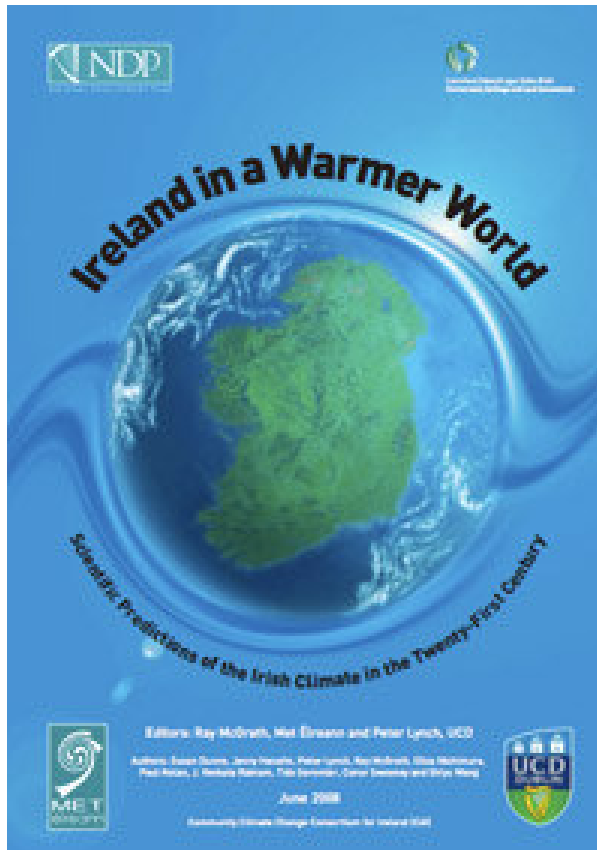




# **Regional Climate Modelling for Ireland**

Ray McGrath  
Met Éireann

Climate Change Research Adaptation Workshop: Gresham Hotel, 17 June 2008.



C4I project viewed as the start of a process - bringing climate modelling into Met Éireann as a core activity.

3 new permanent staff to support work (to be recruited shortly).

Collaboration with other climate related projects/interests to continue.

# Lessons learned from C4I

- Large uncertainty in climate predictions for some weather elements (e.g. rainfall) – seen in ensemble simulations (~8 members).
- Impact of errors/biases in the global models difficult to quantify in regional forecasts.
- A judicious blend of dynamical and statistical modelling is probably the best approach for some applications (e.g. involving precipitation).
- Still some way to go to provide realistic probabilistic forecasts of future climate and impacts.
- Data resources/archival/accessibility requirements either underestimated or ignored – downstream problems!

# Carrying forward the basic work

## ENSEMBLES

- Continues to end of 2009 (and possibly extended through FP7).
- 14 ensemble simulations for current century currently available – will form basis for probability forecasts in Met Éireann.
- No plans to substantially extend our own (i.e. C4I) ensemble set by dynamical downscaling (but will finish off high resolution run for wind energy project) – will focus on global modelling via EC-EARTH.

# Carrying forward the basic work

## EC-EARTH

- See ourselves as a big player (together with ICHEC) in the development of the new ESM.
- Tuning of atmospheric model well advanced.
- Coupled atmosphere/ocean model probably available early 2009 (in parallel with coupled regional model).
- Will use the model for very high resolution (25-50 km) global runs focusing on near future for Atlantic sensitivity studies.
- Requires optimisation of code for Blue Gene (underway in ICHEC).

# Applications: work in progress or to commence shortly

- Examine influence of Atlantic circulation on Irish climate (goal: determine sensitivity to changing sea ice, changes in the Gulf Stream; provide estimates of sea level rise). Development of coupled regional model. [STRIVE Fellowship]
- Catchment/coastal flooding: initial study to be expanded using an ensemble of climate simulations. [STRIVE Fellowship; OPW student project on catchment flooding]
- Storm surges: use ensemble simulations to extend initial study (goal: as for catchment flooding). [Student project]
- Impacts on crop growth /forestry using ensemble simulations. [Possible STRIVE project]
- Impacts on fish stocks. ????
- Climate change / air quality impacts. [STRIVE Fellowship]

# Gaps

- Sea level rise – difficult to model – large regional variations expected – impacts from melting ice-sheets/glaciers? Global model approach needed?
- Economic impacts of climate change – linkup with ESRI?
- Impacts on renewables (wind/wave/solar power).

End



# **OPW INTERESTS IN CLIMATE CHANGE RESEARCH**

**Ray McGrath (Met Eireann)**

**On behalf of Mark Adamson**

**Office of Public Works**

**17<sup>th</sup> June, 2008**



# ROLE OF THE OPW

- Lead Agency for Flood Risk Management
- Involved with:
  - Flood risk assessment studies
  - Design and implementation of measures
  - Require predictions of:
    - Flood flows
    - Extreme sea levels
- National flood policy emphasises need for the management of future, as well as existing, risks

# **FLOOD RISK ASSESSMENT AND MANAGEMENT (FRAM) STUDIES**

- Focal point for flood risk management
- Deliver key requirements of EU ‘Floods’ Directive
- Study process includes:
  - Hydrological and hydraulic analysis
  - Flood mapping
  - Development of flood risk management plan
- Long-term – Includes assessment of potential future risk as well as existing

# APPROACH TO CLIMATE CHANGE IN 'FRAM' STUDIES

- Future risk assessed using two scenarios
  - 'Mid-Range' future scenario (MRFS - appx average of current predictions for 2100)
  - 'High-End' future scenario (HEFS – appx double increases of MRFS)
- Provision for MRFS in design of measures:
  - Assume change (i.e., include allowance), OR,
  - Allow / design for future adaptation
- Sensitivity test adaptability of options vs HEFS – More robust / adaptable preferred

# OPW REQUIREMENTS FROM CLIMATE CHANGE RESEARCH

- Future changes in frequency / severity of flooding – Requires assessment of:
  - Changes in rainfall patterns (short-duration)
  - Catchment responses to changes in rainfall (change in flood magnitude)
  - Increases in sea levels
  - Changes in storm surge frequency / severity
- Aim is to have numerical allowances to use for future scenarios (MRFS / HEFS)

# UNCERTAINTY

- Significant uncertainty in current climate change impact predictions
- Assessment using ensemble modelling to generate probability distribution of change
  - Permit identification of appropriate climate change impact allowances (MRFS, HEFS)
  - Permit statistical approach to economics of adaptability

# RESEARCH NEEDS / PROPOSAL

- Ensemble climate modelling -> probability distribution of change in rainfall patterns
  - Temporal and spatial variations
- Catchment modelling
  - Estimation of change of flood flows
  - Possible relationship between catchment response and characteristics (e.g., BFI)

# RESEARCH NEEDS / PROPOSAL

- Outputs required late 2010
- OPW have been liaising with Met. Eireann on research proposal
- OPW would welcome:
  - Collaboration on research
  - Coordination among research funders
- [Mark.adamson@opw.ie](mailto:Mark.adamson@opw.ie) --- 01 647 6734



# **OPW INTERESTS IN CLIMATE CHANGE RESEARCH**

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