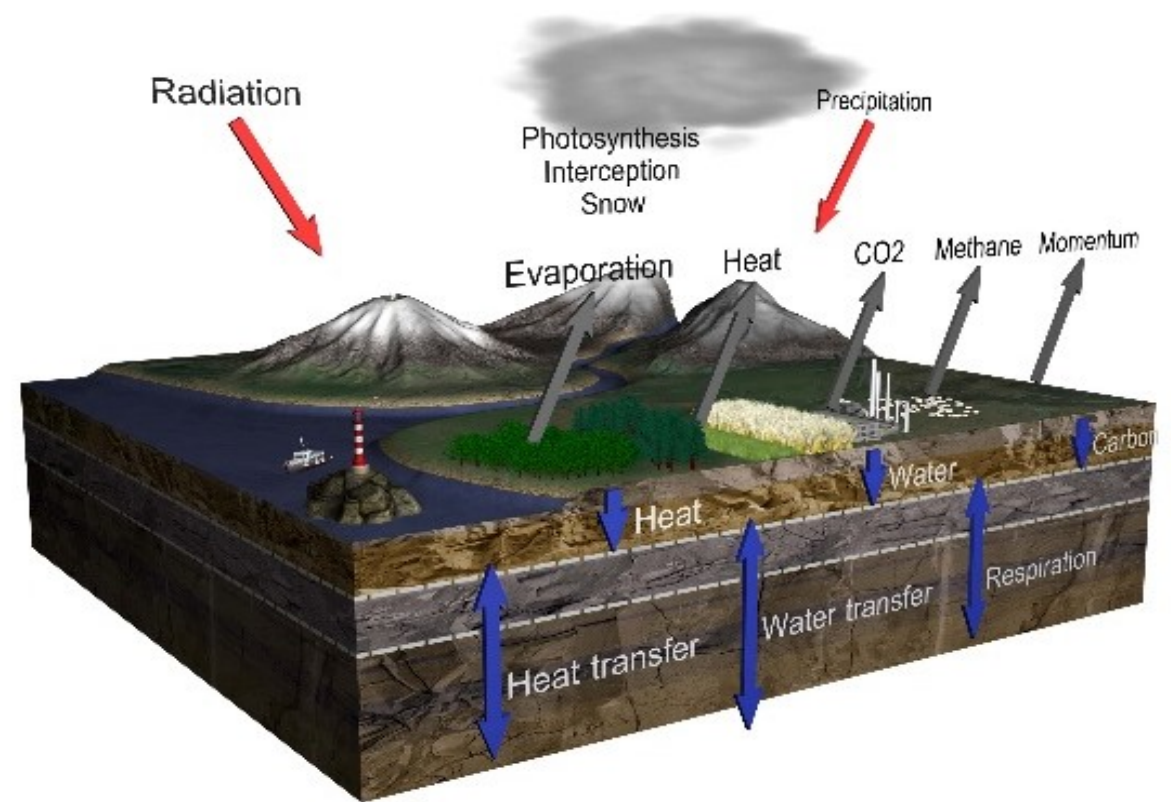# Hydro-JULES

Next generation land-surface and hydrological predictions

Simon Dadson, Eleanor Blyth, Douglas Clark, Andrew Hughes, Jamie Hannaford, Bryan Lawrence, Jan Polcher, Nick Reynard

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 programme to CEH, BGS and NCAS

Hydro-JULES

Amazon

AKTUH surface Atmos river outflow kg/m2/s
At 01Z on 30/ 3/1991, from 00Z on 1/ 1/1989
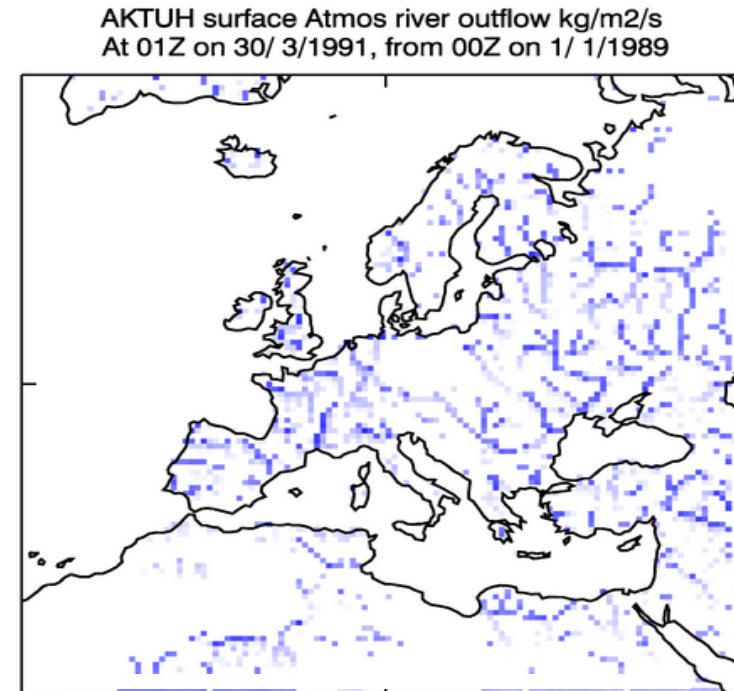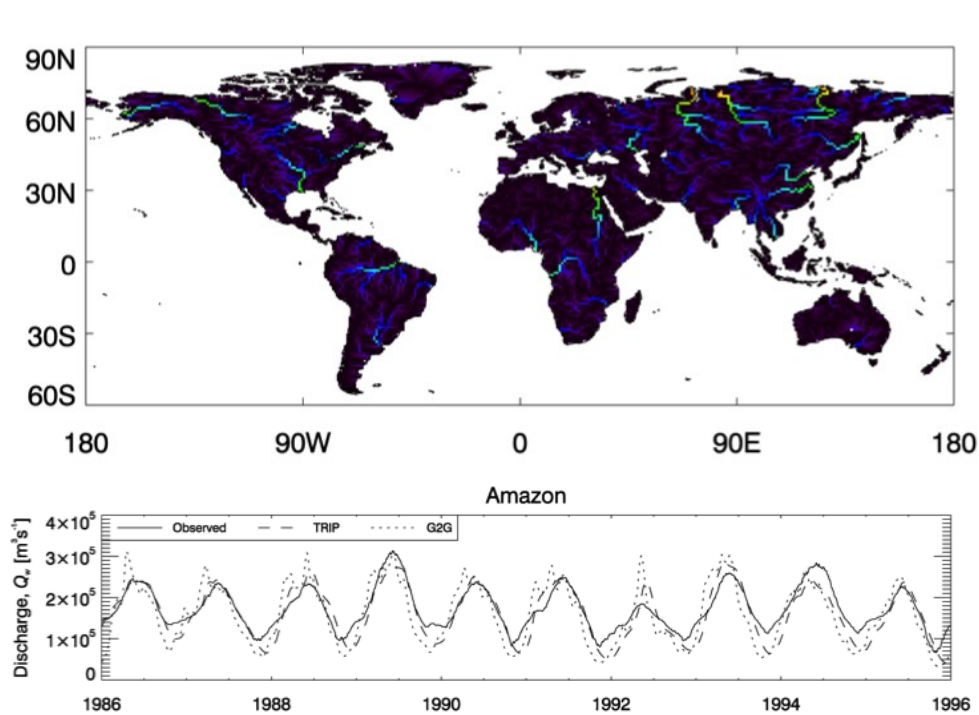
Dadson, S. J. *et al.*, 2011, *J. Hydrology.*

- Land surface models underpin results in climate change and Earth system science

- Hydrological models are needed to make reliable predictions

- Converging on commensurable scales (0.5º Global; 1 km National)

- Responses to current and future climate variability
- Effects of high-intensity convective precipitation
- Response to land use change & management

- Changing biogeochemistry and nutrient cycles
- Data assimilation to improve predictions
- Uncertainty and sensitivity in the process chain

State of the art process representation

- Groundwater (lateral, heterogeneous)
- Soil hydraulics (macropore flow, spatial properties)
- Evaporation (soil, vegetation, canopy)
- Inundation (fluvial, groundwater)
- Anthropogenic influences (dams, abstractions, irrigation)

- Uncertainties in process chain
- Interoperable components
- Data assimilation from novel sources
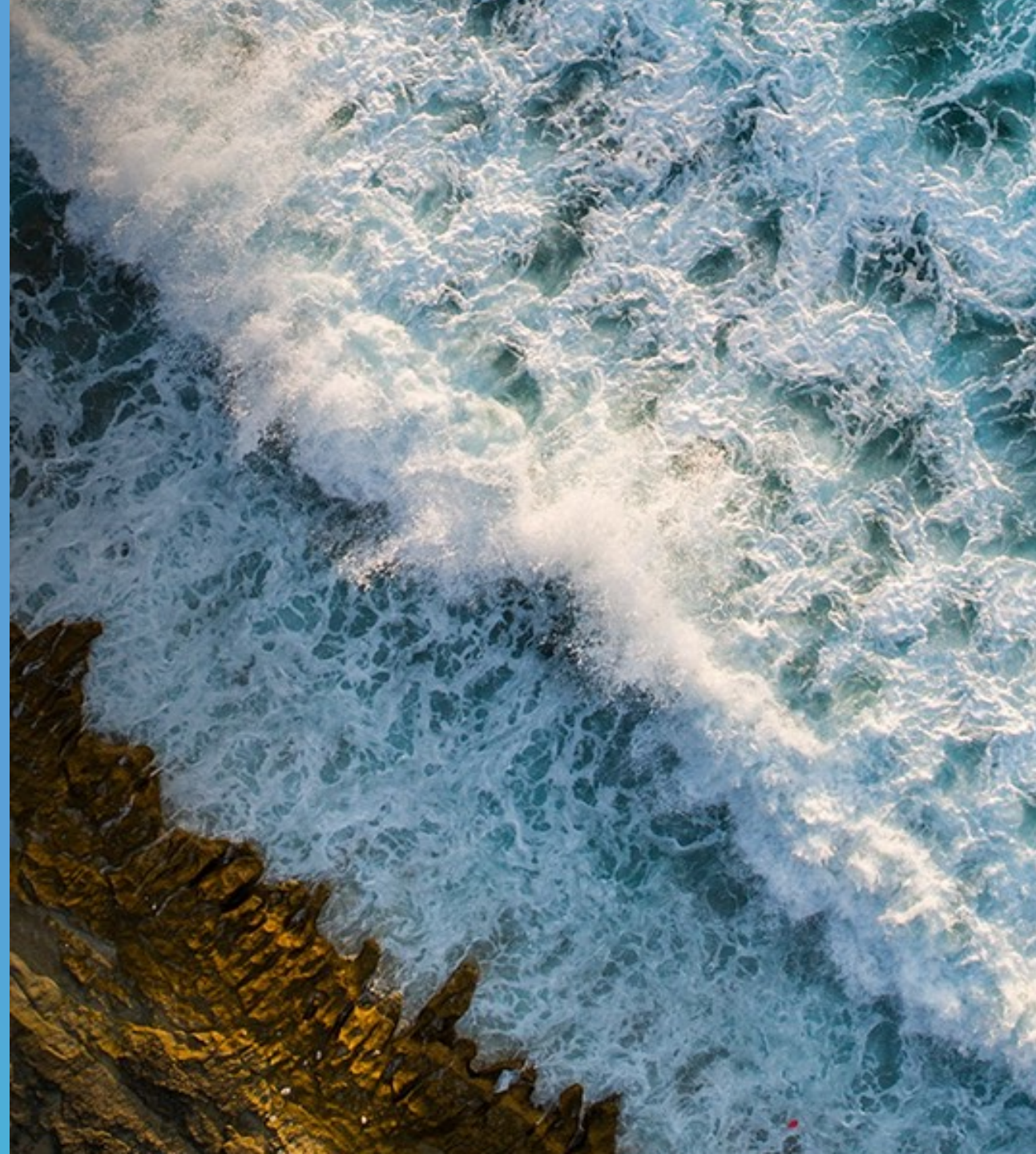
Partnerships, engagement, sustainability

Community building

- Outreach
- HEIs, government, private

Additional Funding

- Highlight topics
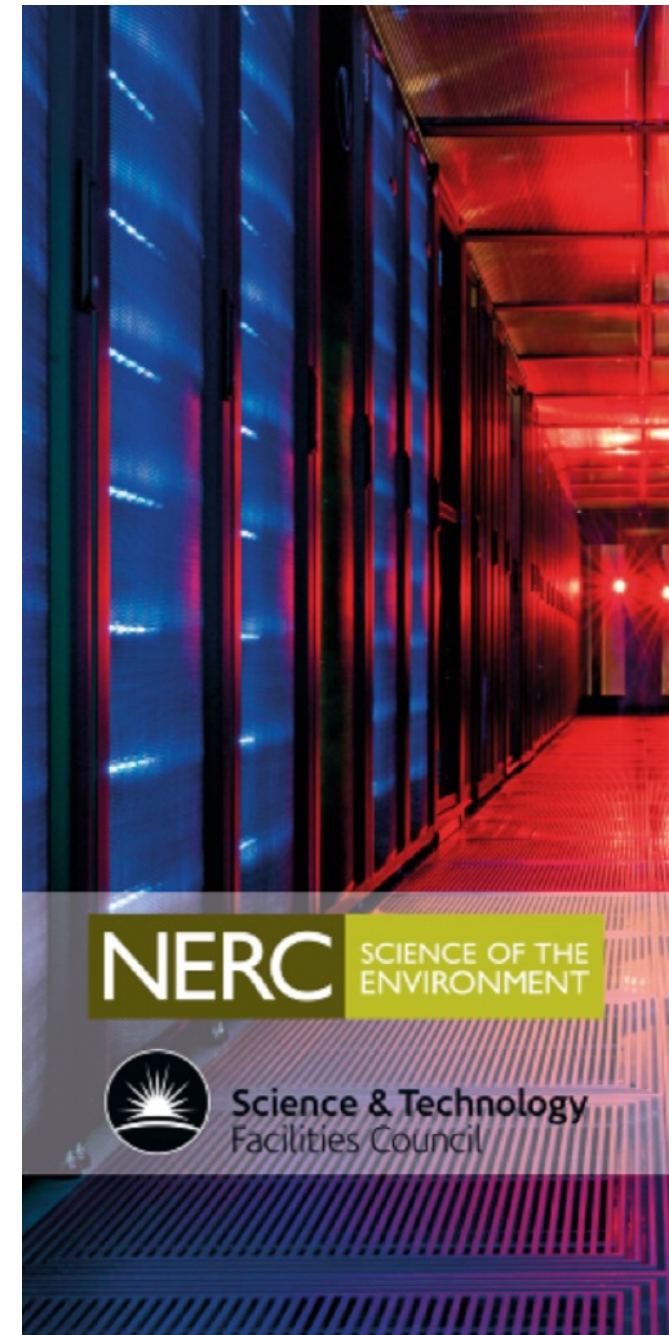- Strategic programmes
- Joint funding calls
- Capital investment

System design – Levels of access

- ## Tier 1 – Users
  - Access pre-calculated datasets and model results via DataLab

- ## Tier 2 – Model users
  - Set up and run model via JASMIN GWS

- ## Tier 3 – Developers
  - Edit and contribute code via repository and run on a range of platforms

Image credit: NCAS

Soil hydrology and surface water

- ## Soil physics and COSMOS (Cooper, Blyth)
- ## River flow routing and inundation (global and UK)
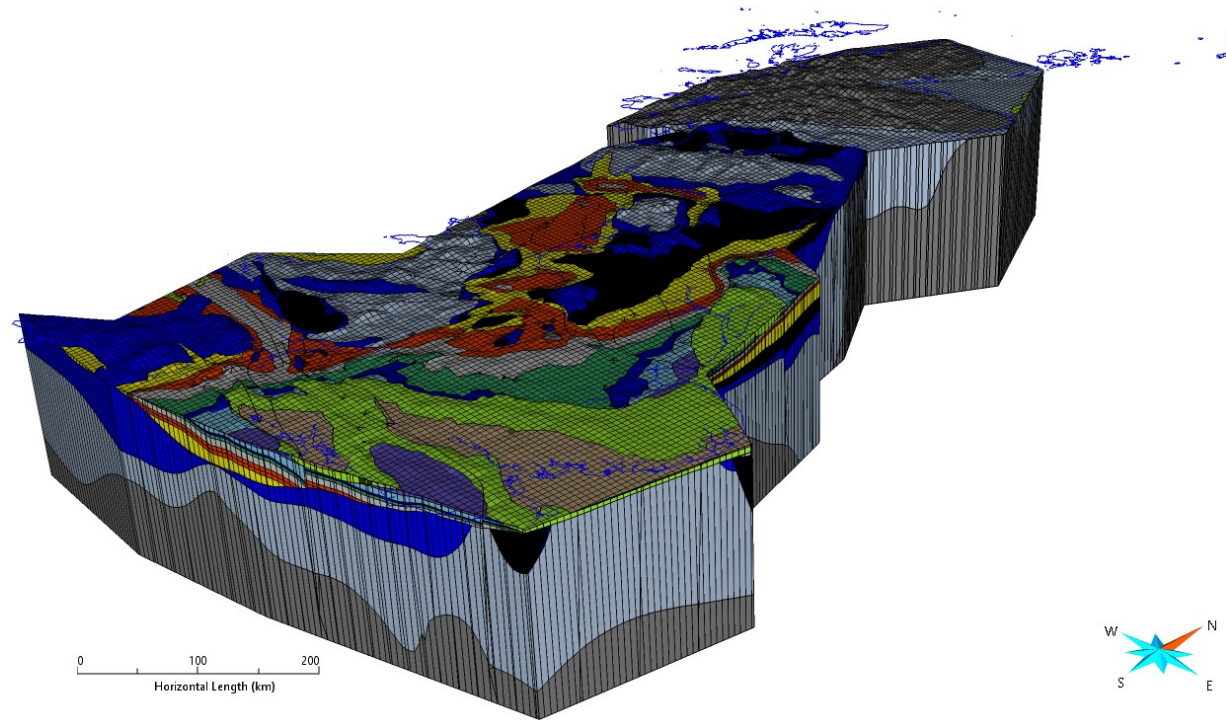- ## Link to UKEP for coupling to ocean
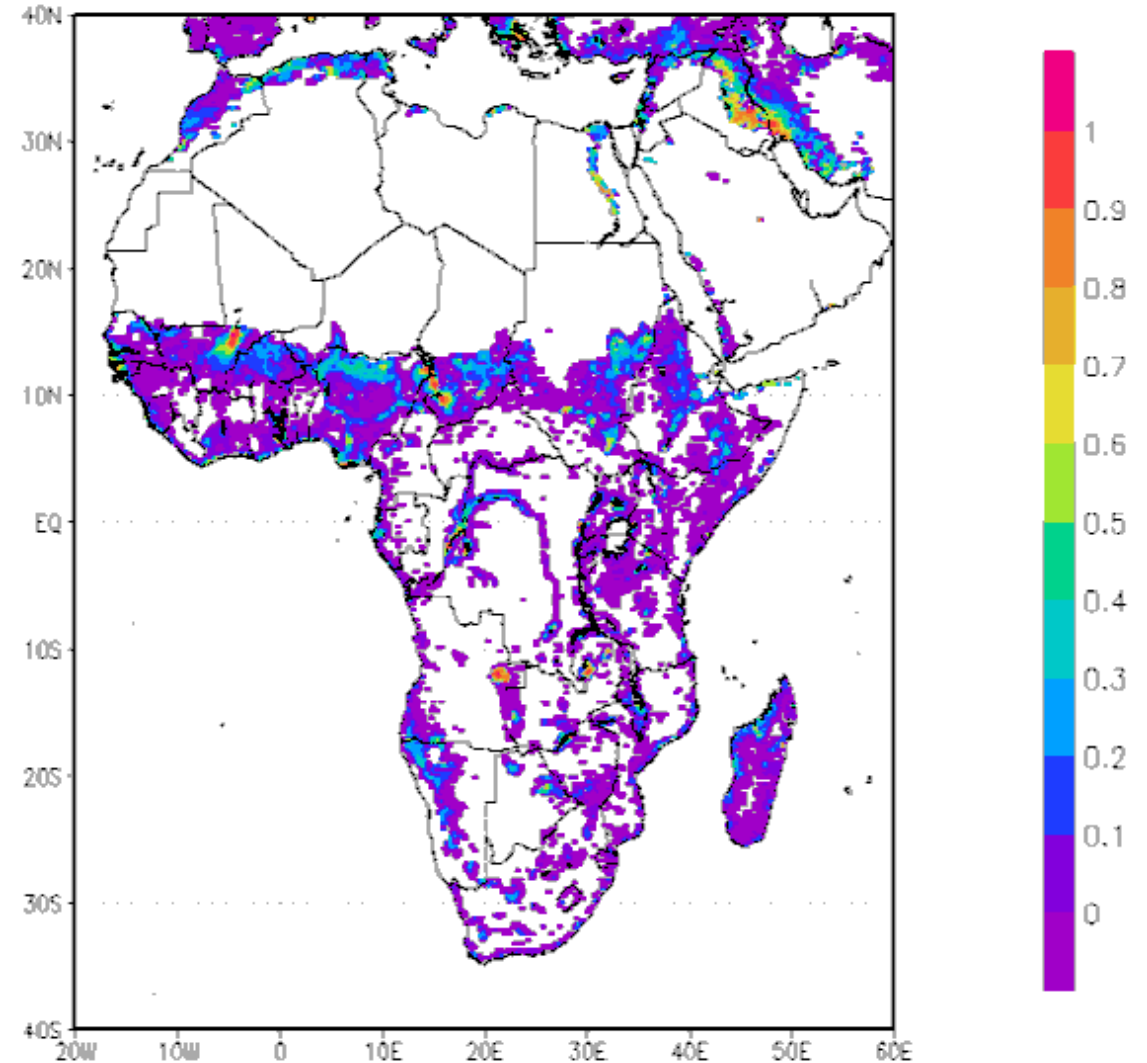
Groundwater science and resources

- Development of National Groundwater Model (1 km)
- Gridded groundwater models for UK and global domains

Image credits: BGS

Summer Student Programme

• paid internships for current gr

• applications open May 2019

Visiting Scientist Programme

• collaborative proposals from

• cover travel and subsistence

Annual Science Conference

• "Next Generation Land-surfac

• 11th September 2019, Royal S

Q&A

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