

Using Existing Data

Types of data: Soviet maps

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Google Earth

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

NORPLAN 

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

What are the prerequisites for A Hydrogeological Survey

Data on the existence and behaviour of water

- The level of the water table
- The quality of the groundwater
- The yield of groundwater
- Rivers (flow, elevation, quality)
- Rainfall/Snowfall (recharge)

What are the prerequisites for A Hydrogeological Survey

Data on the existence and behaviour of the rocks
and sediments

- The outcrops of different rock types
- Their distribution with depth
- Their hydrogeological properties (transmissivity, storage, porosity)
- Their chemistry

What are the prerequisites for A Hydrogeological **Survey**

The location of these data (wells, boreholes, springs, karezes, rivers):

- In x and y dimensions (GPS location/grid reference)
- In z dimension (elevation and depth)
- In t dimension (when were the data collected?)
- Metadata (who collected the data, where were the samples analysed, who drilled the well?)

Background data

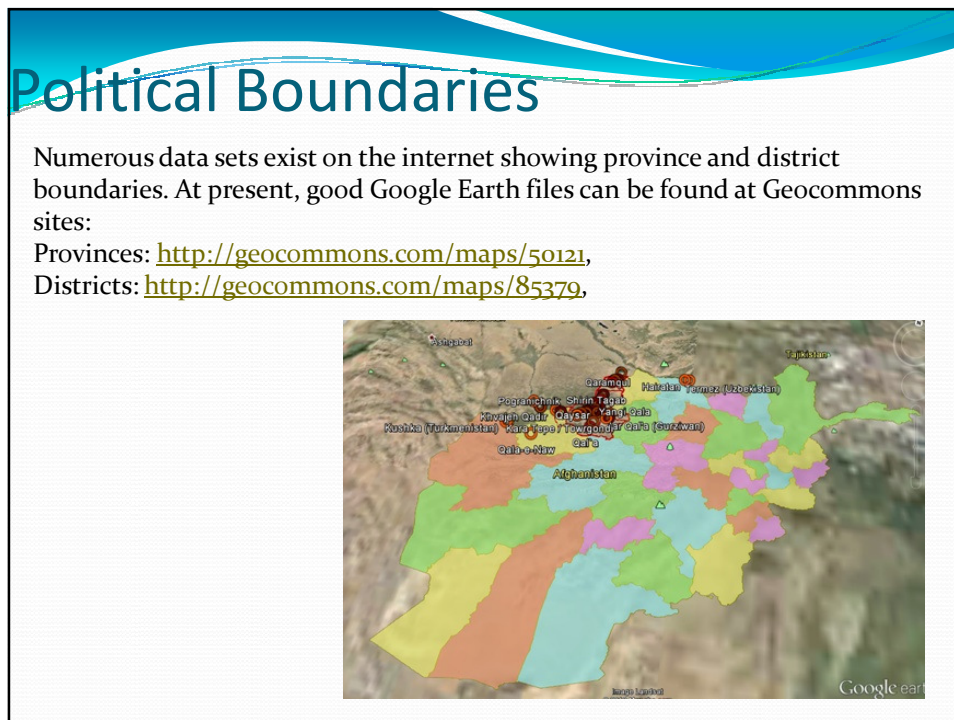
- Topographic / terrain elevation data
- Political data (province / district boundaries, major towns and cities)
- Other topographic data (road network)
- Geological outcrops, faults and contacts
- Outcrops of hydrogeological units (aquifers and aquitards)
- Hydrological data (river network)
- Meteorological data

Much of this data will already be available from the relevant Afghan Ministries / organs or from:

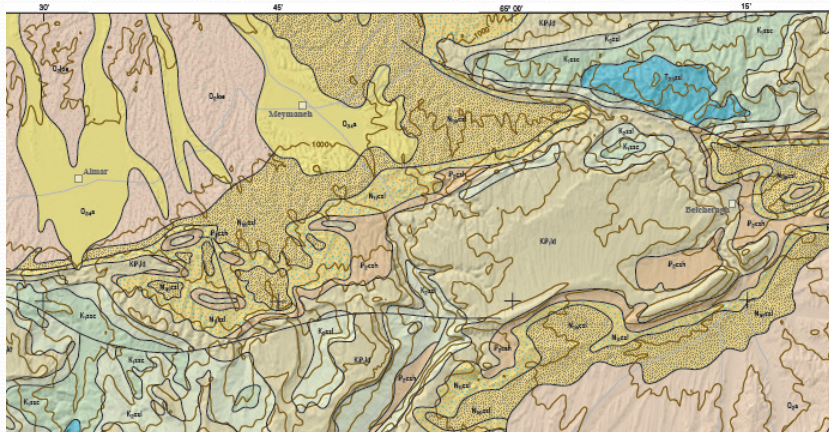
The USGS Afghanistan website at <http://afghanistan.cr.usgs.gov/geospatial-reference-datasets>.

CD-ROMs and data provided with USGS Open File reports 2006-1038 and 2006-1179, also available at http://pubs.usgs.gov/of/2006/1179/Data_layers.html.

Various digital elevation models are available from the USGS Afghanistan website at <http://afghanistan.cr.usgs.gov/geospatial-reference-datasets>.



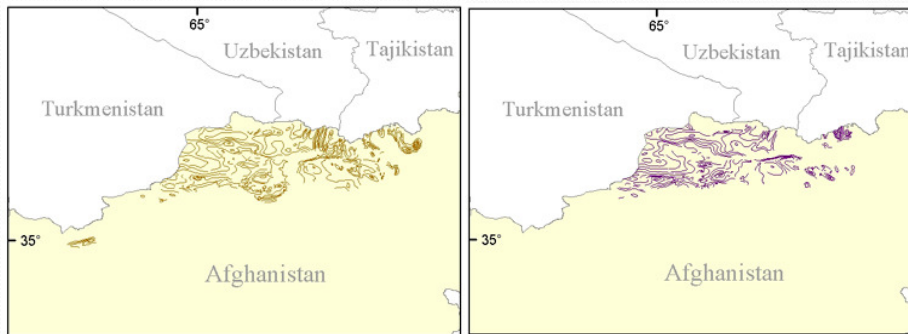
We recommend using the most recent Afghan Geological Survey USGS 1:250,000 scale geological maps. Available at http://afghanistan.cr.usgs.gov/afghan_geo.php as pdf files or at http://pubs.usgs.gov/of/2006/1179/Data_layers.html as shape files.



Geological base-map

In addition, other files may be available, giving structure contours on specific horizons: e.g.

- The Palaeogene Ghory Formation at <http://pubs.usgs.gov/of/2006/1179/shapezip/ghorydpafg.zip> or the
- top of Hauterivian sandstones (Qezeltash Formation) at <http://pubs.usgs.gov/of/2006/1179/shapezip/qezeldpafg.zip>



Rivers & Surface Waters

The USGS data sources have basic outlines of Rivers as line files for GIS environments.

In Faryab, however, it has been found preferable to “trace” surface waters in the Google Earth environment, to save them as kml or kmz files and then import them into the relevant GIS environment.



Climate data - temperature

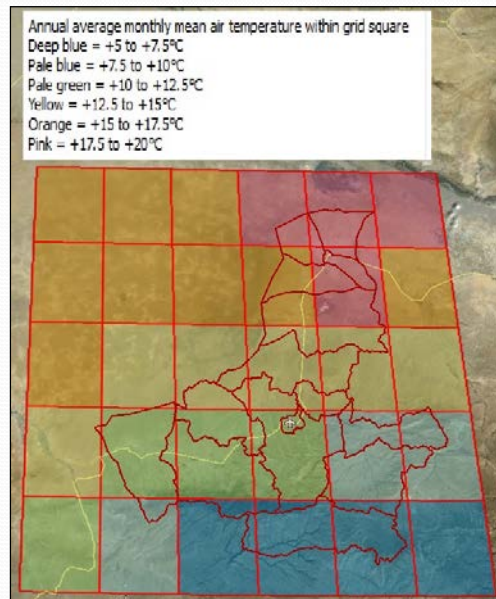
The best regional sources of meteorological data are found at the NOAA website

<http://www.esrl.noaa.gov/psd/data/gridded/data.ghcncams.html>

We have used the file:

<ftp://ftp.cdc.noaa.gov/Datasets/ghcncams/Derived/air.mon.1981-2010.ltm.nc>

The data are gridded at intervals of 0.5 degrees of longitude



Climate data - precipitation

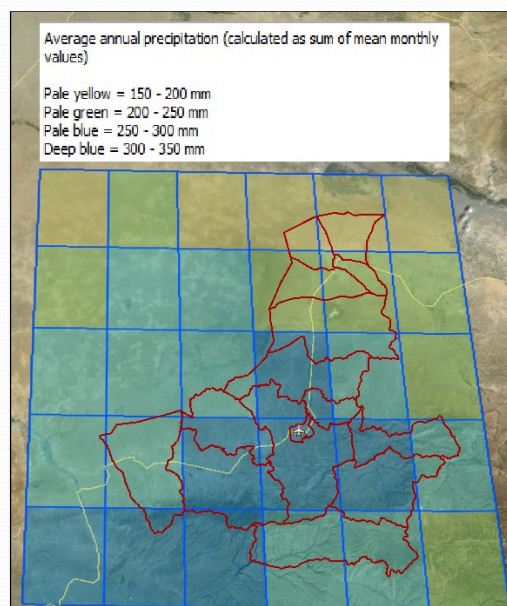
The best regional sources of meteorological data are found at the NOAA website

<http://www.esrl.noaa.gov/psd/data/gridded/data.gpcc.html>

We have used the file:

ftp://ftp.cdc.noaa.gov/Datasets/gpcc/full_v6/precip.mon.1981-2010.ltm.v6.nc

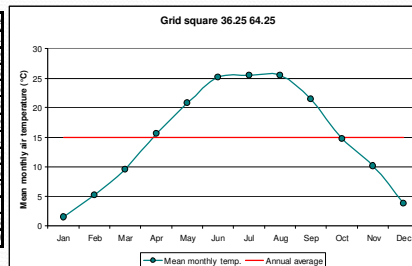
The data are gridded at intervals of 0.5 degrees of longitude



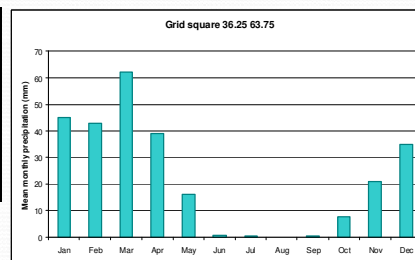
Climate data - detail

By clicking on a grid square, climate detail can be called up:

Mean Monthly temperature	
Jan	1.4
Feb	5.2
Mar	9.6
Apr	15.6
May	20.8
Jun	25.2
Jul	25.4
Aug	25.5
Sep	21.5
Oct	14.7
Nov	10.1
Dec	3.8
Annual average	14.9



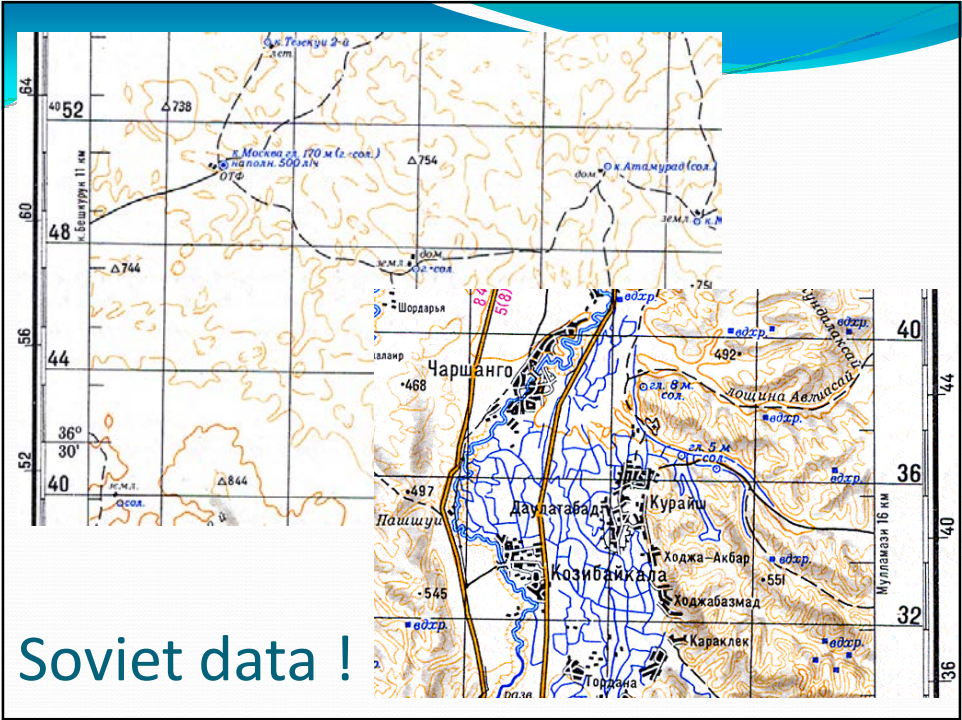
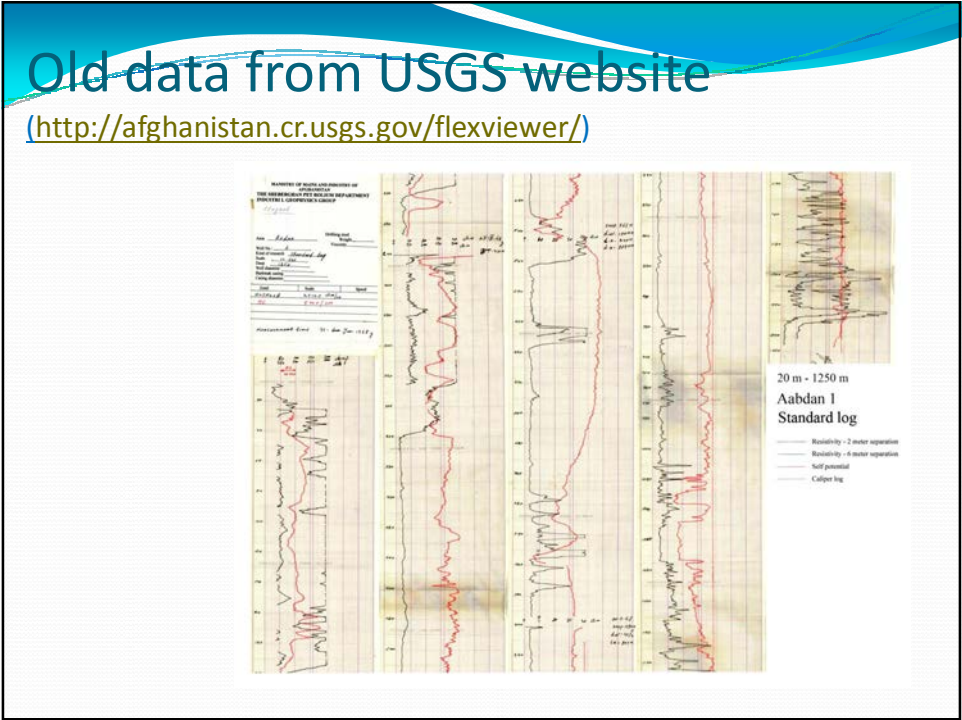
Mean monthly precipitation (mm)	
Jan	45
Feb	43
Mar	62
Apr	39
May	16
Jun	0.73
Jul	0.37
Aug	0.013
Sep	0.41
Oct	7.6
Nov	21
Dec	35
Annual total	270.1



Waterpoint data collection

(Springs, karezes, wells, boreholes, meteorological stations, river stations)

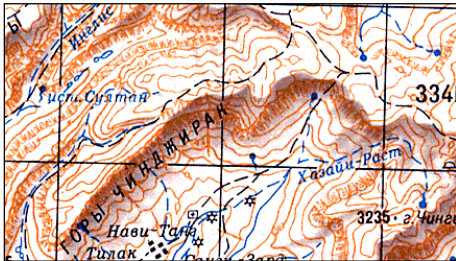
- Ministries, at both national and provincial level
 - MRRD
 - MoM / Afghan Geological Survey
 - MAIL
 - MoEW
 - MUDA / CAWSS / AUWSSC
- NGOs, especially
 - DACAAR (main supplier)
 - INTERSOS
 - NCA
- UN organs, including UNICEF and possibly also UNHCR, FAO, UNDP, UNEP.
- Private drilling companies and consultancies
- International donors, lending organs and consultancies.
- US Geological Survey (who provide geophysical logs and details of hydrocarbon exploration boreholes via their own WebGIS at <http://afghanistan.cr.usgs.gov/flexviewer/>)
- Soviet maps



Soviet maps

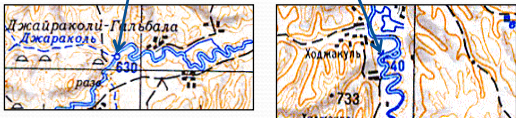
Springs are shown as small blue circles with squiggly tails, and may be marked
род. = родник or *ист.* = источник

Wells (and also boreholes used for water supply) are typically marked
к. = колодец

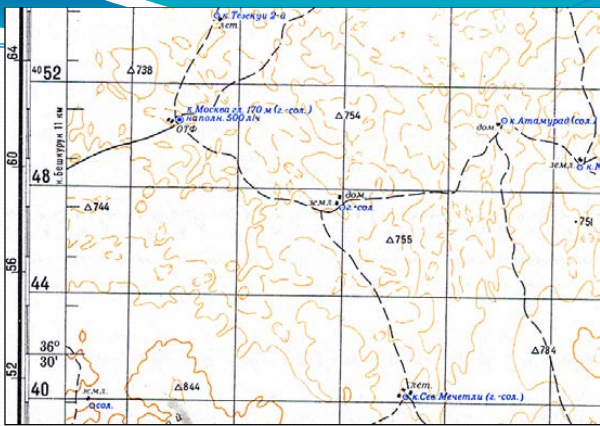


Soviet maps also show:

- Elevations of river (m asl)
- Width of river (m)



Soviet maps



вдхр. = водохранилище =
reservoir or rainwater cistern

Wells (and also boreholes used for water supply) are typically marked
к. = колодец

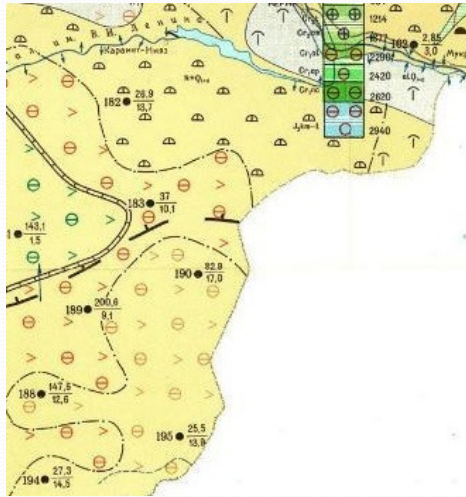
Boreholes (for water supply or exploratory purposes) may also be marked
скв. = скважина

Wells are typically marked with a blue circle, containing a small blue dot

Water quality may be marked as
сол. = соленая (salty) or *г.-сол.* = горько-соленая (bitter salty)

The well name may be followed by a depth *г.л.* = глубина and a statement of yield
наполн. = filling / yield *л/ч* = litres per hour

Hydrogeological map of the Soviet Union



- Provides detailed geological columns and water analyses.
- **Крыжановский, В.А. (editor) (1972).** Гидрогеология СССР: том 38: Туркменская ССР. Институт Геологии Совета Министров Туркменской ССР. Издат. Недра, Москва. *Hydrogeology of the USSR. Vol. 38. Turkmenistan.* Nedra, Moscow. 565 pp.

Remote sensing (e.g. Springs)



Ghormach, in Google Earth

Remote sensing (e.g. karezes)

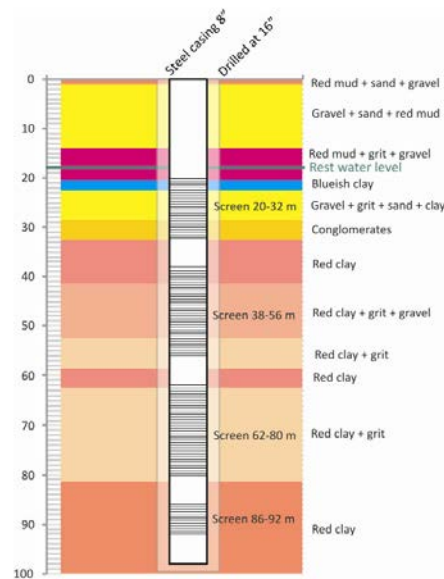
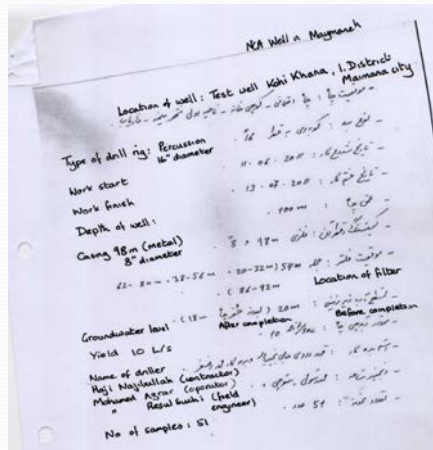


Near
Qalat, in
Google
Earth

Apart from this....

- We are left to go through, quality-control and collate:
 - Paper-based well logs (e.g. Those held by MRRD or in old UNICEF reports)
 - Digital data provided by, e.g. DACAAR or NCA

Paper data



DACAAR's databases

- The main water-point (WSG) database (management database)
- Borehole log database, held in the Schlumberger software *Hydrogeoanalyst*.
- Groundwater analysis database, maintained in the environment of the Schlumberger software *Aquachem*.
- For Faryab, an Excel file containing results of a rapid survey of groundwater electrical conductivity.
- Excel files for water level, electrical conductivity, temperature) for DACAAR's network of observation wells.
- Extraction of information from DACAAR reports

Karnataka TDS pumping test data [Compatibility Mode] - Excel

	Province	District	Village Name	Latitude	Longitude	Pipe Scheme Type	pumping Test Date	Pumping Test Period (hour)	
1	Karnataka	Mysore	Billo Arata	35.52031	64.73155	Motorline	30/05/2008	8	
2	Karnataka	Channarayana	Acclote	35.68789	64.77222	Motorline	05/03/2008	8	
3	Karnataka	Channarayana	Bar Aravali	35.68568	64.29919	Motorline	04/03/2008	8	
4	Karnataka	Channarayana	Hoghalak Balla	35.62441	64.65364	Motorline	05/03/2008	6	
5	Karnataka	Channarayana	Brish Gura and Hoghalak Paven	35.65784	64.52683	Motorline	29/05/2010	15	
6	Karnataka	Channarayana	Garfa	35.6078	64.51177	Tube Well	31/05/2010	13 min	
7	Karnataka	Channarayana	Gura Tara	35.6309	64.5605	Tube Well	01/06/2010	16 min	
8	Karnataka	Channarayana	Shoran Shikhar	35.6320	64.55754	Tube Well	03/06/2010	6	
9	Karnataka	Channarayana	Maramanna University	35.6077	64.78777	Tube Well	30/12/2011	6	
10	Karnataka	Channarayana	Pachanki Ki Jamsaditya Balla	35.6793	64.83953	Tube Well	19/03/2012	6	
11	Karnataka	Channarayana	Shen Tapa Antanna Valley (Shahad village)	35.6105	64.69009	Tube Well	26/09/2009	7	
12	Karnataka	Channarayana	Shen Tapa Antanna Valley (Gur Gudi village)	35.6165	65.0706	Tube Well	39/11/2009	7	
13	Karnataka	Channarayana	Shen Tapa Antanna Valley (Chokkale village)	35.5766	64.76996	Tube Well	24/12/2009	8.5	
14	Karnataka	Channarayana	Shen Tapa Antanna Valley (Chokkale village)	35.2657	64.74518	Tube Well	31/05/2010	9	

All data converted to standard Excel format

[illegible]

