Progress to date on HydEF: BGS work

Denis Peach, Chris Jackson, Stephanie Bricker, Antoine Lafare, Andrew Hughes with help from: Jon Mackay, Majdi Mansour and Ann Williams.

6th November 2012
Outline of talk

• Thames basin
• Drought
• Other areas:
  • Pang/Lambourn
  • Colne Valley
  • Cotswolds
• Thames model
• Eden Valley
• Plans and schemes
Role of the Palaeogene and karst in the Chalk groundwater system in the Pang-Lambourn
Importance of the Palaeogene deposits?
Colne Valley - Adits

Note alluvium, sands and gravel, and river terrace deposits.
Adit Abstraction Systems
Modelling Wall Hall Pumping Test

Modelled levels after 100 days pumping

Adit diameters = 1.6 m
Shaft diameters = 1.8 m
Well diameters = 0.9 m

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Cotswolds limestones

Upper Jurassic
- Oxford Clay

Middle Jurassic
- Great Oolite (GO)
- FullersEarth
- Inferior Oolite (IO)

Lower Jurassic
- Lias

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Geology in 3D using GSI3D™

Great and Inferior Oolite GW level
River Churn – Flow accretion

![Graph showing flow accretion in the River Churn with data points for different geological layers such as Lias, Inferior Oolite, Great Oolite, Jurassic Clays, and Fullers Earth. The graph plots level in mAOD against distance downstream (Km). The river flow (max) and tributary lines are shown in blue, while the lines for Inferior Oolite GWL and Great Oolite GWL are in light blue and dotted blue, respectively.](image)
Water balance

• ~3 month delay between peak water surplus and peak river baseflow at the lowest gauging station downstream of the Cotswolds – Why ??

Extensive terrace gravel deposits overlying the Oxford Clay along the River Thames valley
Conceptual understanding

Cotswolds
Cotswolds – modelling approach

- Semi-distributed model of aquifer system: single head calculated in each “bucket”.
- Designed to be incorporated into a multi-aquifer model of Thames catchment.
- Code is OpenMI compliant to link with other components.

Numbering shows ID of each “bucket”
Rivers are represented as distributions of level for each “bucket”
Linking multiple models in OpenMI
Not included: Superficials (Till – high RO), Drumlins, Sand rich alluvial floodplains.
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<td>Groundwater Levels</td>
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<td>Observation Bore Holes location and information</td>
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<td>Contours</td>
<td>Data from EA (Environment Agency)</td>
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<td>Wellmaster (via GDI)</td>
<td>Clipped to Buffer</td>
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<td>ENVIRONMENT AGENCY GROUNDWATER MONITORING BOREHOLES</td>
<td>Locations of these boreholes</td>
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<td>Karst</td>
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<td>Recharge model</td>
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<td>Rainfall</td>
<td>Distributed Daily Rainfall 01/1961 to 12/2007</td>
<td>Eden Catchment xllcorner 308100 yllcorner 490250</td>
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</table>
Plans and schemes - 1

- Thames:
  - Finished with the Cotswolds – largely
  - Pang/Lambourn – drilled them boreholes and planning a PhD
  - Colne – “not a sausage”
  - Thames – composition being developed
- Eden – just started

“I’ve had it with Oods”
Plans and schemes - 2

Papers:
• IAH – invited paper for Green Book Fractured Rock Hydrogeology (nearly) ready for submission (Steph)
• Complexity based on Thames – nearly completed final draft (AGH/Steph/Denis)
• Hydrogeology of the Cotswolds (Steph/Denis)
• Cotswolds modelling (CRJ/Others)
• Eden – Recharge/run-off (Antoine/Denis/CRJ/AGH)
• Thames basin composition (CRJ/Others)
• Imputation – Joint with UCL and CEH
• Application of Thames modelling composition (Antoine/CRJ/AGH)
• Maybe more: Gravels in the Cotswolds??
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