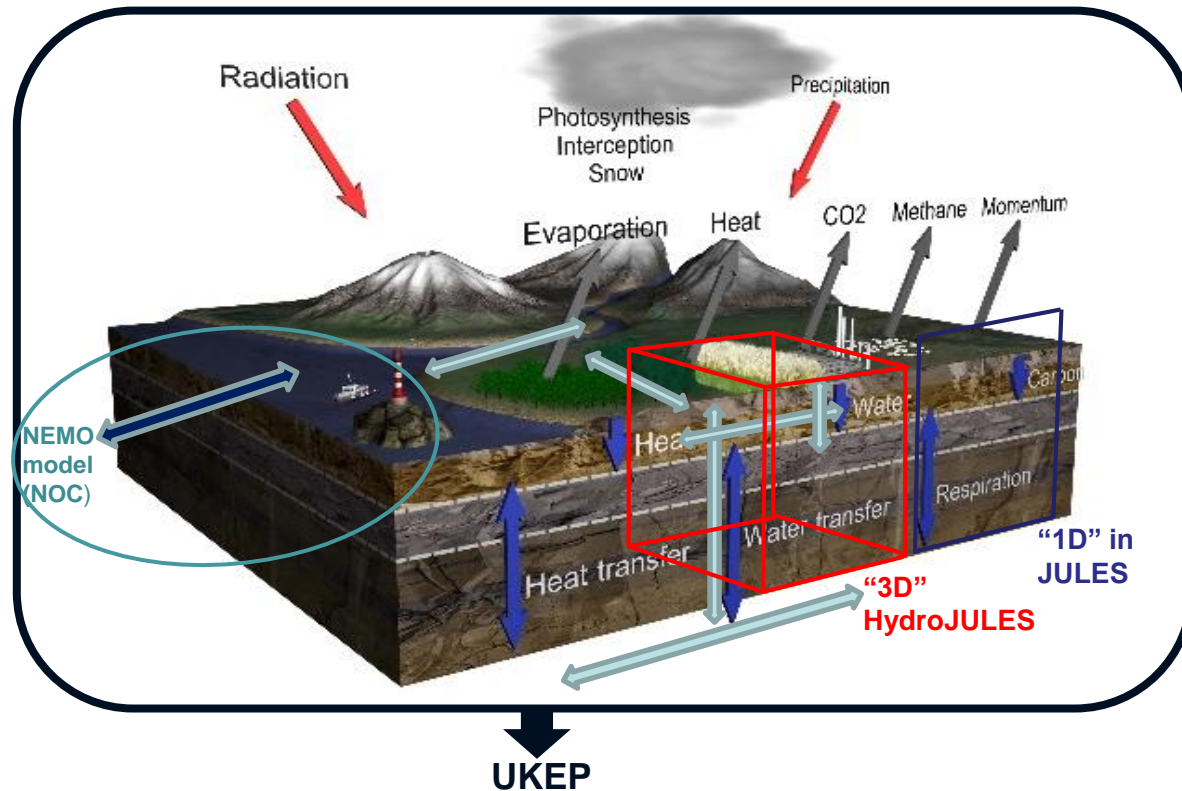


Hydro-JULES

Next Generation Land Surface and Hydrological Predictions

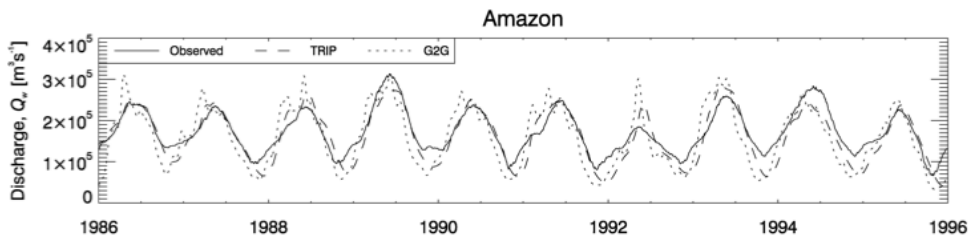
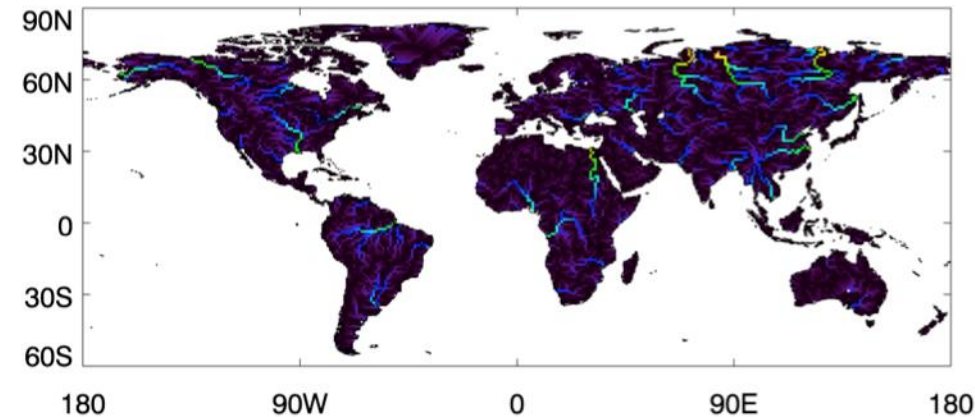
PI: Simon Dadson

Hydro-JULES: NERC LTS-M NC Programme

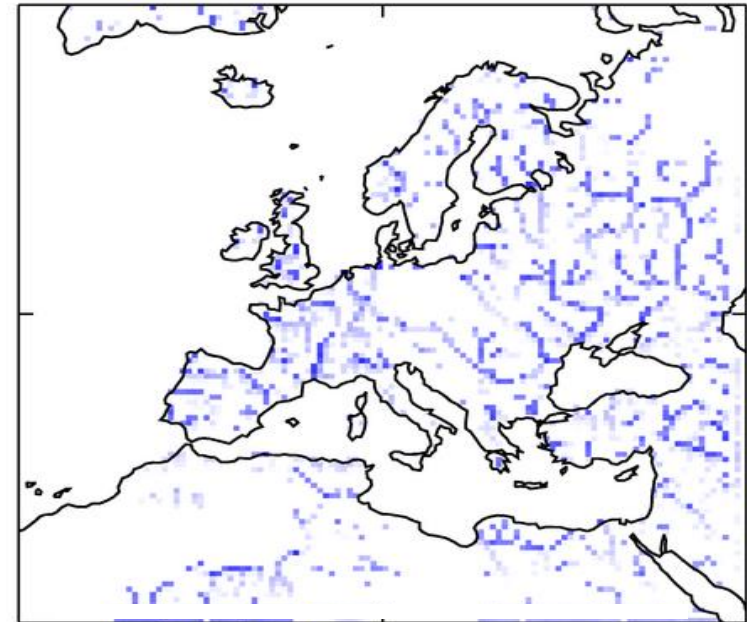


- Aim: To produce a fully integrated, open source coupled model of the terrestrial water cycle linked to the Joint UK Land Environment Simulator (JULES)
- Deliver a major advance in land-surface and hydrological science
- CEH led 5 yr LTS-M national capability programme to CEH, BGS and NCAS

Hydro-JULES



AKTUH surface Atmos river outflow $kg/m^2/s$
At 01Z on 30/ 3/1991, from 00Z on 1/ 1/1989



Dadson, S. J. *et al.*, 2011, *J. Hydrology*.

- Land surface models underpin key results in climate change and studies of Earth system
 - Need to close the energy, water and carbon cycles
- Hydrological models are designed to make predictions
 - Generalised physics; often with calibration
- Converging on commensurable scales (0.5° Global; 1 km National)

Key science questions I

- How will hydrological systems respond to **current and future climate variability**, in data-sparse regions under non-stationary conditions?
- Can new observational and modelling techniques improve our understanding of how **high-intensity convective precipitation** drives flooding?
- How will changes in **land-use and land management** affect surface permeability, soil water storage, runoff, river flows and flood inundation?
- Can a coupled approach quantify risks of **fluvial, pluvial, coastal and groundwater** flooding more effectively?

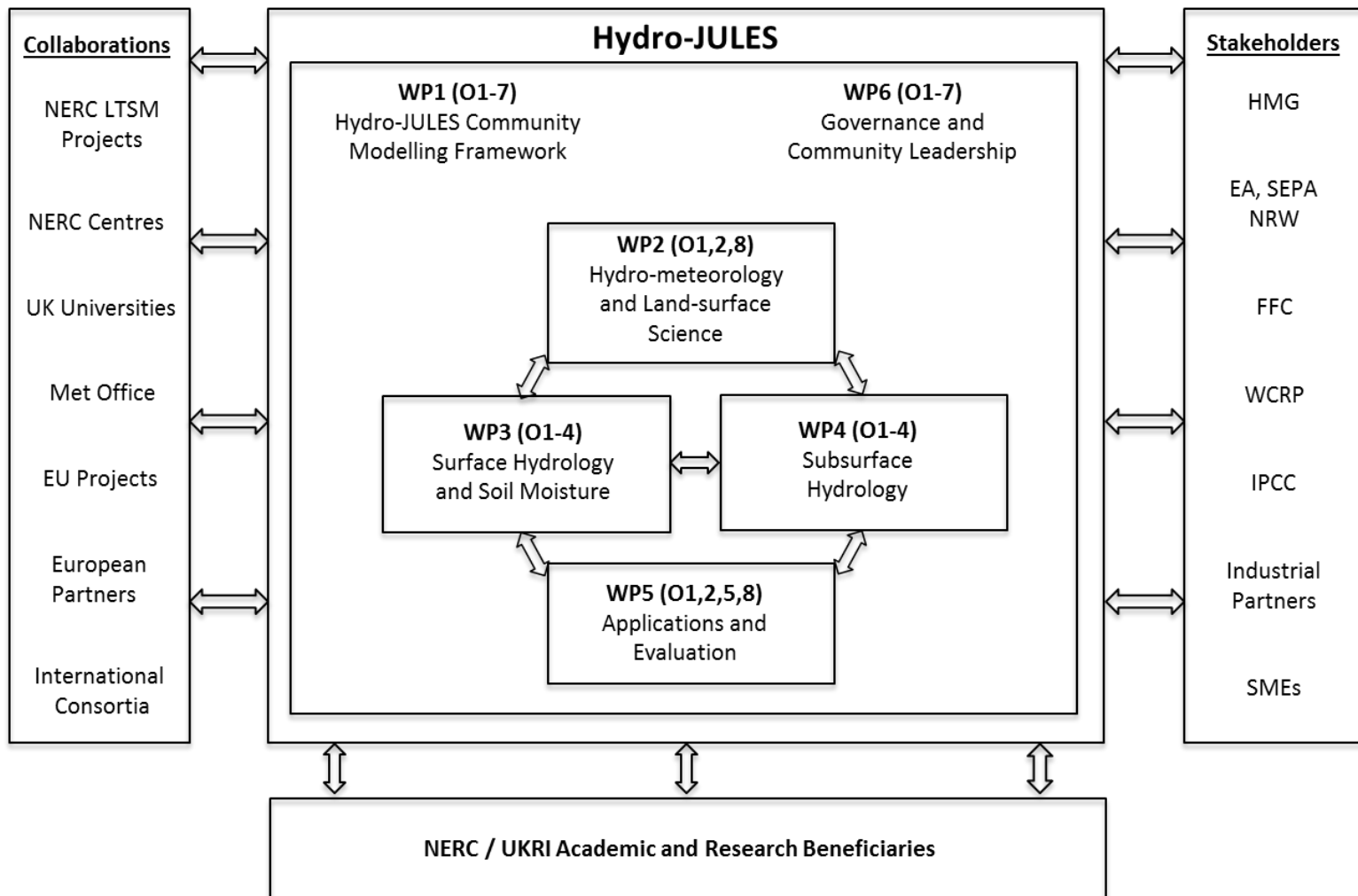
Key science questions II

- How will **biogeochemical and nutrient cycles** respond to current and future hydrological and land use change?
- Can **assimilation of observed hydrological states and fluxes** (e.g., soil moisture and stream flow) improve hydrological and meteorological predictions?
- Can **uncertainty in large-scale hydrological predictions** be attributed to specific hydrological processes in order to target future process-based research?
- What is the **sensitivity of Earth system components to changing hydrology**

Key process-based advances required

- State of the art **process** representation
 - Groundwater (lateral; heterogeneous)
 - Soil hydraulics (macropore flow; spatial properties)
 - Evaporation (soil, vegetation, and canopy)
 - Inundation (fluvial, groundwater)
 - Anthropogenic influences (dams, abstraction, irrigation)
- Evaluate uncertainties in the process chain
- Infrastructure for interoperable model components
- Data assimilation using novel data sources

Programme Structure



Partnerships, engagement, sustainability

- Mobilise and convene the UK hydrological community
 - Awareness raising and engagement
 - Community building, outreach
 - Met Office, HEIs, Defra/EA, DfID, Private Sector
 - UK and International
- Additional funding opportunities
 - Highlight topics
 - Strategic programmes
 - Joint funding calls
 - Capital investment

Summary

- The interplay between land surface and hydrological models presents an unprecedented opportunity.
- Hydro-JULES will focus on:
 - Building a robust technical platform;
 - Enabling key advances in hydrological science;
 - Mobilising the UK hydrological & land-surface communities around a common goal.

Programme

1000 Registration and coffee

1030 Welcome and Introduction to the Programme (Simon Dadson)

1045 Building a community hydrological model (Bryan Lawrence)

1100 Hydrometeorology and land-surface science: the research frontier (Eleanor Blyth)

1115 Improving surface water hydrological models (Nick Reynard)

1130 A national groundwater model? (Andrew Hughes)

1145 Hydrological applications: the state of the art (Jamie Hannaford)

1200 Q&A session

1230 Lunch

1330 Breakout Discussions

1515 Panel Discussion

1600 Final remarks and close

Afternoon Schedule

Now – Group Photograph (lawn)

1230 Lunch

1330 Breakout Discussions

First part – get in to discussion groups based on thematic sign-up groups; identify key questions...

Second part – switch groups based on post-it colour; design a programme of research to support based on themes...

1515 Panel Discussion

1600 Final remarks and close

Breakout conclusion

Please make sure you identify yourself to your break-out leader so that we can remain in touch to invite you to future workshops and events about the ideas discussed (if you wish...)

Funding for future workshops, researcher exchanges, doctoral support, will be based on open competition – further details to follow...

1515 Panel Discussion

1600 Final remarks and close

Panel Discussion

Anita Asadullah, Environment Agency

Huw Lewis, Met Office

Anne Verhoef, University of Reading

Rob Ward, British Geological Survey

Hydro-JULES

Next Generation Land Surface and Hydrological Predictions

Photo: iStockPhoto