The 16th International Seminar on Climate System and Climate Change

第十六届气候系统与气候变化国际讲习班（ISCS）

Final report for seminar on climate change and climate system

1-Introduction:

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1 . **Jeffrey A. Hicke**, from USA, Associate Professor at Department of Geography, University of Idaho, Coordinating Lead Author, Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Working Group II, mainly engaged in research of climate change impact and carbon cycle. jhicke@uidaho.edu
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2． **Anna Victoria Maidens**, Senior Researcher in UK Met Office Hadley Centre, mainly engaged in research of global climate system and climate prediction.

3. **Andrew Manning**, Professor in UK University of East Anglia, mainly engaged in research of atmospheric chemistry.

4. **Daithi Stone**, Professor in National Institute of Water and Atmospheric Research (NIWA) of New Zealand, Lead Author, Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Working Group II, mainly engaged in research of climate change detection and attribution.

5. **Mikiko Kainuma**, Professor in Institute for Global Environmental Strategies of Japan, Lead Author of Intergovernmental Panel on Climate Change, Fourth and Fifth Assessment Report, and Special Report on 1.5 ℃, mainly engaged in climate change policies and adaptation.

2- Sessions:

Prof. Mikiko Kainuma (15-16) July:

1- Lecture 1: Scenarios for zero carbon societies.
2- Lecture 2: Methodologies: Asia-Pacific Integrated Model (AIM).
3- Lecture 3: Climate policy analysis.
4- Lecture 4: Linkage with Sustainable Development.

Summary and key messages:

- Climate change is already affecting people, ecosystems and livelihoods all around the world
- Limiting warming to 1.5°C is not impossible but would require unprecedented transitions in all aspects of society.
- There are clear benefits to keeping warming to 1.5 °C compared to 2 °C, or higher. Every bit of warming matters.
- Limiting warming to 1.5 °C can go hand-in-hand with achieving other world goals.

Prof. D áth íStone (17-18) July:

1- Lecture 1: The detection and attribution of climate change.
2- Lecture 2: Identifying a human role in extreme weather events.
3- Lecture 3: Detection and attribution of impacts of climate change.
4- Lecture 4: Potential and limitations for using detection and attribution information.

Summery and Key messages D&A climate changes:

- As a scientist, you should not blindly believe what climate models tell you
- As a scientist, you should not blindly assume a cause for an observed trend
- Predictions (from climate models) and observations are independent sources of information, and should not agree by chance.
- Detectionandattributionconfrontspredictionsofpastchangewithobservations.
- Detection confirms the existence of a changing climate •
- Attribution assesses the relative role of various causes •
- Lack of detection of change does not mean change is not occurring! – You may be looking at the wrong measure – You may not have sufficient observational data – Just because your models a deficient or your observations are incomplete does not mean the world is not changing.
- Potential and limitations for using detection and attribution information.

Prof. Andrew Manning (19-20) July:

1- Lecture 1: Atmos_CO2+O2.
2- Lecture 2: Carbon_Sinks+FF_Emissions & Quantifying_FFCO2.
3- Lecture 3: Ocean_Carbon_Cycle.
4- Lecture 4: Geoengineering.

Summery and main messages:

- Understanding the global carbon cycle from the atmosphere.
- Global carbon sinks and quantifying fossil fuel emissions.
- Quantifying fossil fuel emissions: Quantifying fossil fuel CO_2- a new approach using APO
- The ocean carbon cycle.
- Geoengineering: Two categories of geoengineering:
  - **SRM = Solar Radiation Management**
    - Does not address ocean acidification
    - Commits world to continue with SRM for hundreds of years
    - Attractive because some options are relatively cheap and quick to implement
  - **CDR = Carbon Dioxide Removal**
    - Also not without problems, e.g.
      - possible unintended ecosystem impacts
      - scale-up issues
      - Lack of available land for biofuels / BECCS
      - Possible leakage

Prof. Jeff Hicke, (22-23) July

1- Lecture 1: Impacts of Climate on Terrestrial Ecosystems.
2- Lecture 2: Impacts of Ecosystems on Climate: The Terrestrial Carbon Cycle.
3- Lecture 3: Mitigating Future Climate Change: Natural Ecosystems.
4- Lecture 4: Forests, Forest Disturbances, and Climate Change.

Summery and main messages:

Impacts of Ecosystems on Climate: The Terrestrial Carbon Cycle

- introduction to carbon cycle terms, concepts
- global carbon cycle

- stocks and fluxes
- budget
- drivers of change: terrestrial ecosystems
- deforestation
- forest regrowth
- agricultural soils
- permafrost thaw
- CO2- and climate-induced changes
- projections of future carbon cycling

❖ introduction to climate change impacts

- role of climate in shaping ecosystems
- what climate metrics influence ecosystems
- climate change effects on
- species range shifts
    - climate velocity
- biome shifts
- phenology
- CO_2 fertilization

❖ How much do we have to mitigate?

❖ mitigation strategies (focus on ecosystems)

- agriculture
- forests
- other
- study of "natural climate solutions"

❖ impacts of mitigation on ecosystems

❖ . Forests, Forest Disturbances, and Climate Change (study).

Prof. Anna Maidens: (24-25) July

1- Lecture 1: Seasonal forecasts for China
2- Lecture 2: Seasonal prediction of the winter extratropical North Atlantic Oscillation and Arctic Oscillation.
3- Lecture 3: Influence of the stratosphere on surface climate.
4- Lecture 4: Analysis of real-time predictions.

Summery and main messages:

- Seasonal forecasting - operational systems and applications for the end user
- From slowly varying initial/ boundary conditions to useful output
- Atmospheric dynamics – how we represent processes in climate models, and how they become useful in seasonal forecasts
- Some case studies of real-time forecasts – what's going right, what's not working yet, where we can improve.
- UK input to collaboration on seasonal forecasting over China
- Seasonal Prediction of the winter extratropical North Atlantic Oscillation and Arctic Oscillation
- Influence of the stratosphere and Rossby wave dynamics/breaking on the surface climate
- Analysis of real time predictions.

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