

# Climate System Theme

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# Climate System Theme Challenges

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1. Predictions for decision making
2. Enabling society through climate science

**“Grand Challenge”:  
To develop risk-based  
predictions of climate on  
regional and local scales,  
spanning days to decades.**

7. The changing water cycle
8. The role of polar regions

See the Theme Report on NERC [www](http://www.nerc.ac.uk) site

# Climate System Theme Investments

ACTION	Earth Sys Modeling	Quantifying Uncertainty	Water Cycle	JCRP	Next Generation Predic	Arctic	Ice Sheets
THEME CHALLENGE							
High resolution predictions for decision making		●		●	●		
Informing mitigation and adaptation strategies	●	●	●	●			●
Improve obs for climate change detection and prediction	●			●	●	●	
Phys, chem and biol feedback processes	●		●	●		●	
Key processes determining climate sensitivity	●		●			●	
Natural variability			●		●	●	
Water cycle	●		●	●			
Polar regions	●			●		●	●

# Progress with TAP1/TAP2 Actions

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1. Development of a strategy for Earth System Modelling (with ESS)
2. Development of the Joint Climate Research Programme with the Met Office (with NH, ESS)
3. Contributing to the UK's development of Next Generation Weather and Climate Prediction Systems (with Tech, NH)

# 1. Development of a national strategy for Earth System Modelling

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- TAP1 action. Develop strategy for sustained support of *global* ESM development. Informs future NC and RP funding
- Audit of UK capability Sept 09. Expert drafting group Dec 09/Mar 10.
- Draft document is NERC contribution to development of national strategy. On web for consultation soon (NERC science community and other partners).
- Covers individual component models, the framework for coupling and running components, and specific ESM configurations.
- Implementation through NC and RP from Summer 2010.

## 2. Development of the Joint Weather and Climate Research Programme with the Met Office

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- A strategic partnership between NERC and the Met Office, launched March 09:
  - *To ensure, in areas of common interest, that the UK maintains and strengthens its leading international position in **weather and** climate science, and hence in climate forecasting and provision of advice for climate policy.*
- New governance structure set up: Programme Board, Science Strategy Group, Infrastructure/Facilities group
- New JWCRP Programme Manager (Andy Parsons) + several joint postdocs appointed in agreed areas of common interest
- MONSoon joint supercomputing facility
- Alignment of NERC NC and Met O programmes in several strategic areas including global physical ocean modelling
- Early issues to be addressed:
  - Further alignment of national capability activities across NERC and MO
  - Partnerships in new Research Programmes (e.g. Changing Water Cycle)
  - Broadening to include all areas of joint strategic interest (*incl operational oceanography*)
- **Current RP activity provides annual opportunity for joint funding of strategically important projects. £0.9M NERC, £0.9M Met O. 2010 call just closing**



### 3. Contributing to the UK's Development of Next Generation Weather and Climate Prediction Systems (with Tech, NH)

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- Goal a: Develop atmospheric model core suitable for ultra-high resolution on next generation supercomputers
  - Current algorithms not able to exploit supercomputers coming in 5-10 years time  $\Rightarrow$  fundamental redesign of model core
  - Joint effort NERC (£2.2M), Met Office (£2.2M), STFC (£2.75M). Tightly coordinated. Commissioning well under way
  - Develop 'roadmap' of needs for ocean model cores for next 10 years – Commissioning in progress
- Goal b: Initialisation of climate predictions
  - Coupled model imbalances mean that simple minded methods don't work
  - Design of ensembles to span uncertainty
  - Emerging scientific field  $\Rightarrow$  diverse approaches. More independent projects feeding into coordination project. Link to Met Office prediction systems through JWCRP. NERC £2.2M MetOffice (£2.2M) – Commissioning in progress

# Forward look to future actions

*(Some ideas at this stage. Need to prioritise)*

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1. Ocean boundary layer processes and modelling; shelf edge exchange; aerosols/ice cloud. Process observations → theoretical models → relocatable parametrisations → improved GCMs. **Announcement expected soon.**
2. Beginning implementation of ESM strategy. Following agreement of strategy and discussion with NCAG and stakeholders. **TAP3?**
3. Integrating climate information into environmental decision making. Tackling key scientific problems in close collaboration with stakeholders/decision makers. Integrated impacts modelling/attribution. Possible contribution to UK Climate Service. Days to decades. **TAP3?**
4. Improved understanding of other key processes contributing to uncertainty in climate prediction (days to decades).
5. Something on geoengineering? Some projects expected from recent EPSRC-led workshop. Don't lose other good ideas!
6. Improved climate observing/monitoring systems. Need to define role for RP action (rather than NC or non-NERC funding).