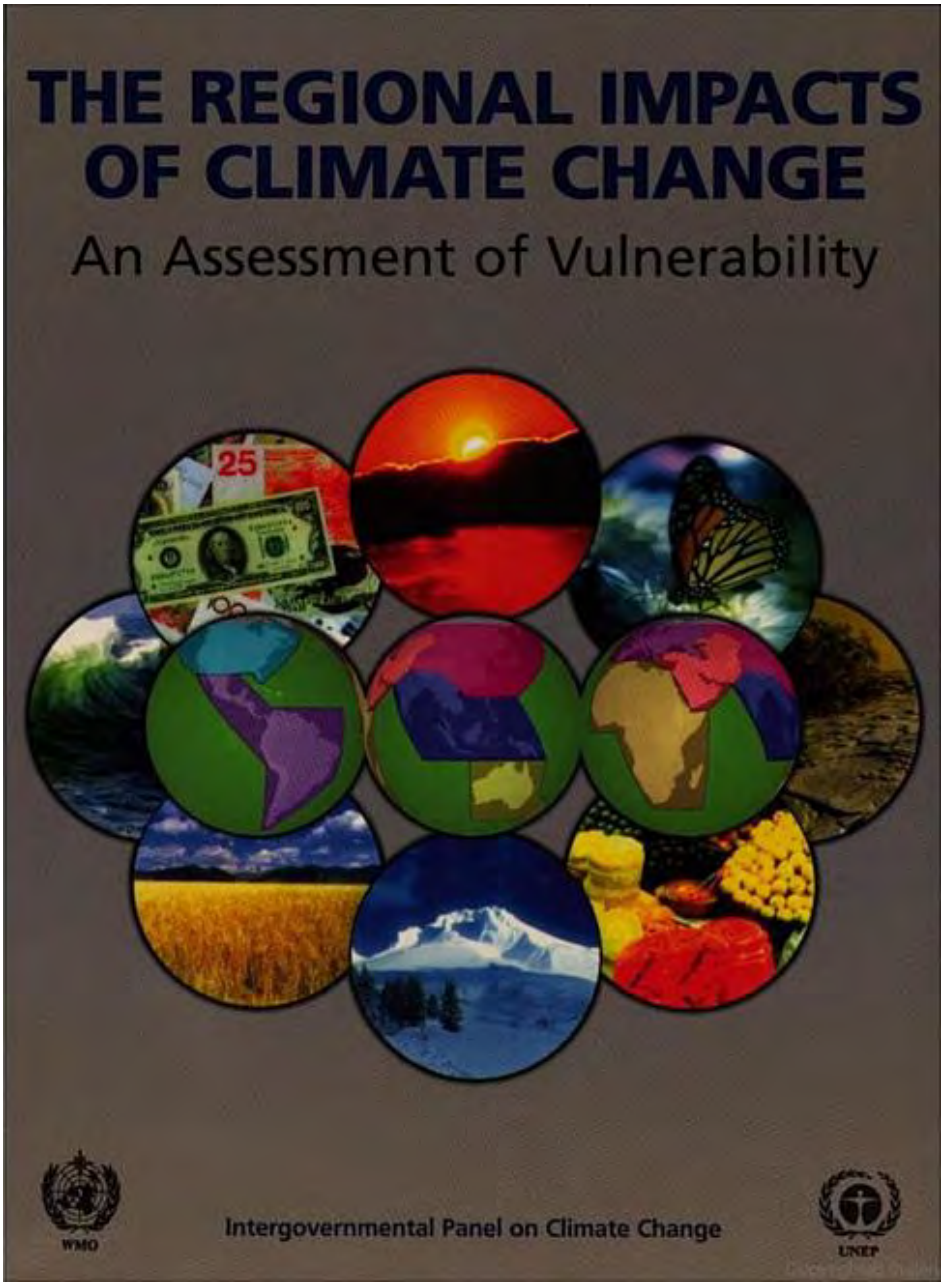

Figure 29. Special report: The Regional Impacts of Climate Change: An Assessment of Vulnerability (Watson et al. 1997)

Figure 30. Special report**: Aviation and the Global Atmosphere (**Penner et al. **1999)**

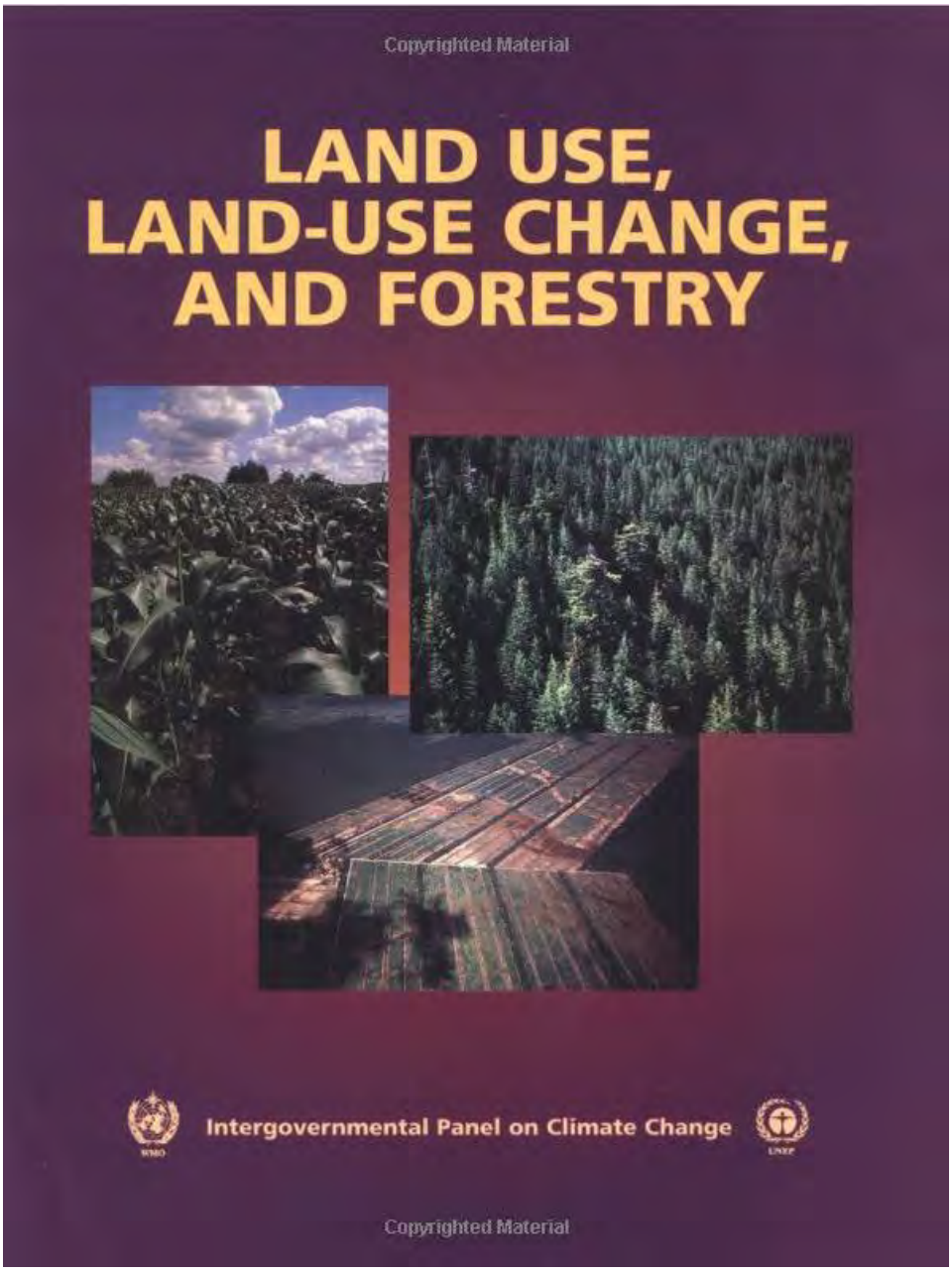

Figure 31. Special Report: **Land Use, Land-Use Change, and Forestry (**Watson et al. **2000)**

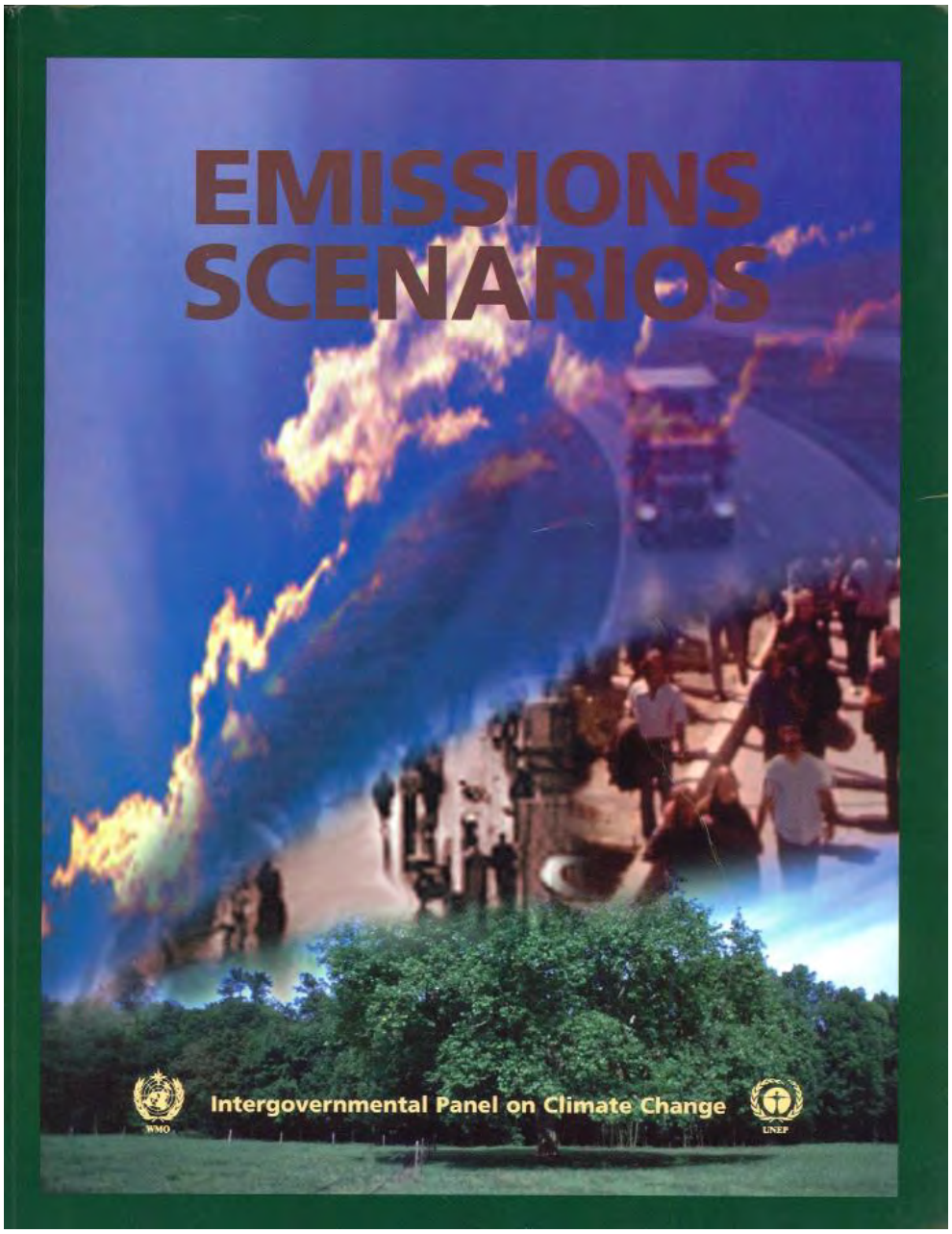

Figure 32. Special Report: **Emissions Scenarios (**Nakicenovic et al. **2000)**

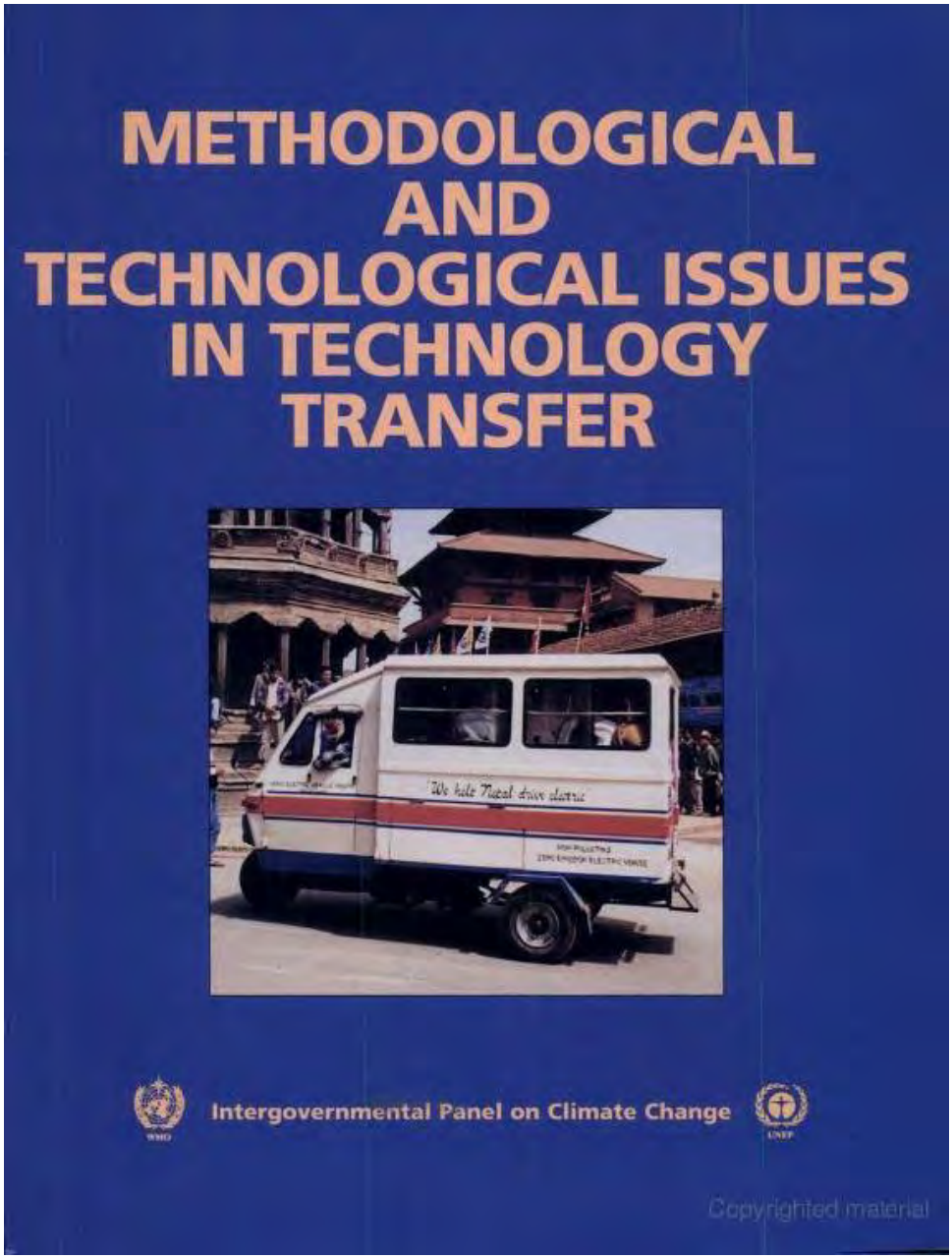

Figure 33. Special report: Methodological and Technological Issues in Technology Transfer (Metz et al. 2000)

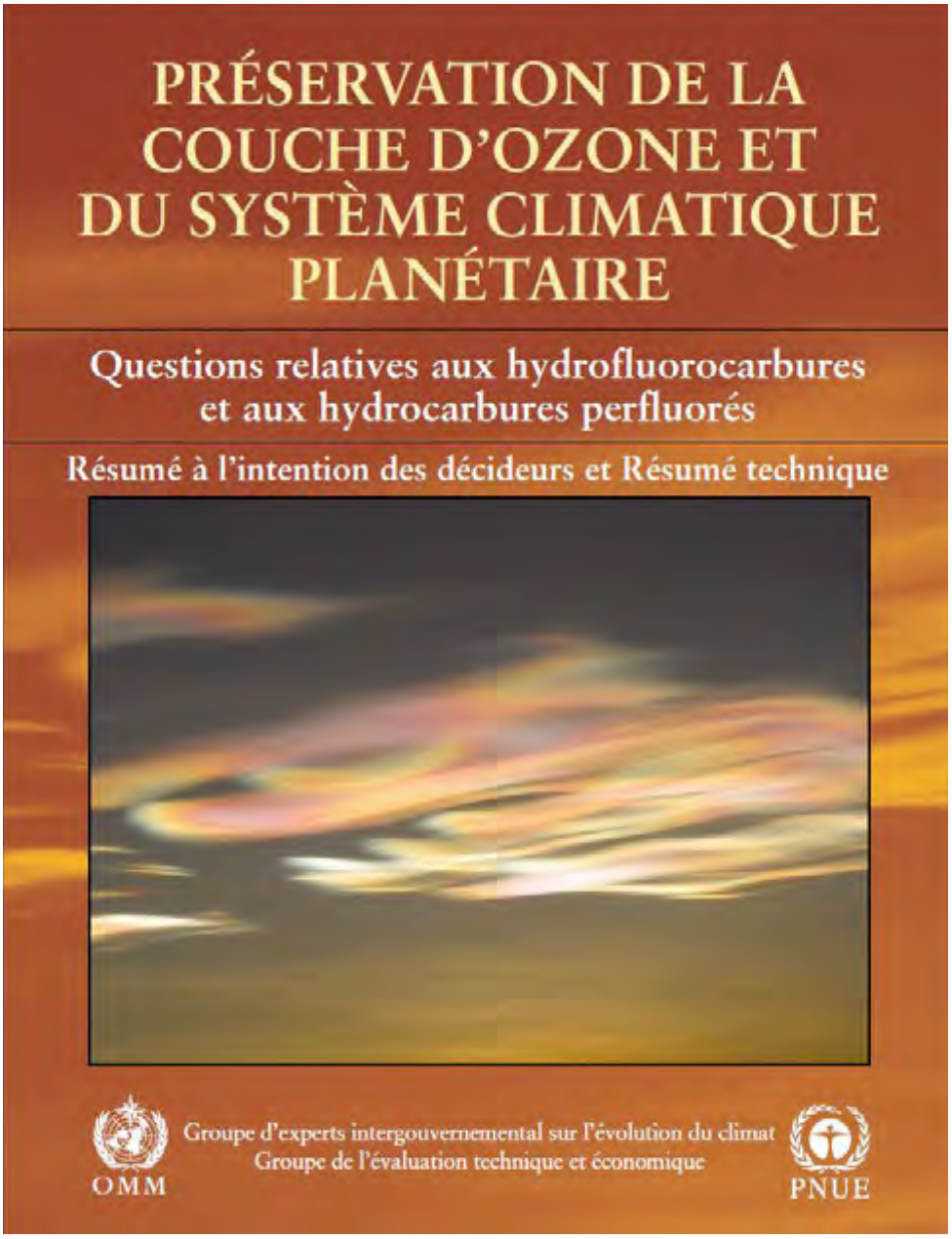

Figure 34. Special report: Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons (de Jager et al. 2005)
*This is the French version of the original cover. All efforts were made to secure a high resolution version of the original English cover, however the only high resolution image available was in the translations. All elements are the same as in the original save for the translated text.

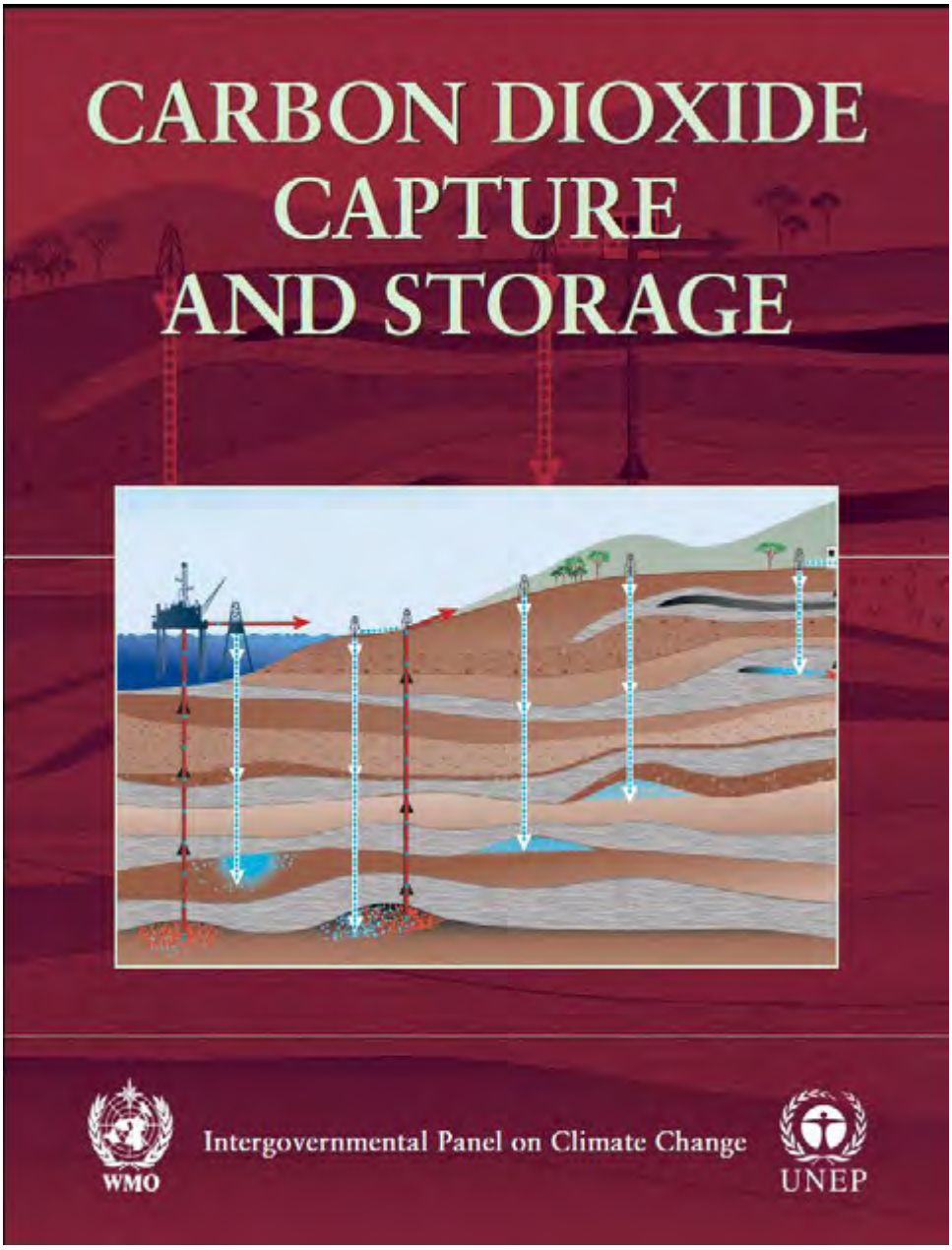

Figure 35. Special report: Carbon Dioxide Capture and Storage (Metz et al. 2005)

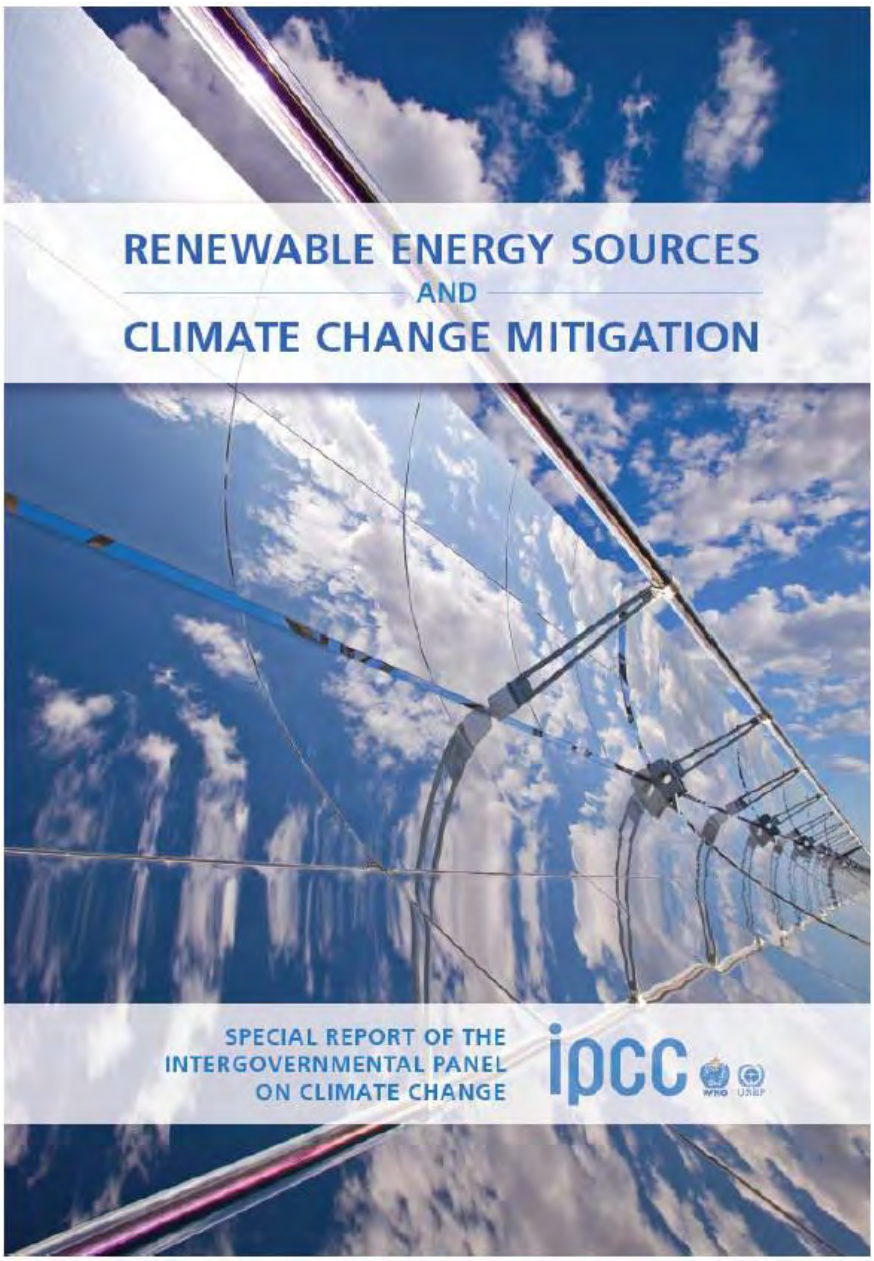

Figure 36. Special Report: Renewable Energy Sources and Climate Change Mitigation (Edenhofer et al. 2011)

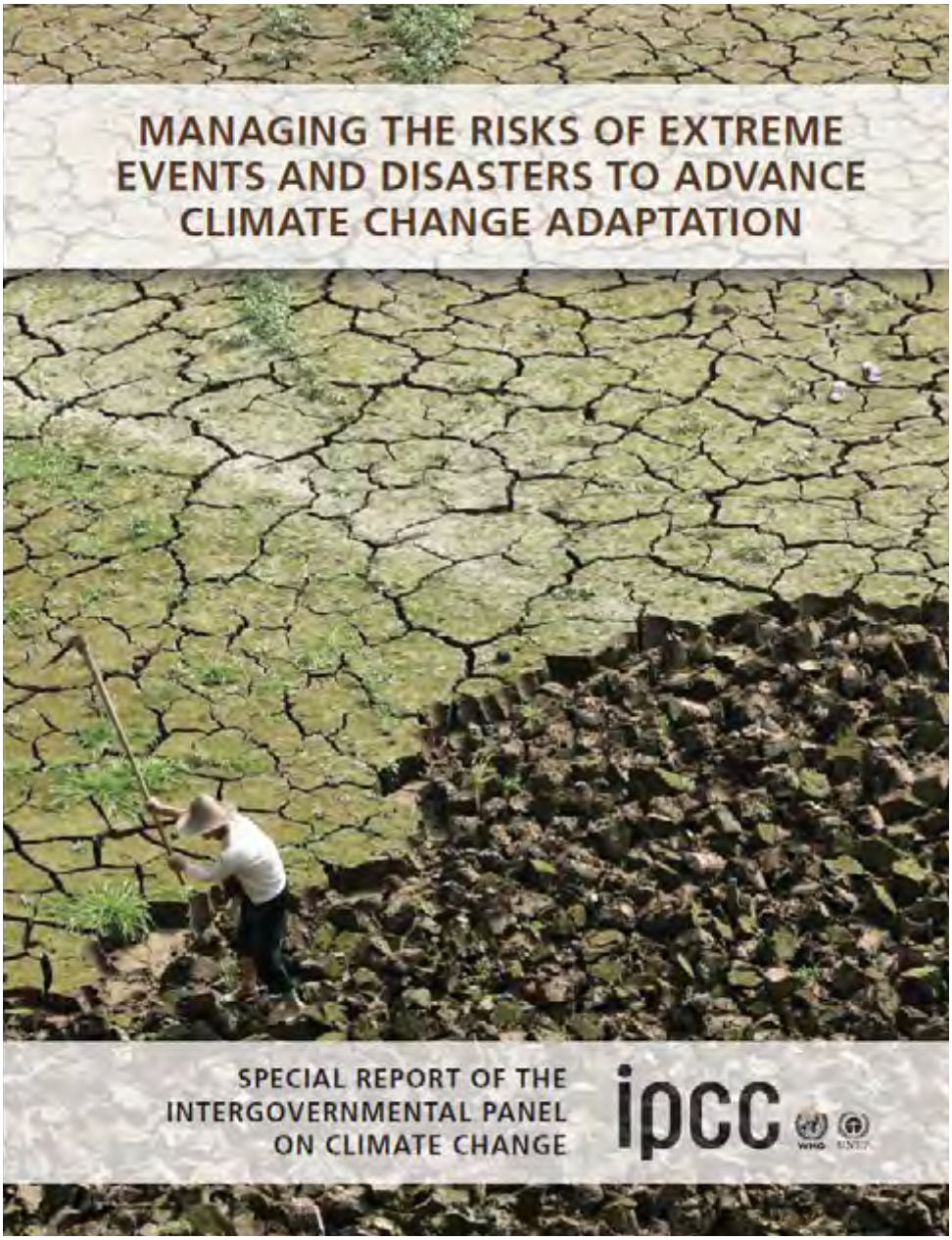

Figure 37. Special Report: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (Field et al. 2012)