



**British  
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL



Applied geoscience for our  
changing Earth

# Integrated surface and groundwater modelling in the Thames Basin, UK using the Open Modelling Interface

J. Mackay<sup>1</sup>, M. Mansour<sup>1</sup>, C. Abesser<sup>2</sup>, C. Jackson<sup>1</sup>, A. Williams<sup>2</sup>, M. Pachocka<sup>1</sup>,  
L. Wang<sup>1</sup>, A. Hughes<sup>1</sup> and A. Kingdon<sup>1</sup>.

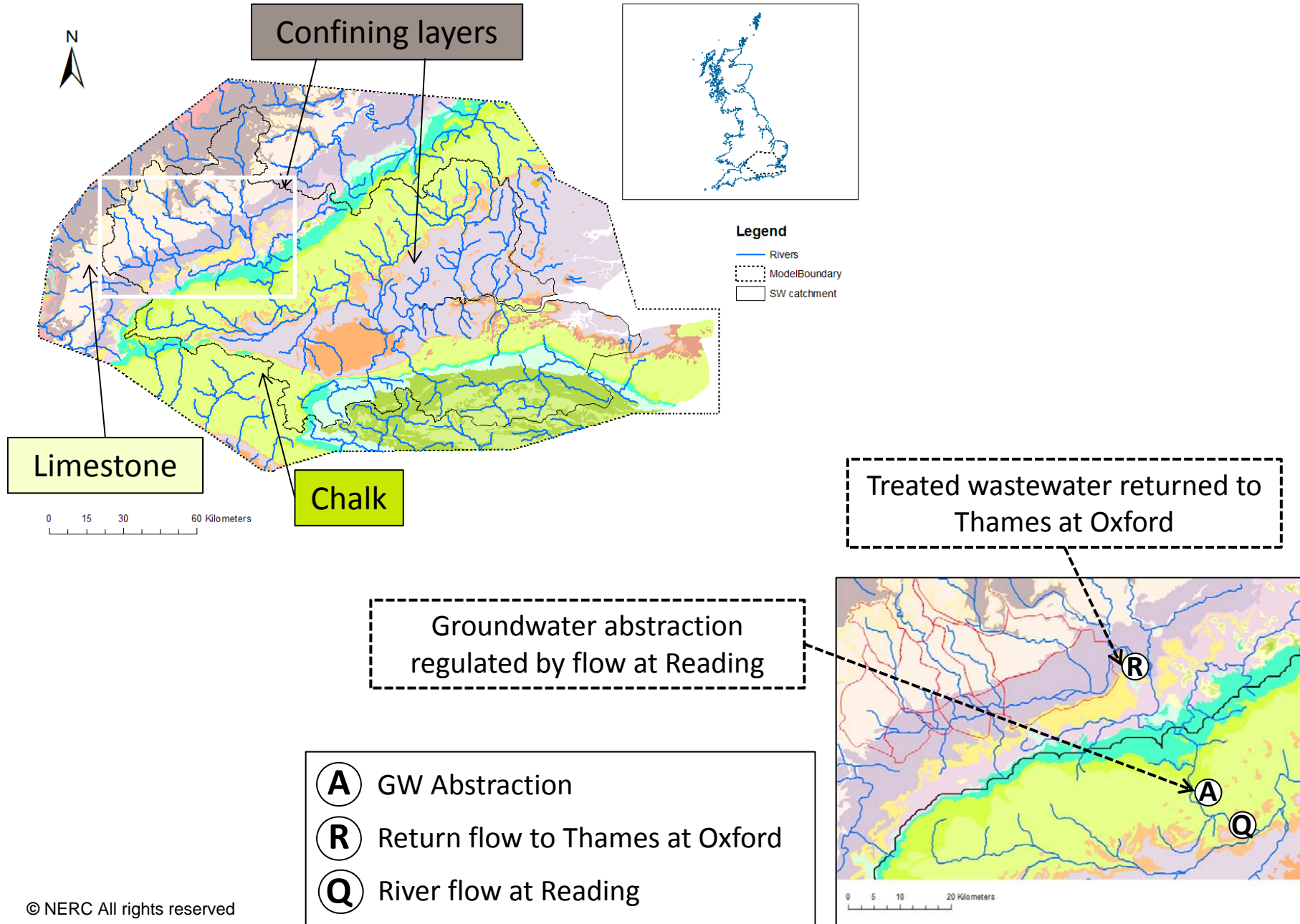
<sup>1</sup>British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, NG12 5GG, UK.

<sup>2</sup>British Geological Survey, Maclean Building, Wallingford, OX10 8BB, UK.

8<sup>th</sup> April 2013

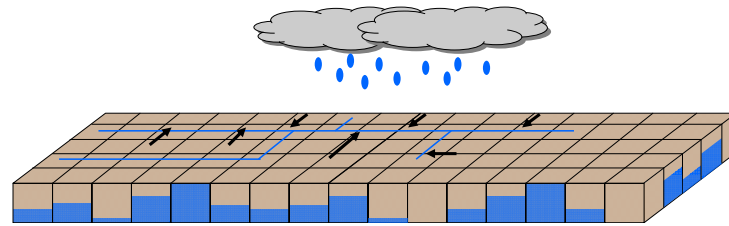
**With the support of Thames  
Water Utilities Ltd**

# Thames Basin



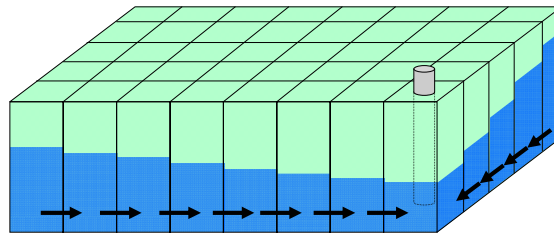
# Current Suite of Models

**ZOODRM**  
recharge  
model



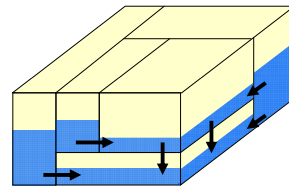
- **2D distributed** explicit model (1x1 km grid)
- **Daily** time-step
- Inputs: climate (rainfall and PET)
- Outputs: **overland flow**, soil moisture, **recharge**

**ZOOMQ3D**  
groundwater  
model (chalk)



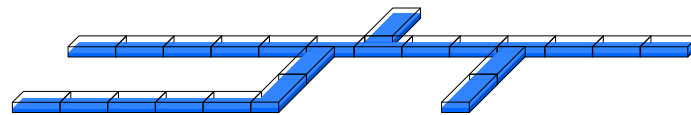
- **2D distributed** implicit model (1x1 km grid)
- **Variable** time-step
- Inputs: **recharge**, spring flow, abstractions
- Outputs: **baseflow**, groundwater head

**BGSGW**  
groundwater  
model  
(Limestone)



- **Semi-distributed** conceptual model (variably sized units)
- **Daily** time-step
- Inputs: **recharge**
- Outputs: **baseflow**, groundwater head

**Muskingum**  
river model  
(Thames)



- **1D distributed** river routing algorithm
- **Daily** time-step
- Inputs: **overland flow**, **baseflow**
- Outputs: **total flow**

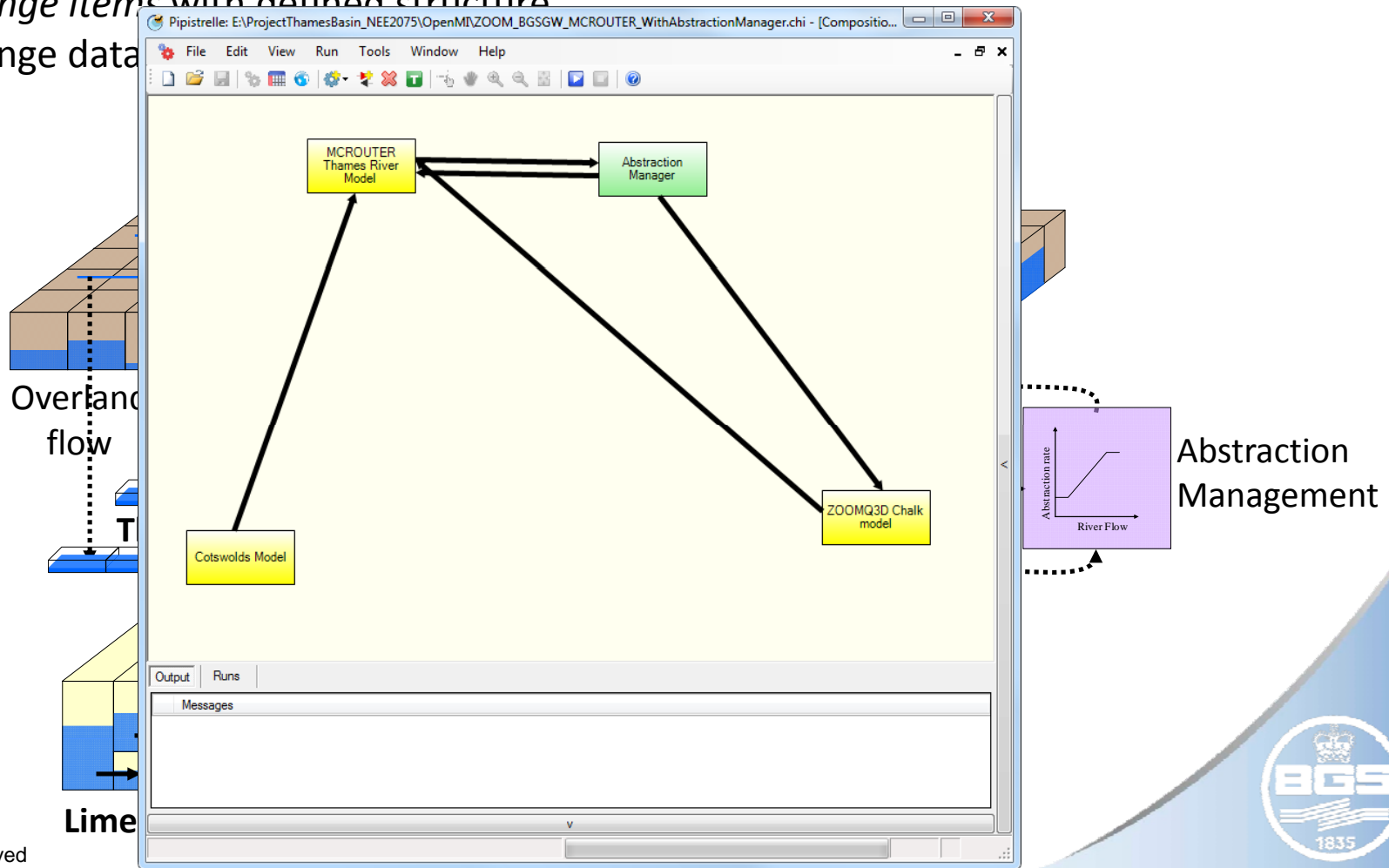
# The Open Modelling Interface (OpenMI) Standard



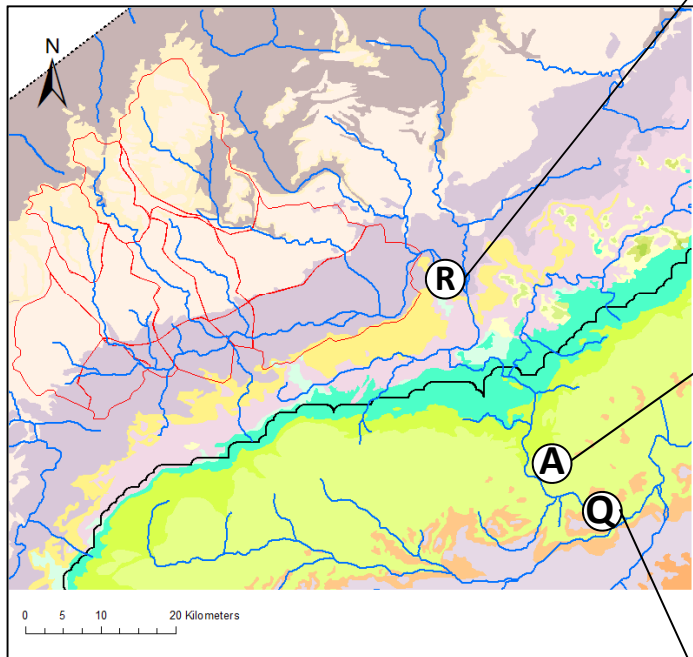
- An interface standard for model integration
  - Development initiated after Water Framework Directive (2000)

## •“OpenMI compliant” model

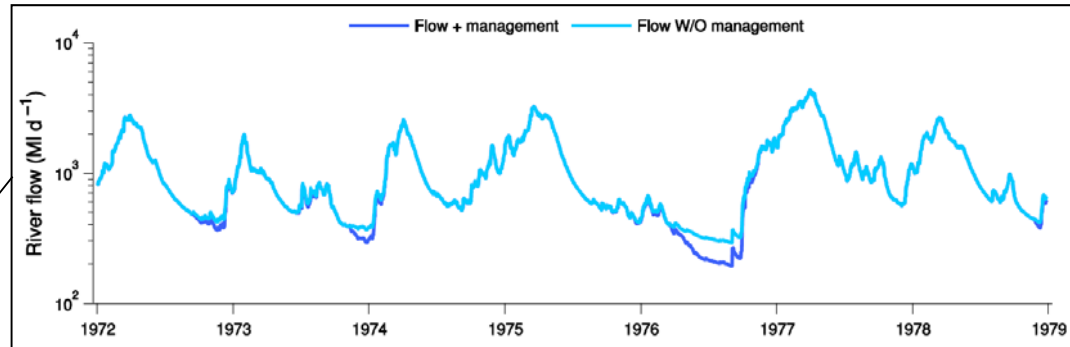
- Exchange items with defined structure
- Exchange data



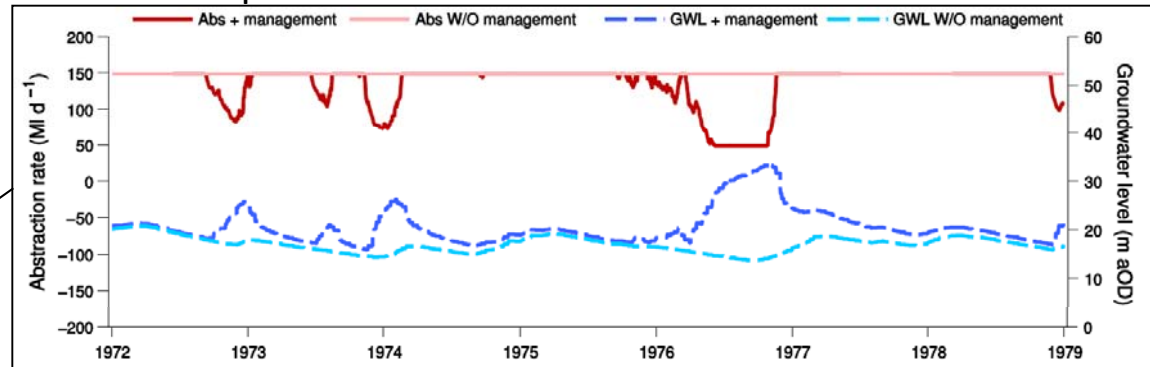
# Case Study: Preliminary Results



### Oxford



### Abstraction point



### Reading

