

What is a  
**Hydrogeological Map?**  
International Approaches to Hydrogeological Mapping

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Hydrogeologist and  
thermogeologist





Photo by D Banks

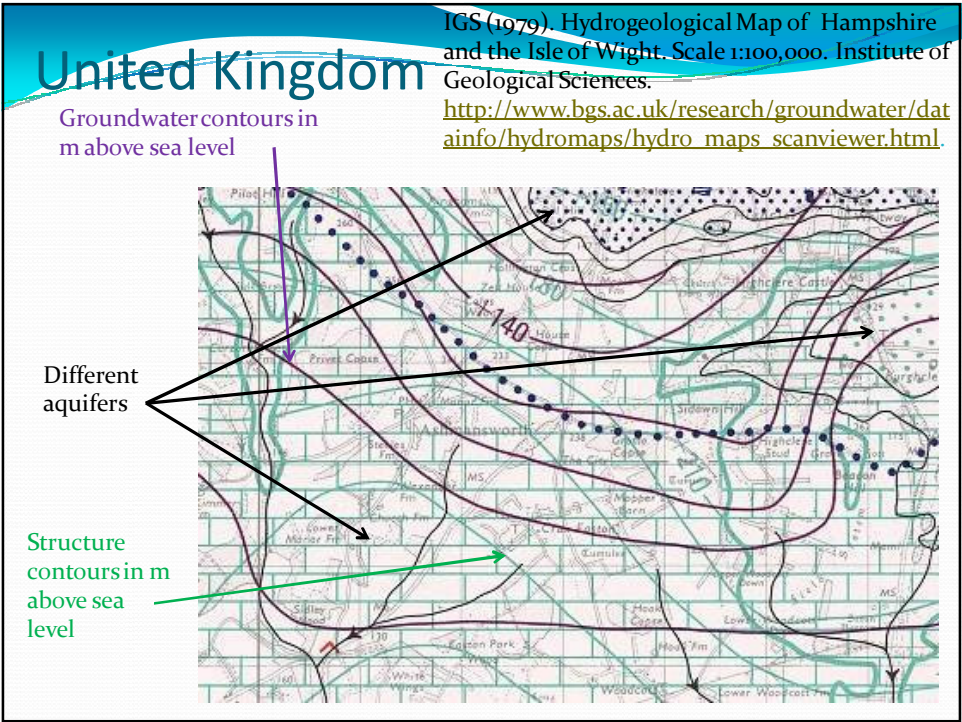
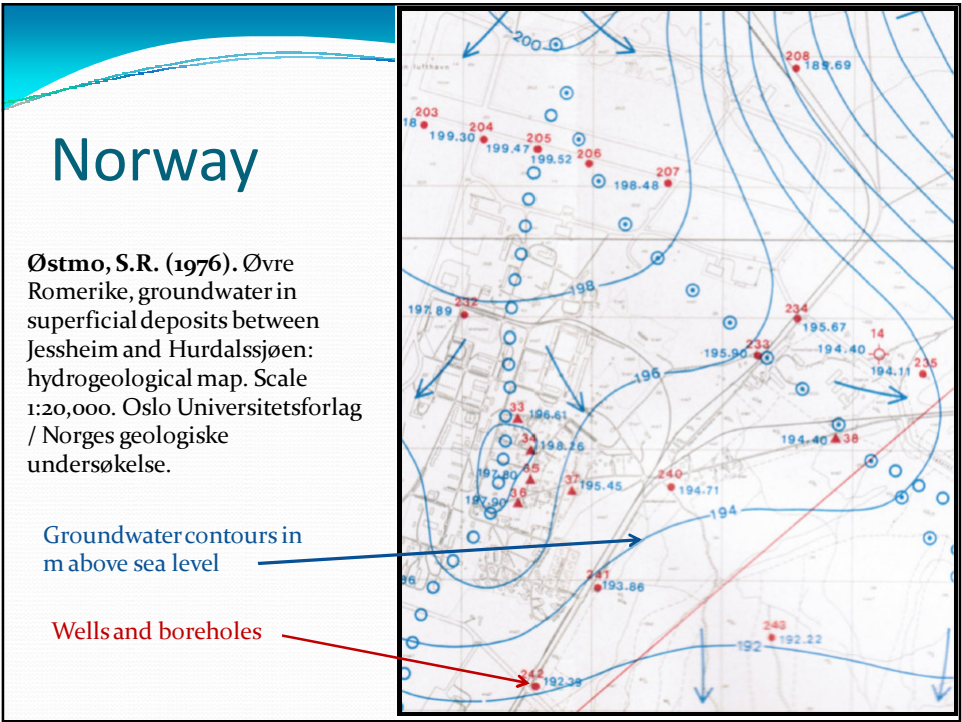
NORAD supported project in MRRD:  
Capacity Building and Institutional Cooperation in the field of Hydrogeology for Faryab  
Province, Afghanistan

**NORPLAN** 

**What is a Hydrogeological Map?**

**ANSWER:** A paper-based, digital or web-based map service,  
which aims to provide information on:

1. The occurrence of groundwater (aquifers)
2. The depth to groundwater (water table and aquifer horizons) and its direction of flow
3. The likely yield of wells (aquifer properties)
4. The quality of groundwater
5. ...and to provide some information about the third dimension (e.g. By cross-sections or structure contours)





**Мышкин Д.П. (1968).** Схематическая карта гидрозогипсы минерализации подземных вод четвертичных отложений центральной части Северного Афганистана. Масштаб 1:500,000 (Schematic map of hydrosohypses of groundwater mineralization in the Quaternary deposits of the central part of northern Afghanistan. Scale 1:500,000).

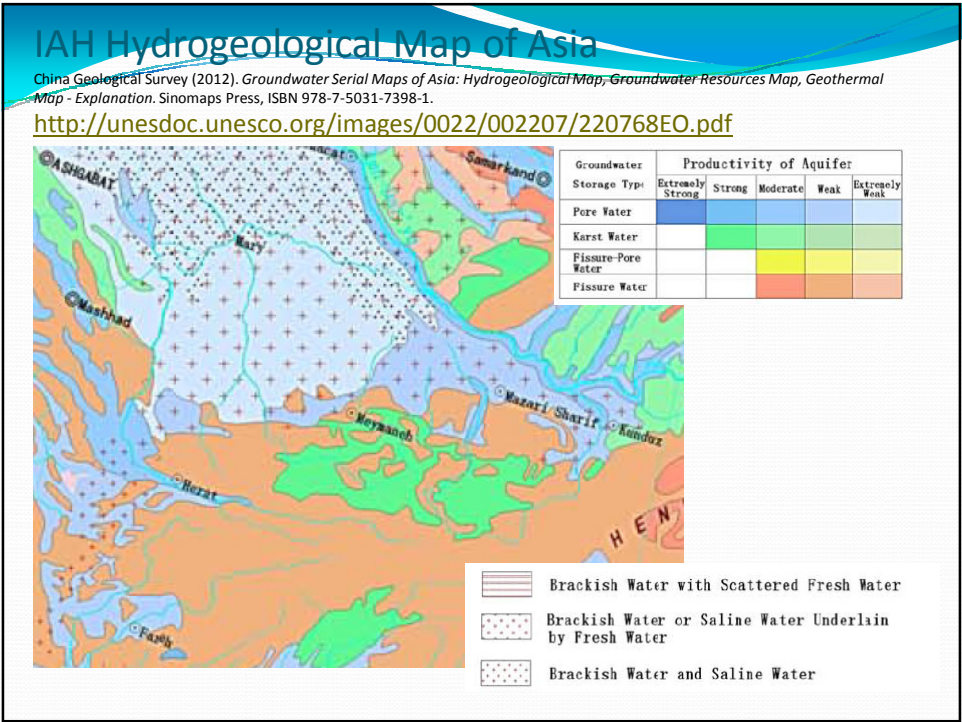
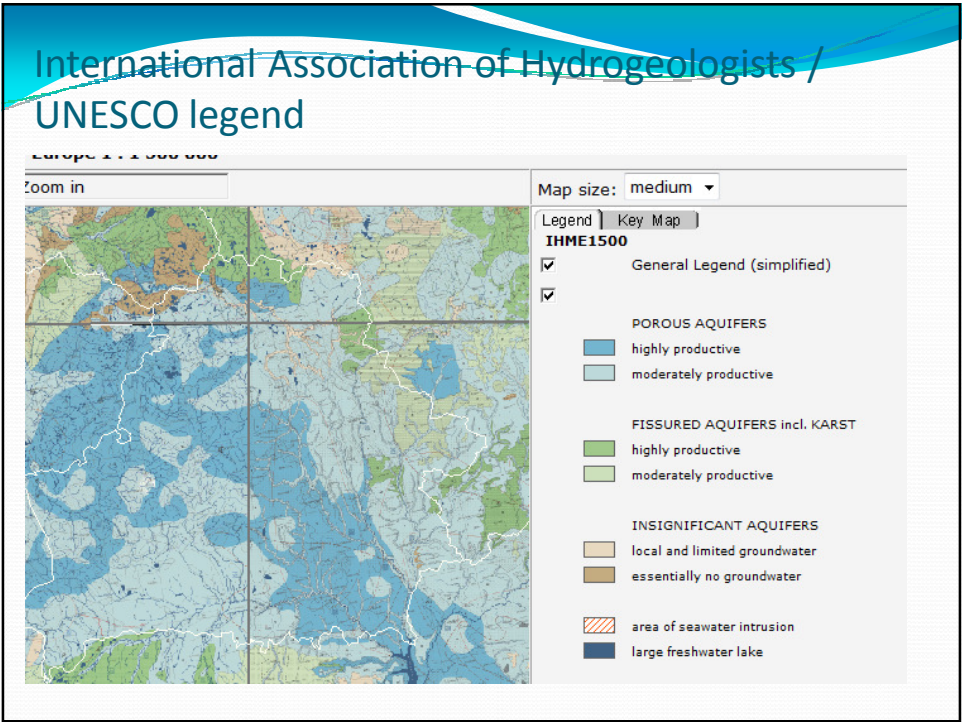


## Wells and boreholes

Areas of different salinity  
(shaded)

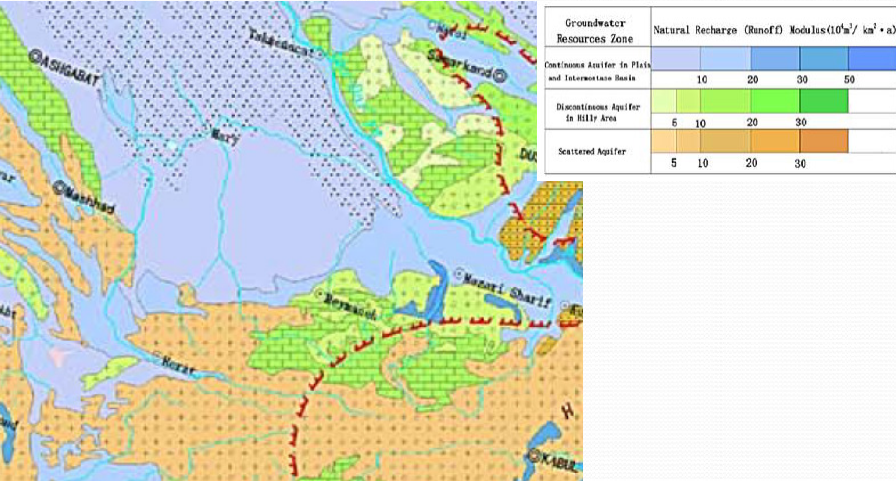
An extract of the IAH/UNESCO 1:500,000 sheet  
for Moscow.







### IAH Hydrogeological Map of Asia



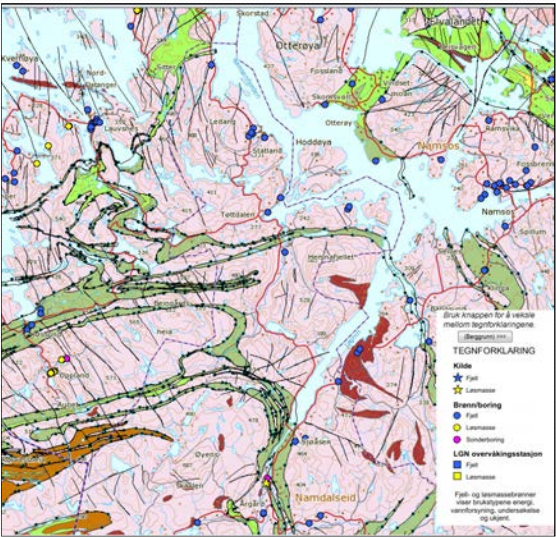
### Web-based maps: GRANADA Norway

#### Geology (Flatanger)

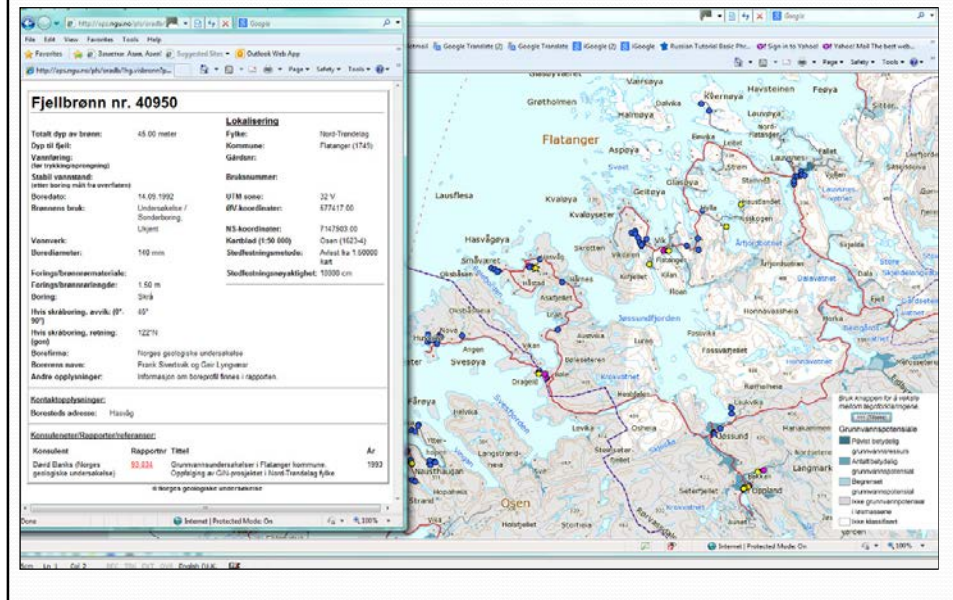
The GRANADA database and WebGIS, hosted by the Geological Survey of Norway, shows

- geology
- groundwater potential
- information on individual boreholes and wells

The service is located at <http://geo.ngu.no/kart/granada/>

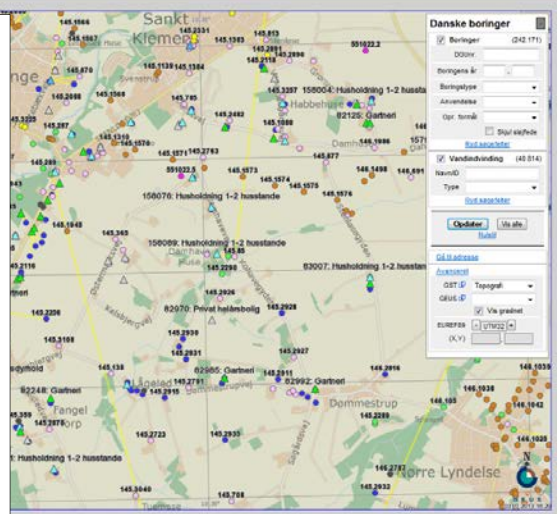


## Web-based maps: GRANADA Norway



## Web-based maps: JUPITER Denmark

The JUPITER database, hosted by the Geological Survey of Denmark and Greenland (GEUS), shows information on individual boreholes and wells, with all associated data and geological columns. It does not attempt to show geology (probably because most of Denmark's aquifers are concealed beneath varying deposits of superficial Drift and are not easily shown on a map) or any interpretative information on groundwater potential or depth. It places greater emphasis on raw data availability. The service is located at [http://geuskort.geus.dk/GeusMap/index\\_jupiter.jsp?imgxy=700+396&MapWidth=1400&MapHeight=791](http://geuskort.geus.dk/GeusMap/index_jupiter.jsp?imgxy=700+396&MapWidth=1400&MapHeight=791)

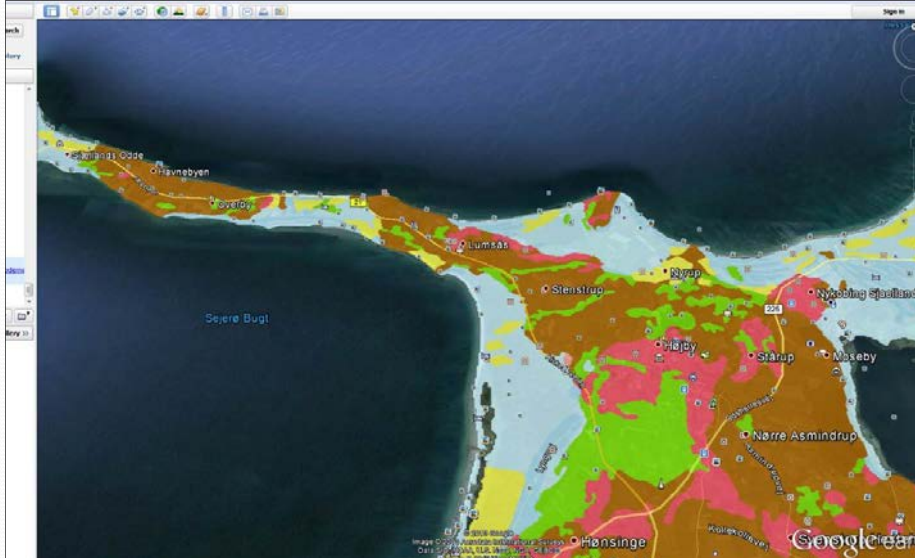




# Web-based maps: JUPITER Denmark

# Web-based maps: Google Earth

## Geological Maps of Denmark



The screenshot displays the Google Earth interface with a geological map of a coastal region in Denmark. The map is color-coded to represent different geological formations. Key geographical features and labels include:

- Sejere Bugt**: A large body of water on the left side of the map.
- Lumfås**: A location marked on the coast.
- Stenstrup**: A location marked inland.
- Stårup**: A location marked inland.
- Nørre Asminderup**: A location marked inland.
- Hønsinge**: A location marked at the bottom center.
- Google Earth**: The logo is visible in the bottom right corner.

The map shows a complex pattern of land and sea areas, with the Google Earth interface elements (search bar, map controls, and the Google Earth logo) visible around the edges.

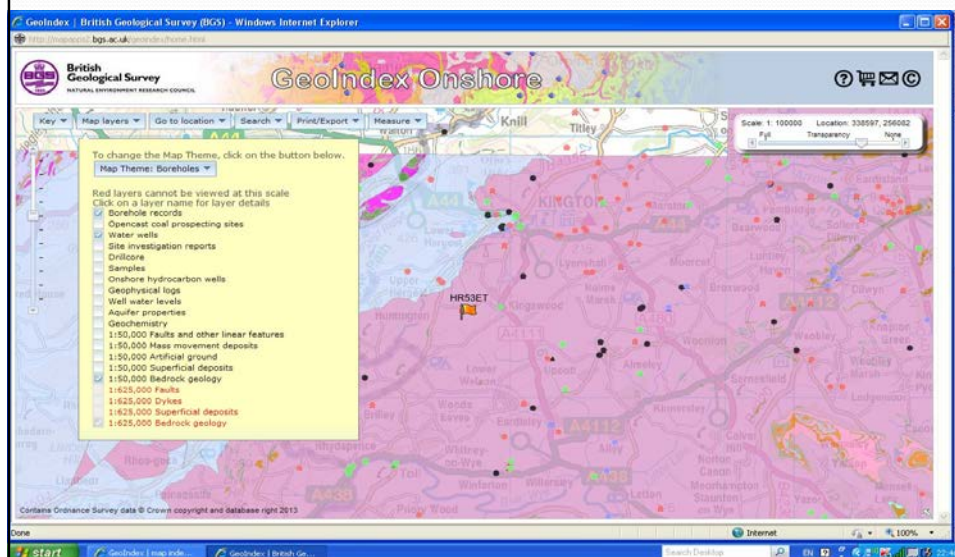
## We have also overlain Afghan geological maps in Google Earth

(see file Geological Maps 200000 external.kmz)

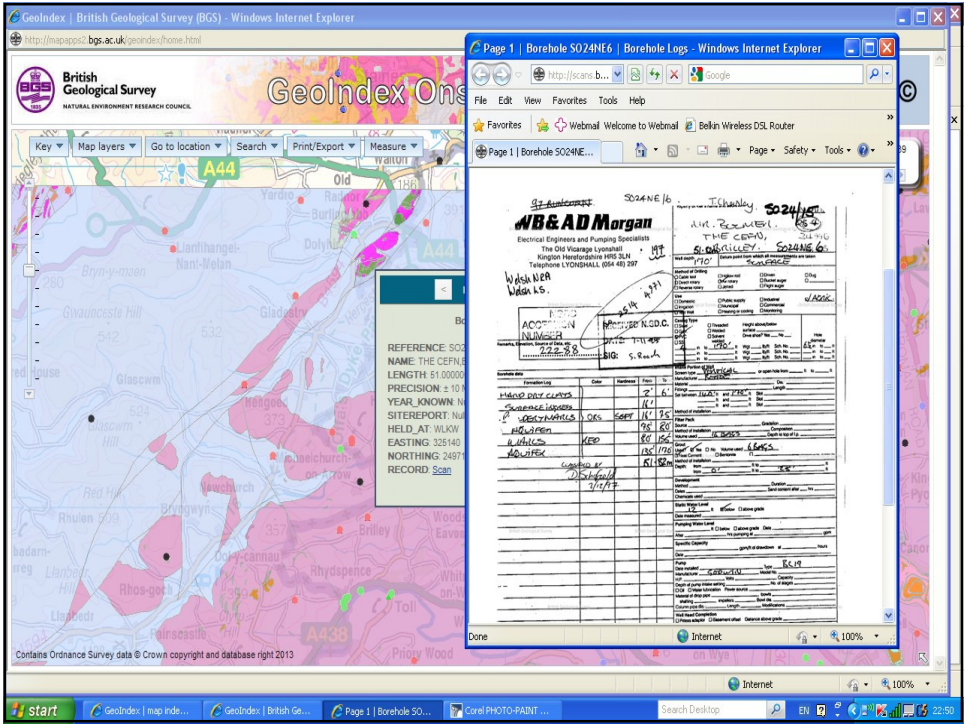
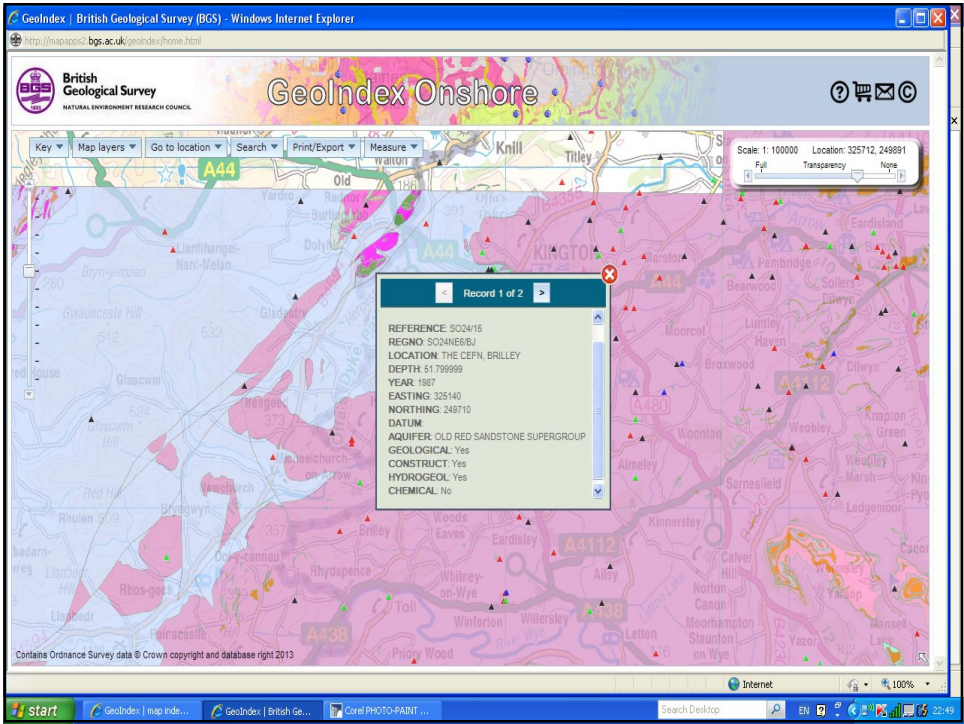


## Web-based maps: GEOINDEX, UK

<http://mapapps2.bgs.ac.uk/geoindex/home.html>.

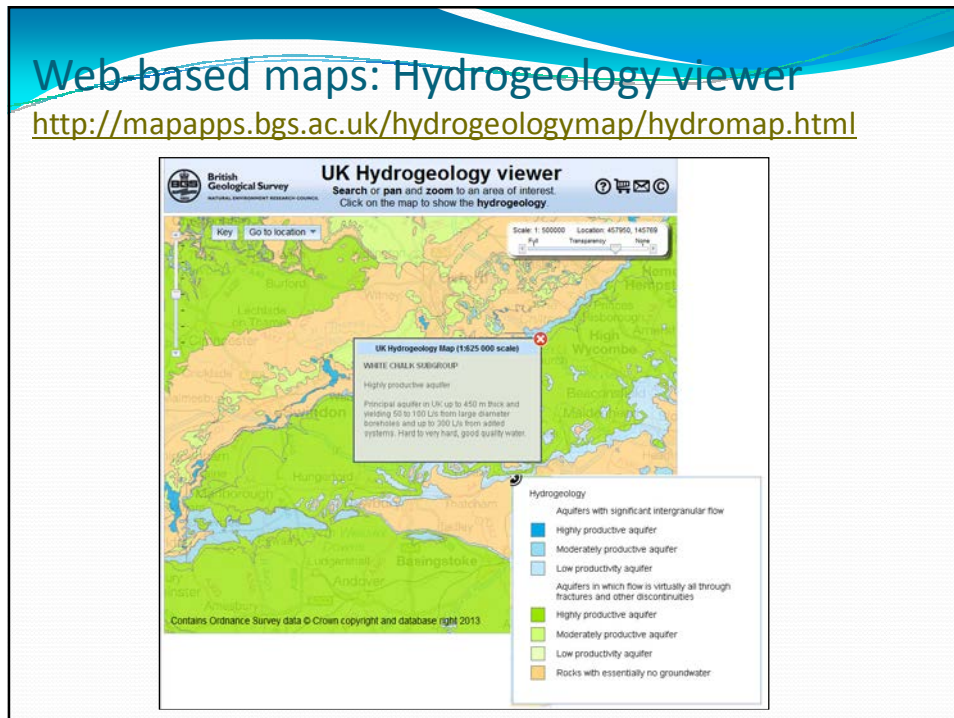






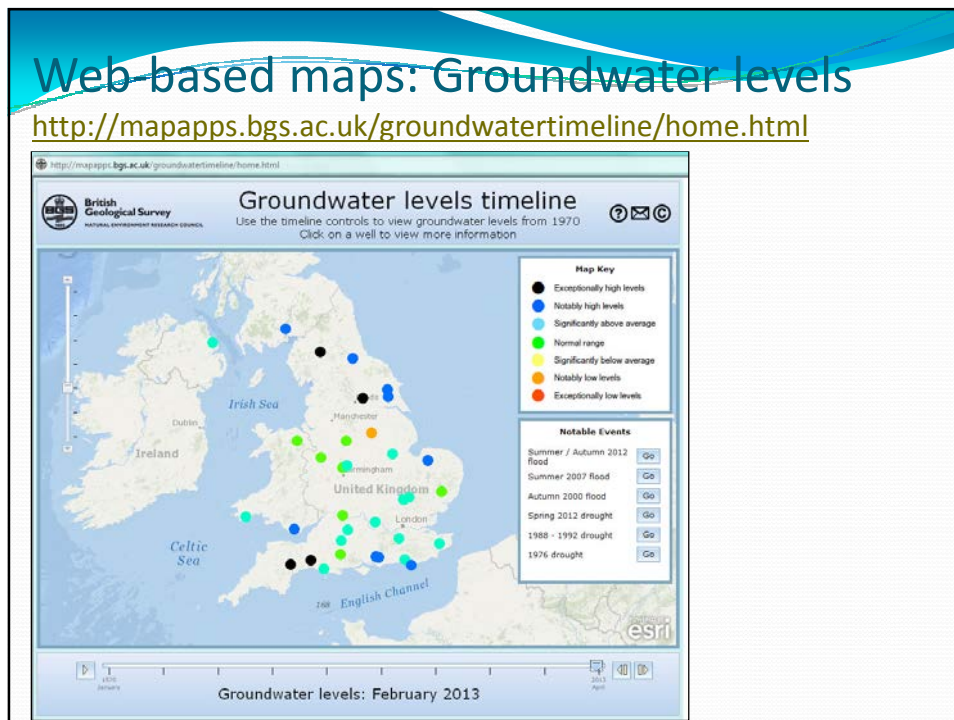
## Web-based maps: Hydrogeology viewer

<http://mapapps.bgs.ac.uk/hydrogeologymap/hydromap.html>

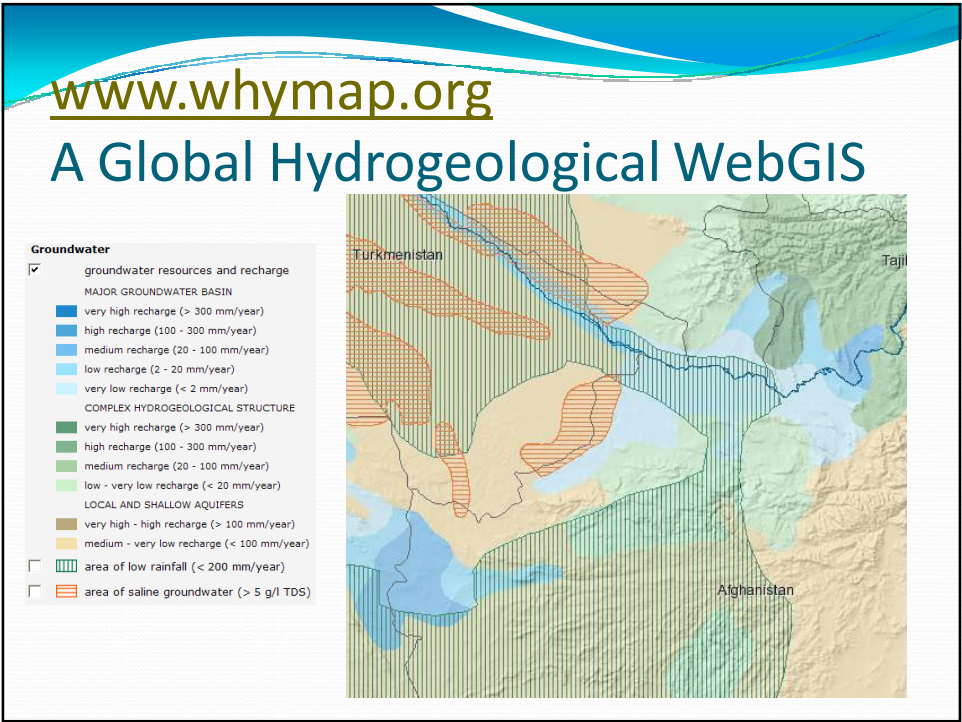
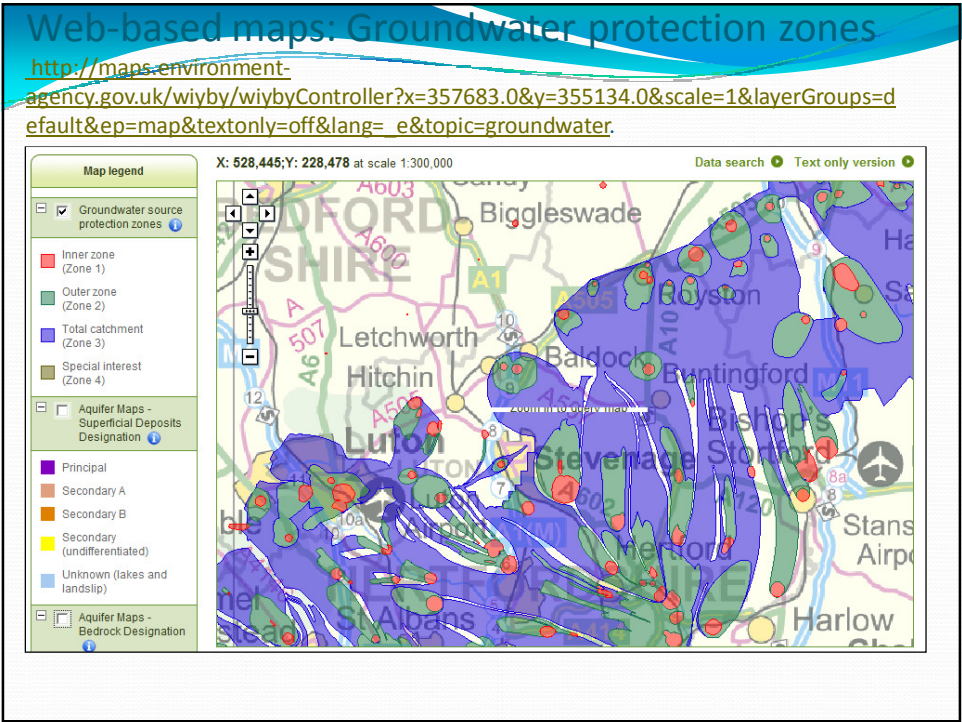


## Web-based maps: Groundwater levels

<http://mapapps.bgs.ac.uk/groundwatertimeline/home.html>







## A Plea for Open Data

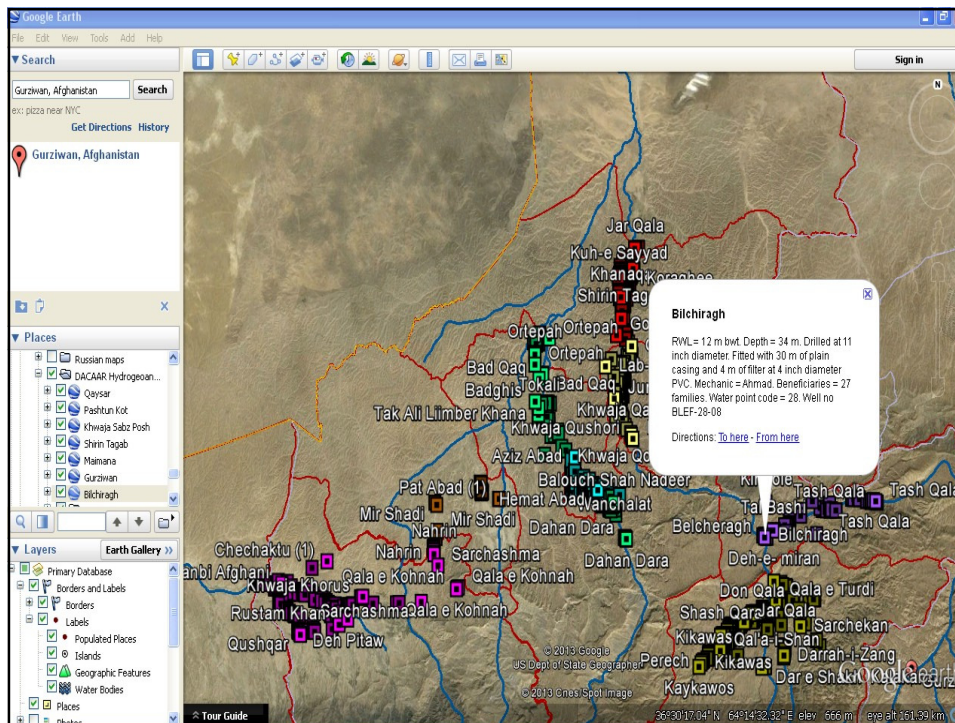
### Information = power

If a private authority has as its ambition to maintain power and earnings for itself, it should restrict access to the data it holds and charge for access to that data.

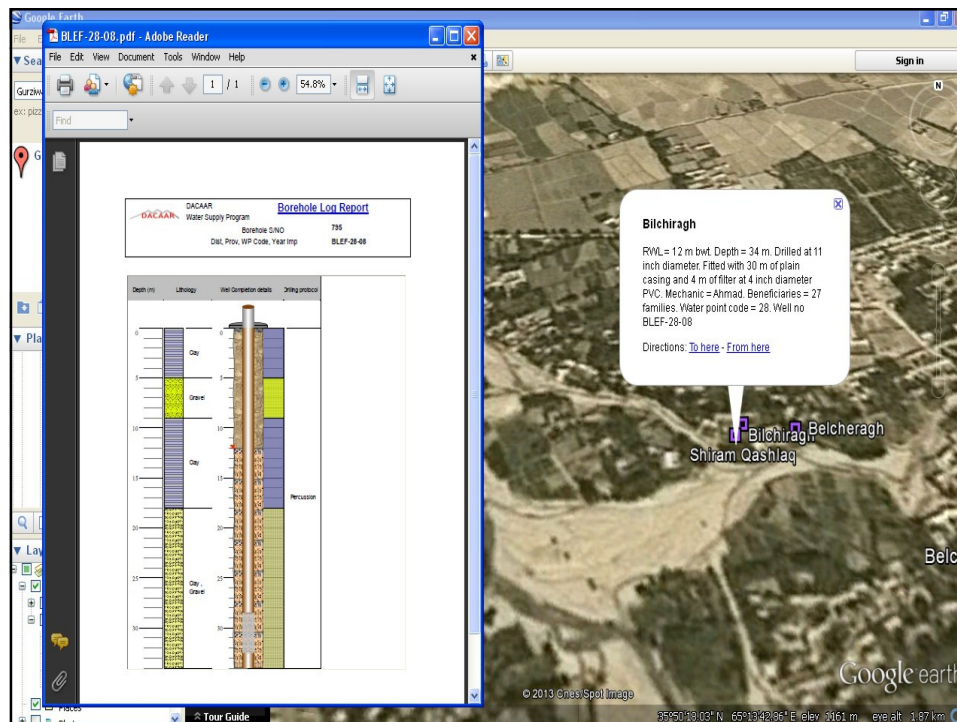
If a public authority has as its ambition to spread power, encourage a freely competing and collaborating private / NGO sector and to facilitate the greatest possible use of data that, ultimately, has often been paid for by domestic public taxes or foreign public donors, then it should aim to make its data as freely available as possible, via the internet.

This applies not just to interpretations of data (because state experts can also be wrong!), but to the raw data itself.

**We are working towards an open, web-based map tool and information system**







## Hydrogeological Survey

**OBJECTIVE:** To improve possibilities of successful and sustainable groundwater resources development:

1. A good functional database / GIS
2. **Collation of all existing data**
3. Collection of additional hydrogeological data in the field
4. **A web-based interactive hydrogeological atlas of Faryab**
5. A "paper format" Atlas

[illegible]

# Practical 1

Contours on the base of the Tertiary

Contours on the base of the Upper Chalk

Contours on the base of the Lower Chalk

Contours on the top of the Lower Greensand

Isopachytes for the Lower Greensand, beneath the Gault, in metres

in metres relative to Ordnance Datum

## Groundwater Features

Contours on the potentiometric surface of the Chalk (and Upper Greensand)

Contours on the potentiometric surface of the Lower Greensand

Principal groundwater divide in Chalk

Principal groundwater divide in Lower Greensand

in autumn 1976, in metres relative to Ordnance Datum

Upper Chalk 50-120m

Chalk Rock

Middle Chalk 50-100m

Marlston Rock

Lower Chalk 40-60m

Upper Greensand 0-20m

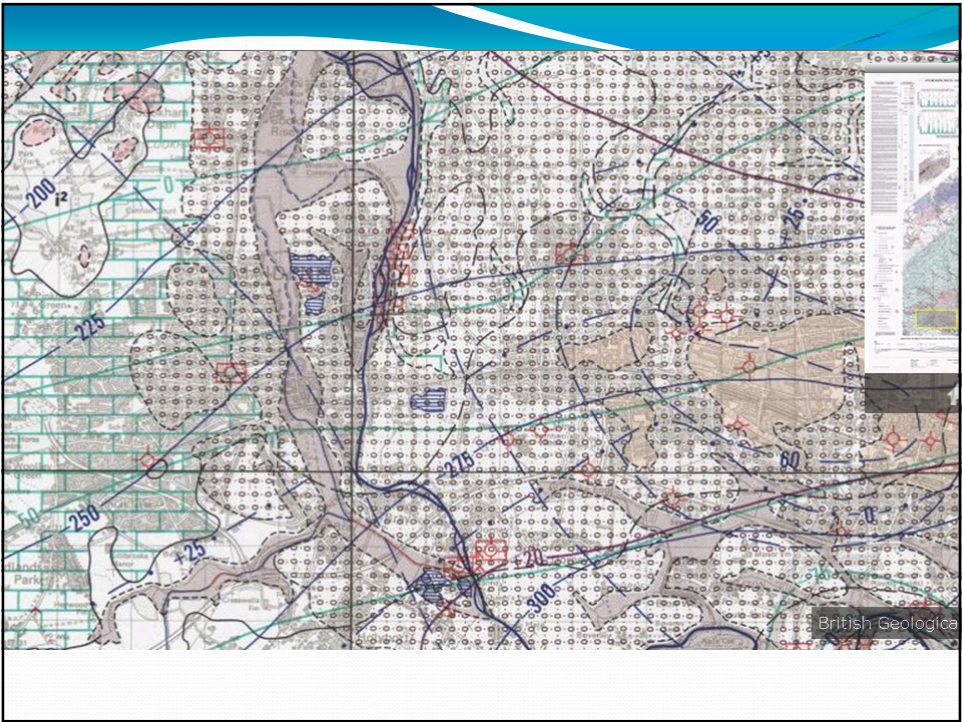
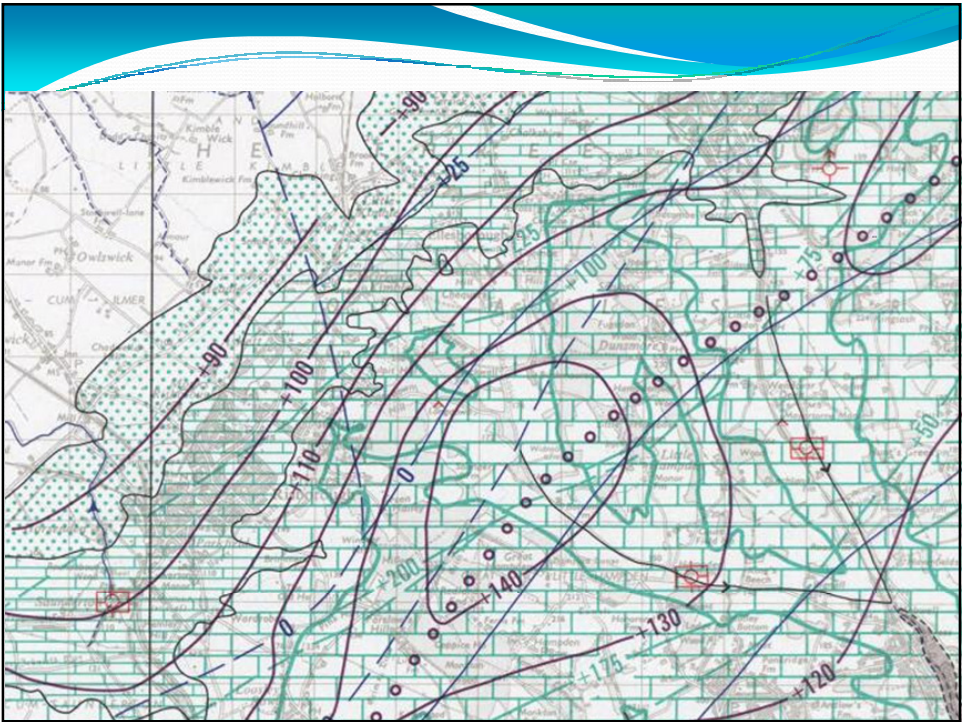
Gault 30-100m

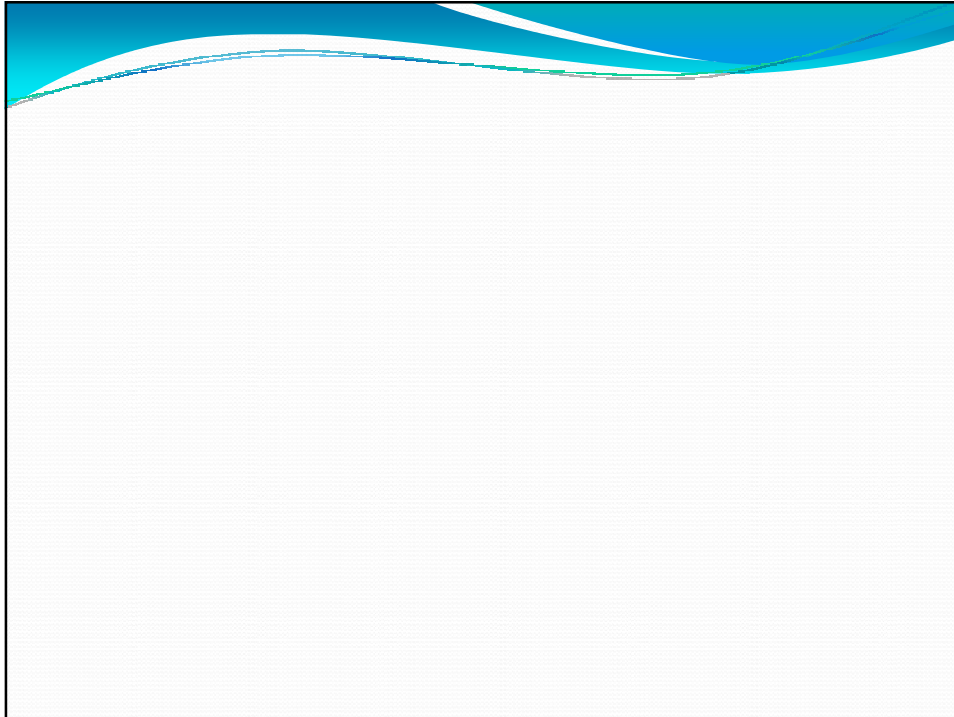
Lower Greensand 0-10m

Cretaceous

Tertiary







## The Maharajah's Well (Stoke Row UK)

- Sunk in 1863-64
- Financed by the Maharajah of Benares (who also funded a cherry orchard to finance its upkeep)
- Sunk to 368 ft deep (112 m), at c. 4 ft diameter
- Water lifted by 2 x 9 gallon buckets

The Maharajah's well; Stoke Row; Oxfordshire

Photo by Dave Banks

