NASA's Land Information System (LIS) products for Central Asia Snow Modeling

A. McNally amy.l.mcnally@nasa.gov, **J. Jacob,**
C. Peters-Lidard, K. R. Arsenault, S. Kumar, J.P Verdin
UMD ESSIC, NASA GSFC HSL, USGS, USAID, UC Santa Barbara

NASA Land Information System (LIS) Central Asia run

Parameters:
UMD landmask, UMD-AVHRR landcover, FAO soils, GTOPO30 elevation, NCEP albedo (quarterly/seasonal)

Meteorological Inputs:
6 hourly GDAS - NCEP Global Data Assimilation System Final (FNL) Operational Global Analysis

Land surface models:
Noah3.2,CLM2,
1km x 1km resolution,
1 hr model timestep,
No snow assimilation

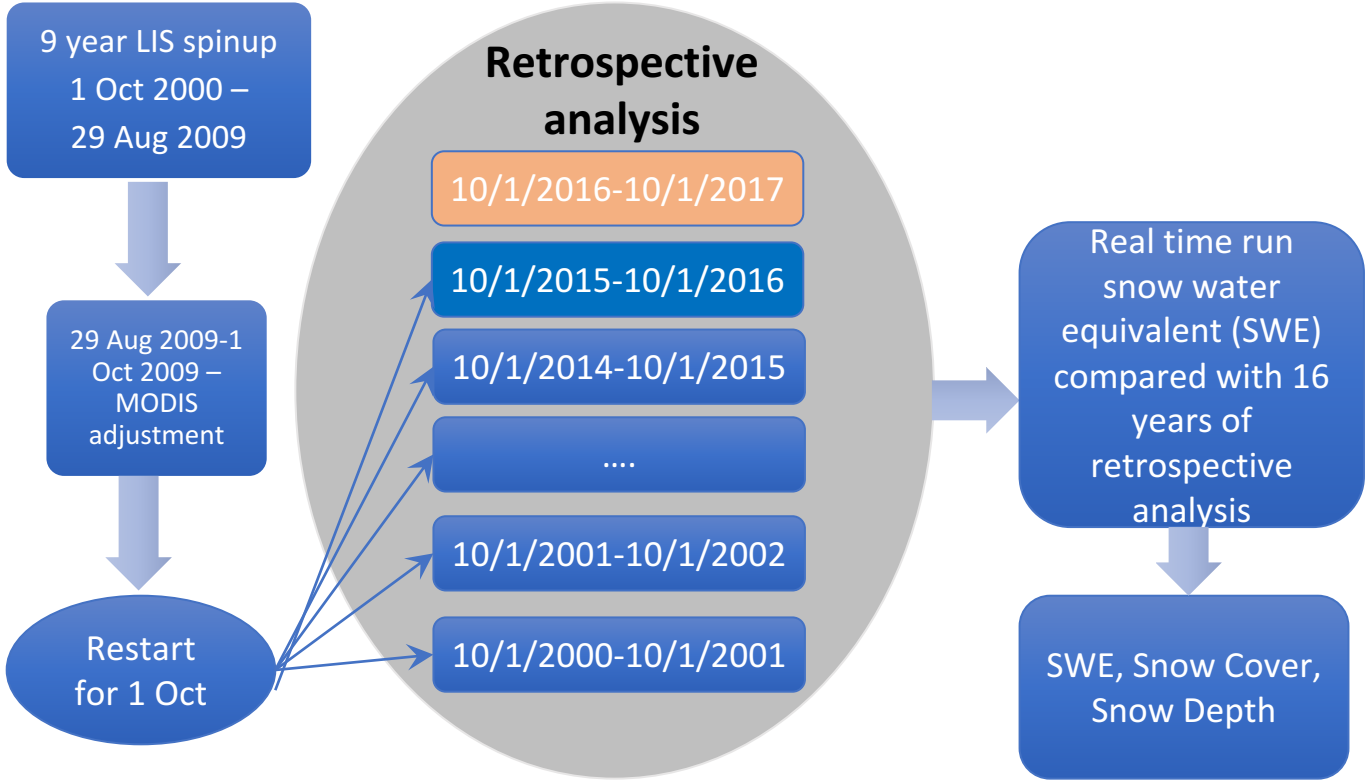
Daily - near real time outputs:
Snow water equivalent
Snow covered area
Snow depth
Air temperature

Evaluation
remote sensing
(e.g. MODIS & Landsat Snow Cover Fraction, SSM/I & AMSR-2 snow depth)

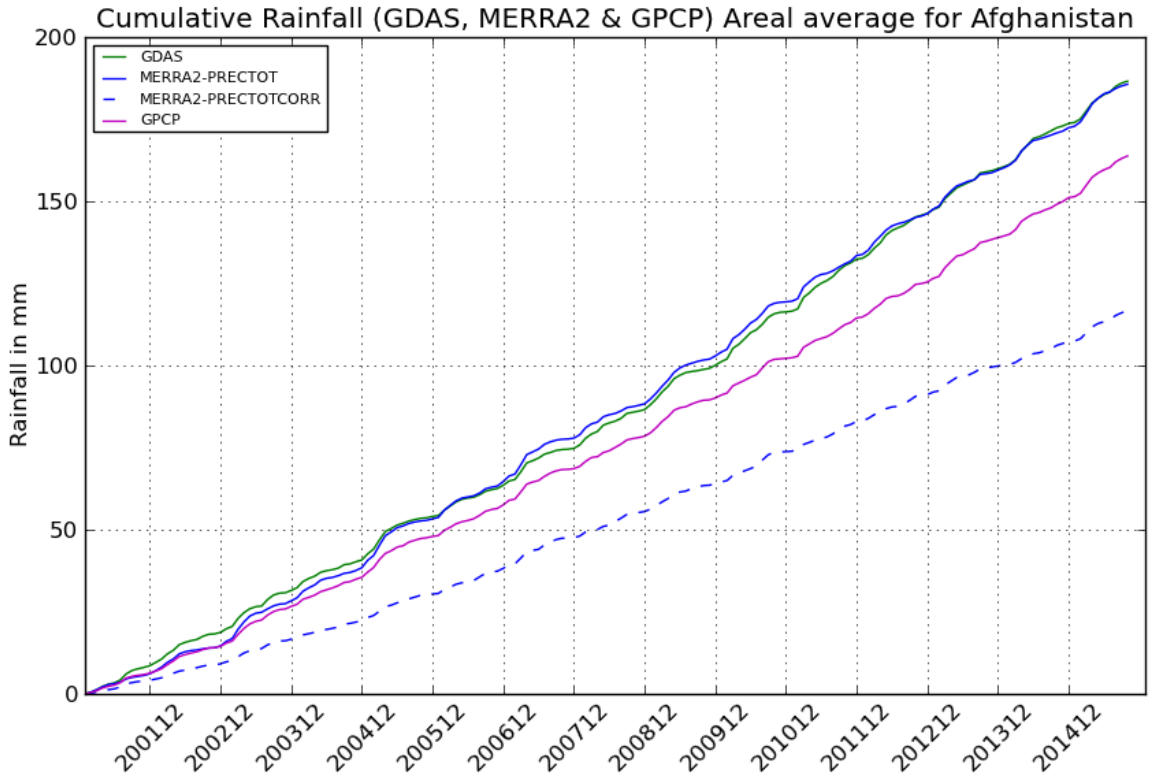
Data delivery:
LIS Data Portal,
USGS Early Warning Data Portal

Analysis period: 2000-Oct-01 to present, 16 years

NASA Land Information System (LIS) Central Asia run

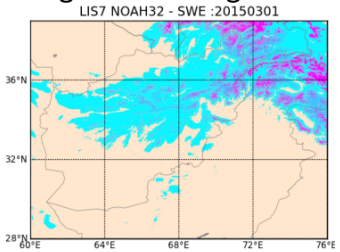


Afghanistan comparison of GDAS rainfall inputs vs GPCP, MERRA2 & MERRA2+CPC rainfall



- GDAS and MERRA2 compared well.
- GDAS/MERRA2 PRECTOT overestimate PRECIP compared to GPCP.
- Note that GPCP coarser resolution data
- CPC corrected MERRA2 precipitation is lower than the other estimates, possibly due to low density station data.

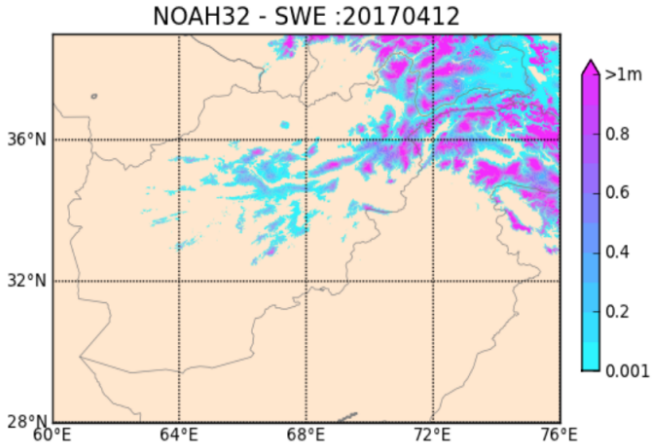
Afghanistan Region



Monitoring SWE

https://lis.gsfc.nasa.gov/projects/fewsnet-central-asia

Snow Water Equivalent (SWE) for Land Surface model NOAH32 & MODIS Terra Satellite image



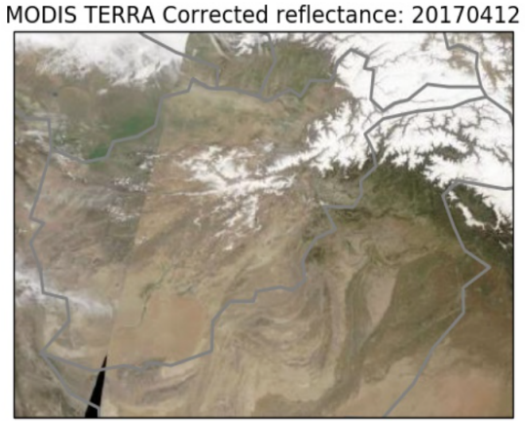
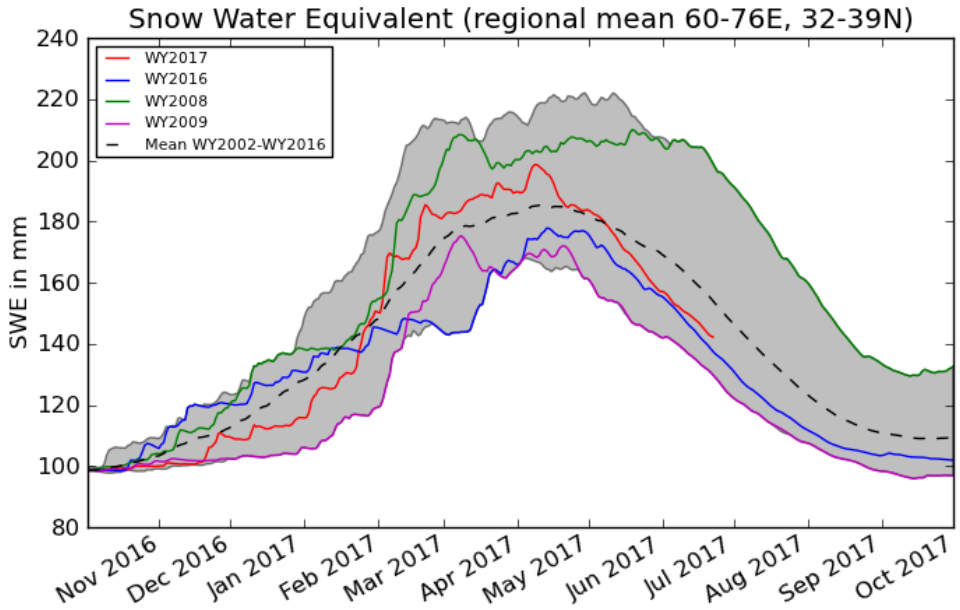


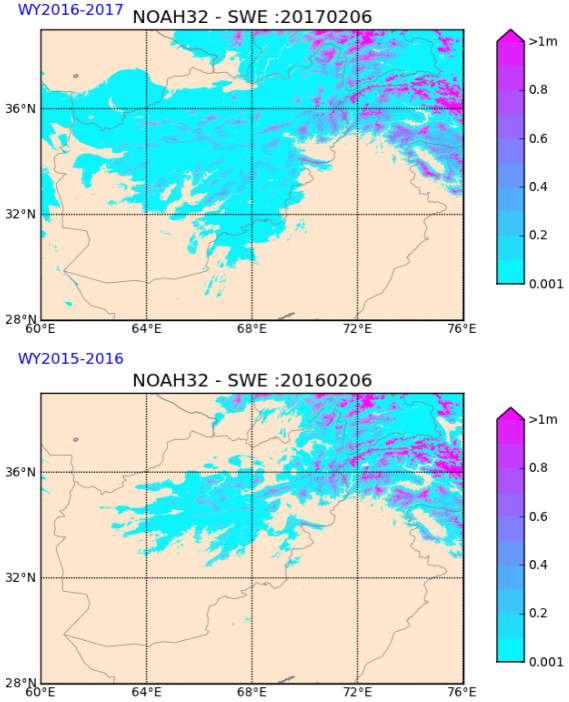
Image Credit: Global Imagery Browse Services (GIBS), NASA/GSFC/ESDIS, https://earthdata.nasa.gov

Evaluation

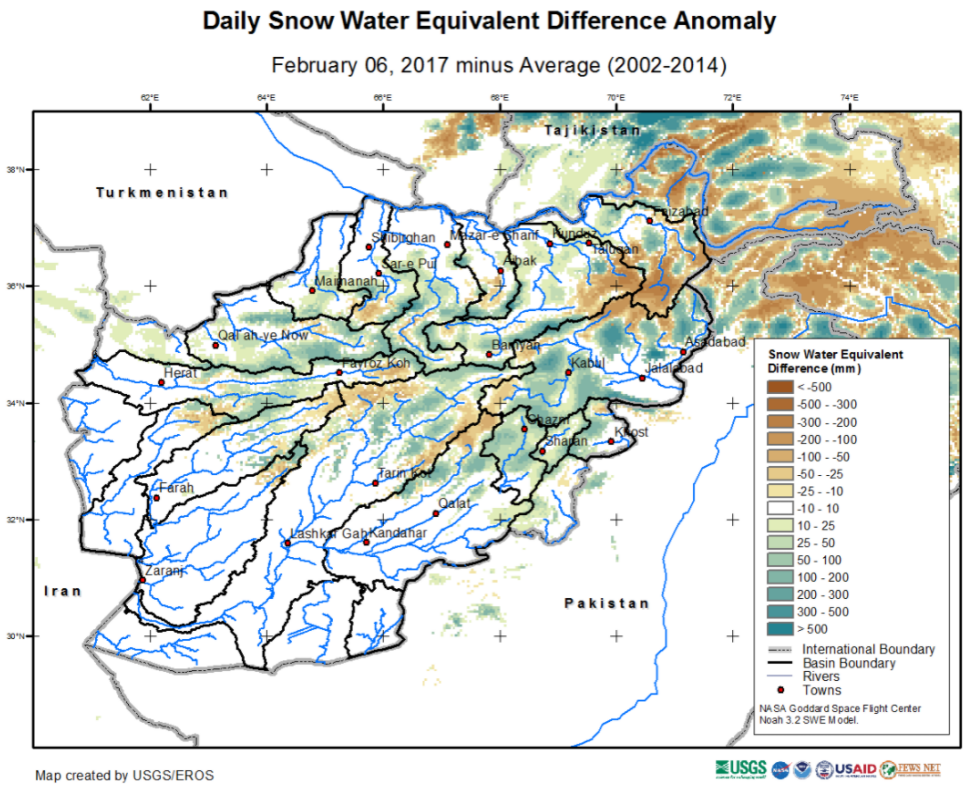
SWE for 2017 with climatology



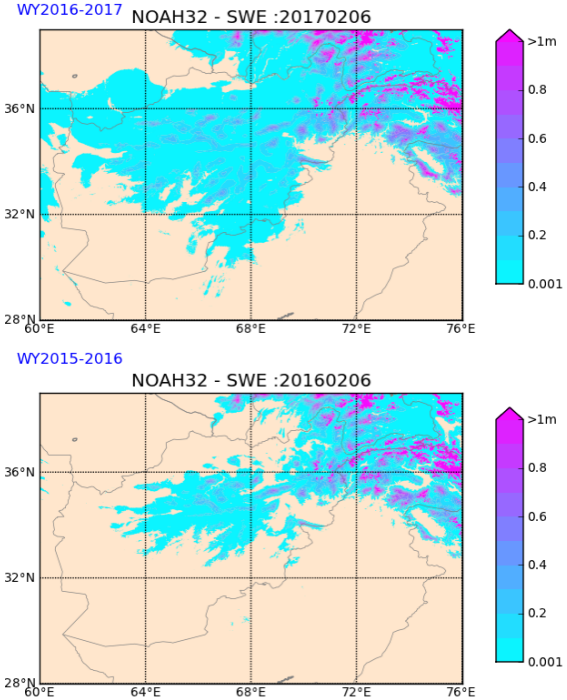
Spatial distribution of SWE for 02062017 compared to last year 02062016



Snow Water Equivalent and snowfall for the WY 2016-2017 shows that for months Oct, Nov & December, the SWE was less than normal/ or climatological mean. After ~Jan 20, heavy snowfall caused SWE to increase in Feb 2017. The spatial snow distribution for Feb 6, 2017 shows that the snowfall is widespread, compared to last year.



Spatial distribution of SWE for 02062017 compared to last year 02062016



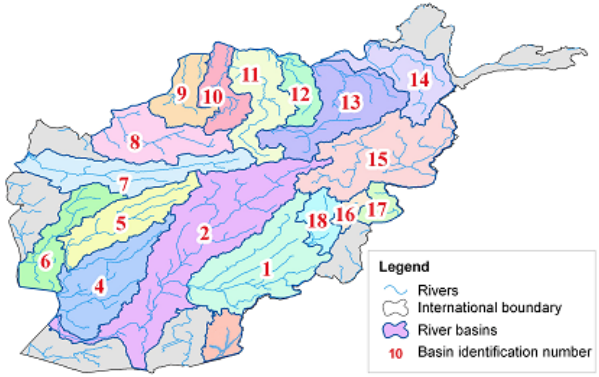
SWE anomaly map from USGS shows that SWE is generally above average compared to the 2002-14 mean (in addition to greater than last year).

https://earlywarning.usgs.gov/fews/imagemap/144

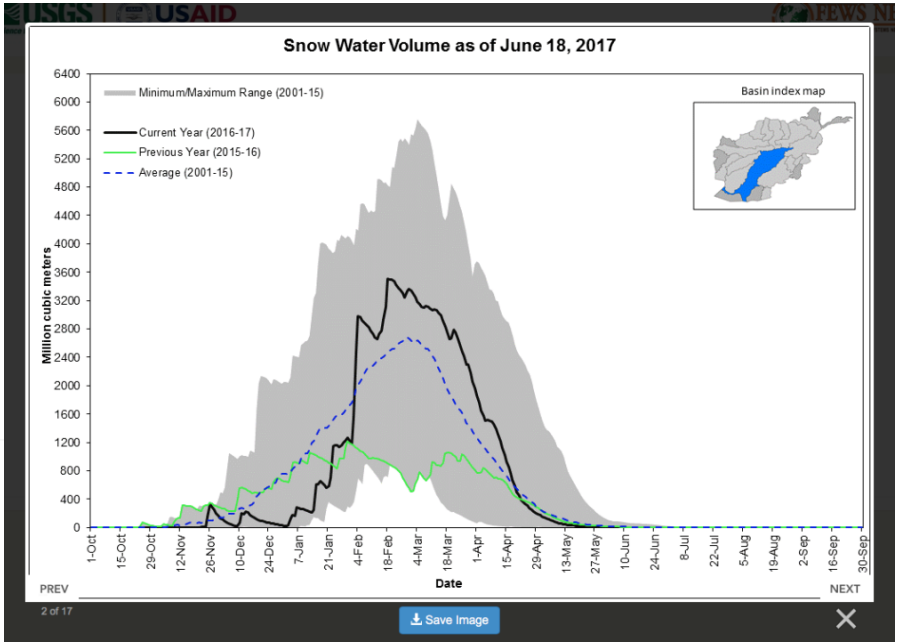
Afghanistan Snow Water Equivalent

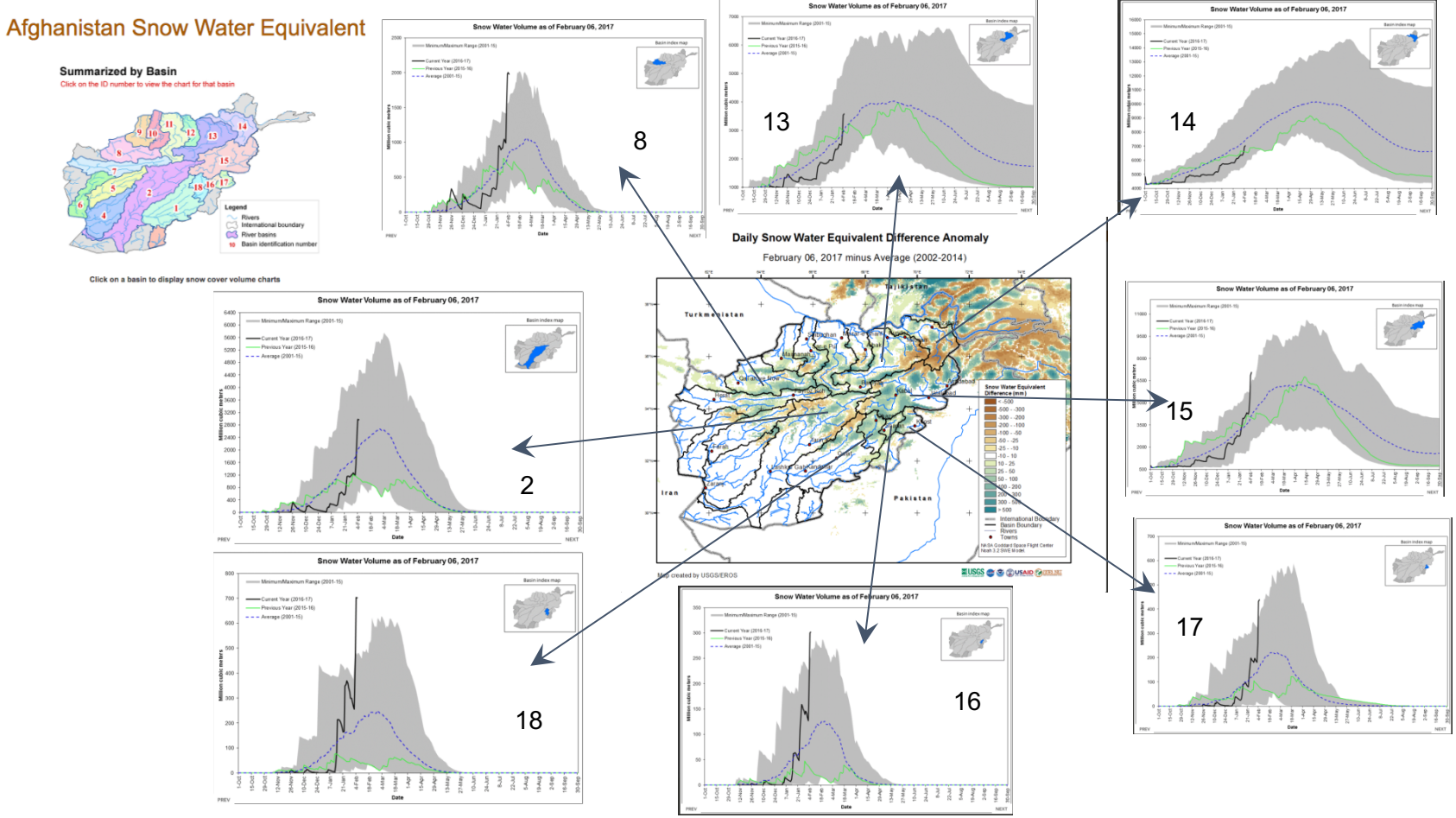
Summarized by Basin

Click on the ID number to view the chart for that basin

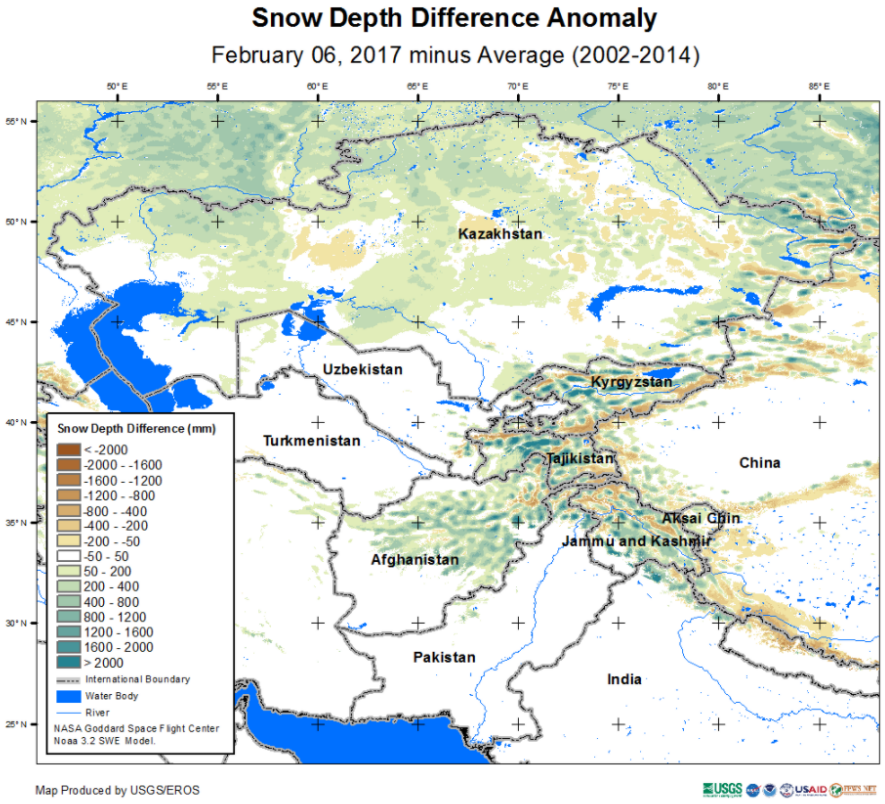


Click on a basin to display snow cover volume charts

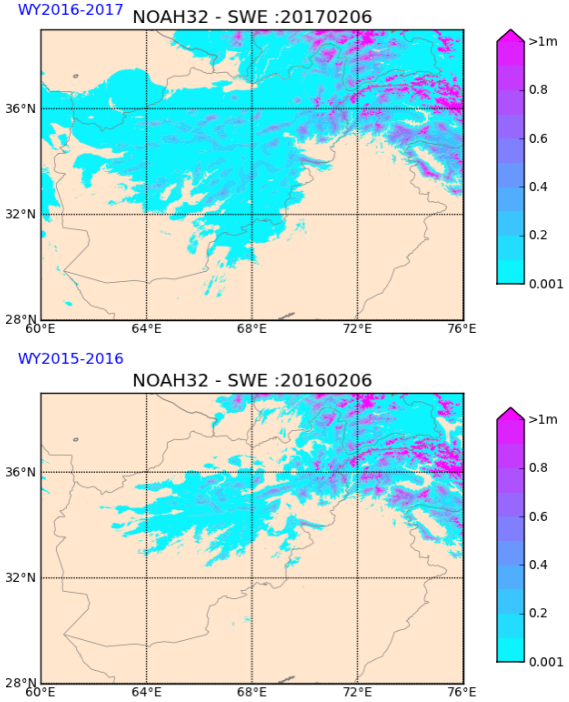




The Daily SWE by basin's tool allows us to compare the current season's evolution to historic season time series.



Spatial distribution of SWE for 02062017 compared to last year 02062016



Snow depth anomaly map from USGS shows that depth is generally above average compared to the 2002-14 mean. Spatial patterns are similar to the SWE, but provides some additional information e.g. given the below average temperatures snow depth may be high, even with average SWE.