SYMPOSIUM ON MARINE GEOENGINEERING

DIRECTIONS FOR SCIENCE AND GOVERNANCE AFTER THE PARIS AGREEMENT

25 NOVEMBER 2016

UNIVERSITY of TASMANIA

IMAS
INSTITUTE FOR MARINE & ANTARCTIC STUDIES

ANTARCTIC CLIMATE & ECOSYSTEMS
COOPERATIVE RESEARCH CENTRE

FACULTY OF LAW
UNIVERSITY of TASMANIA

9:00 – 9:25

Registration

9:25 – 9:30

Opening

Professor Richard Coleman

Executive Director IMAS, Pro-Vice Chancellor (Research Infrastructure and Collaborations), University of Tasmania

9:30 – 11:00

Current Scientific Perspectives on Marine Geoengineering

Chair: Professor Tony Worby

Chief Executive Officer, Antarctic Climate & Ecosystems Cooperative Research Centre

The Science of Ocean Iron Fertilisation

Associate Professor Andrew Bowie

University of Tasmania (IMAS) & ACE CRC

One of the most prominent among the proposed carbon dioxide removal interventions is ocean fertilisation, which targets the removal of carbon dioxide by the addition of nutrients such as iron, nitrogen or phosphorus compounds to stimulate the growth of marine phytoplankton. When marine phytoplankton die and sink into the deep-ocean, their carbon is sequestered where it may remain out of contact with the atmosphere for decades to millennia (i.e., via the 'biological pump'). Deliberate (also known as 'artificial' or 'purposeful') ocean fertilisation has been carried out in more than a dozen scientific field experiments since 1994, and other studies have examined biological pump processes in areas that receive natural nutrient inputs. Proposals for large-scale (>1000 km2) application of ocean fertilisation, some of which have been led by commercial enterprises, have been controversial, attracting criticism from scientists, environmental groups and the public. This talk summarises the science and status of knowledge of ocean fertilisation.

Developing a test-bed for robust research governance of geoengineering: the role of research into ocean iron-enrichment

ARC Laureate Fellow Professor Philip Boyd

University of Tasmania (IMAS) & ACE CRC

Geoengineering to mitigate climate change has long been proposed, but remains nebulous. Exploration of the feasibility of geoengineering first requires the development of research governance to move beyond the conceptual towards scientifically designed pilot studies. Fortuitously, 12 mesoscale (~1000km2) iron enrichments, funded to investigate how ocean iron biogeochemistry altered Earth's carbon cycle in the geological past, provide proxies to better understand the benefits and drawbacks of geoengineering. The utility of these iron enrichments in the geoengineering debate is enhanced by their value in developing mathematical modelling studies, and in helping to both devise and improve policy initiatives and maritime legislation. In this presentation I will make the case that two decades of such multi-faceted transdisciplinary research position ocean iron-enrichments to be an invaluable test-bed to explore the challenges and benefits of research governance into geoengineering. Such governance will be a necessary precursor to any development of geoengineering approaches that might result from the need to intervene in Earth's climate to limit anthropogenically-driven warming to 1.5C.

Carbon Dioxide Removal Modelling

Dr Andrew Lenton

CSIRO & ACE CRC

Recent studies have suggested that deep cuts in emissions may not sufficient to avoid significant impacts on the land and ocean, and the ecosystem services that they provide. This was reflected in the Paris Agreement (COP21) that recognized that Carbon Dioxide Removal (CDR), or Negative Emissions, will be required to limit global warming to the agreed target of less than 2°C. Any large-scale deployment of CDR will induce significant disruption, and is likely to have significant impacts such as on ecosystem services provided in the land and ocean, and on human societies. In this context there is an urgent need to assess how CDR could help either mitigate climate change or even reverse it, and to understand the potential risks and benefits of different options. In response to this, and to better understand CDR options, the Carbon Dioxide Removal Model Intercomparison Project (CDR-MIP) was created to coordinate and advance our understanding of CDR in the earth system. CDR-MIP brings together Earth System models of varying complexity in a series of coordinated multi-model experiments.

This talk will introduce the CDR-MIP project, and present results of preliminary experiments looking at the response, reversibility and hysteresis in the climate system (C1). These highlight the long-timescales of many important climate variables such as overturning circulation. I will present the other CDR-MIP experiments focusing on Direct Air capture (C2) and Afforestation (C3) and Ocean Alkalinity Addition (AOA; C4). Time permitting, the oceanic response to Solar Radiation Management, will also be touched upon.

11:00 – 11:30

Morning tea

11:30 – 13:00

The Governance of Marine Geoengineering: The State of Play and Future Challenges: Part 1

Chair: Professor Marcus Haward

University of Tasmania (IMAS) & ACE CRC

The International Legal Complexities of Ocean Fertilization

Dr Julia Jabour

University of Tasmania (IMAS) & ACE CRC

Marine geoengineering is the “deliberate intervention in the Earth’s climate system via either carbon dioxide removal (CDR) or solar radiation management”. One CDR technique is ocean fertilisation, which involves putting compounds that are in limited quantity into an ocean area that is high in nutrients but low in chlorophyll, to stimulate phytoplankton production. The rationale is twofold: First, it is theorised that the action will draw-down extra CO_2 from the atmosphere–ocean interface during the process of photosynthesis and atmospheric carbon will be sequestered into the deep ocean for a sufficient length of time upon which to build a carbon trading scheme. Secondly, it is thought that the process will stimulate fish production (ie. more phytoplankton, more fish food). There are scientific concerns about ocean fertilisation and they inherently inhibit the development of substantive international law. These concerns relate to efficacy (does it work and how do we verify this?), what environmental risks are there (does it pollute?), can we monitor, and do we have the capacity to respond (can we control it?). A voluntary moratorium on commercial ocean fertilisation is in place while scientists try to answer these questions.

International law on Transboundary Harm, Geoengineering and the Global Commons

Ms Kerryn Brent & Dr Jeffrey McGee
University of Tasmania (Faculty of Law & IMAS)

A key issue for the international governance of marine geoengineering is managing risks of environmental harm. This issue is addressed by several international agreements, but their practical capacity to respond to environmental risks is limited by membership, entry into force or non-binding status. This paper looks beyond international agreements to rules of customary international law which bind all states. It considers the relevance of the longstanding 'no-harm rule' to marine geoengineering proposals. This rule provides that states must take positive action to prevent activities under their jurisdiction and control from causing significant harm to the territory of other states, and to global commons areas including the high seas. This paper considers when a marine geoengineering activity would trigger obligations under the no-rule and what states must do to satisfy these obligations.

Marine Geoengineering in Australian Law

Professor Jan McDonald & Dr Brendan Gogarty
University of Tasmania (Faculty of Law)

The legality of marine geoengineering under international law will be influenced by the way in which geoengineering activities are evaluated and authorized domestically. Australia's national regime for controlling activities with potentially significant environmental impacts on marine resources requires detailed impact assessment and the approval of the Commonwealth Environment Minister. The operation of these provisions in relation to iron ocean fertilization or marine cloud whitening in Australia's EEZ remains untested. This paper explores their likely application and offers some tentative conclusions about the legality of marine geoengineering under existing Australian environmental law. It also considers the potential scope for other Australian government initiatives, such as the emissions reduction fund, to embrace or foreclose marine geoengineering initiatives.

13:00 – 14:00 Lunch

14:00 – 15:45 The Governance of Marine Geoengineering: The State of Play and Future Challenges: Part 2

Co-chair: Professor Philip Boyd
University of Tasmania (IMAS) & ACE CRC

Co-chair: Dr Julia Jabour
University of Tasmania & ACE CRC

Ocean Iron Fertilization and Indigenous Peoples' Right to Food: Leveraging International and Domestic Law Protections to Enhance Access to Salmon in the Pacific Northwest

Professor Randall Abate
Florida A & M University

Ocean iron fertilization (OIF) has been criticized on several grounds including the foreseeable and unforeseeable adverse consequences it may cause to the marine environment and the daunting challenge of reconciling several potentially overlapping sources of international and domestic environmental law to regulate OIF effectively. Notwithstanding these challenges, OIF recently produced a valuable benefit unrelated to its carbon sequestration purpose. In 2012, the Haida indigenous community in Canada conducted an OIF experiment that sought to restore the decimated supply of salmon in Pacific Northwest ocean waters. The experiment significantly increased salmon stocks within the span of one year. Drawing on international environmental law, international human rights law, and federal Indian Law in the United States, this presentation proposes a potential exception to a future international environmental law treaty framework governing OIF experiments to protect indigenous communities' right to salmon as a subsistence and cultural food resource that is essential to their self-determination.

Exploring geoengineering through scenarios

Ms Anita Talberg
University of Melbourne

For an issue such as geoengineering, which exists in an age of increasing complexity and uncertainty, linear extrapolations and predictions based on historical data cannot adequately support robust decision-making. Unexpected and undetected driving forces, thresholds and step changes could generate future threats and opportunities. Thought experiments are used to explore some of these possibilities, but unstructured future-gazing tends to result in myopic thinking that confirms preconceptions. Scenario planning provides a methodical approach to exploring the range of possibilities that the future may bring. In this context, we convened a one-day workshop to consider how Australia and the world might manage climate change in 2050. The workshop adopted an iterative process of collaborative inquiry in an interdisciplinary multi-sectoral group setting, following a method of deduction forecasting adapted from the Mañoa School Four Futures technique. The workshop produced a set of multiscale scenarios that highlight some of the key uncertainties facing the world and Australia in managing climate change in 2050. The process allowed participants from different worldviews and schools of thinking to engage in a process of shared learning. Participants critically reflected on implicitly held assumptions and explored the complex links between present day climate change and future developments in geoengineering.

Consequences of Inaction on Mitigation and Geoengineering

Professor Eelco J. Rohling
ARC Laureate Fellow & Associate Director, Research School of Earth Sciences, The Australian National University

In this presentation, I summarise a joint paper, led by Jim Hansen (Columbia University), which we submitted in October to Earth System Dynamics (open access review) (1). This paper supports a lawsuit (Juliana et al. vs United States 2016) filed against the United States, which asks the U.S. District Court, District of Oregon, to require the U.S. government to produce a plan to rapidly reduce emissions. The suit requests that the plan includes emission reductions at the 6% per year rate that we estimated in an earlier joint paper as the requirement for lowering atmospheric CO_2 to a safe level of 350 ppm (2). At a hearing in Eugene Oregon on 9 March 2016, the United States and three interveners (American Petroleum Institute, National Association of Manufacturers, and the American Fuels and Petrochemical Association) asked the Court to dismiss the case, in part because the requested rate of fossil fuel emissions reduction was deemed implausible. Magistrate Judge Coffin stated that he was “troubled” by the severity of the requested emissions reduction rate, but also noted that some of the alleged climate change consequences, if accurate, could be considered “beyond the pale”. He therefore rejected the motion to dismiss the case. Judge Coffin’s ruling had to be certified by a second judge, after which the case can proceed to trial. Judge Ann Aiken, in the United States District Court in Eugene Oregon, on 10 November 2016 issued an emphatic ruling in favour of the plaintiffs in the case of Juliana et al. versus the United States (3). The case can now proceed to trial, and the plausibility of achieving the emission reductions needed to stabilize climate will be a central issue at the trial. Hence, our new study re-evaluates the veracity of our earlier recommendations. We make a case based on costing the consequences of inaction that the recommendations remain valid. I will outline how we arrive at this conclusion.

(1) http://www.earth-syst-dynam-discuss.net/esd-2016-42/
(2) http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081648
(1) http://www.columbia.edu/~jeh1/mailings/2016/AikenOrder.2016.10November.pdf

15:45 – 16:00

Closing

Discussion of Future Research Directions and Collaborations

Professor Philip Boyd
University of Tasmania (IMAS) & ACE CRC

Dr Jeffrey McGee
University of Tasmania

16:00

Finish