

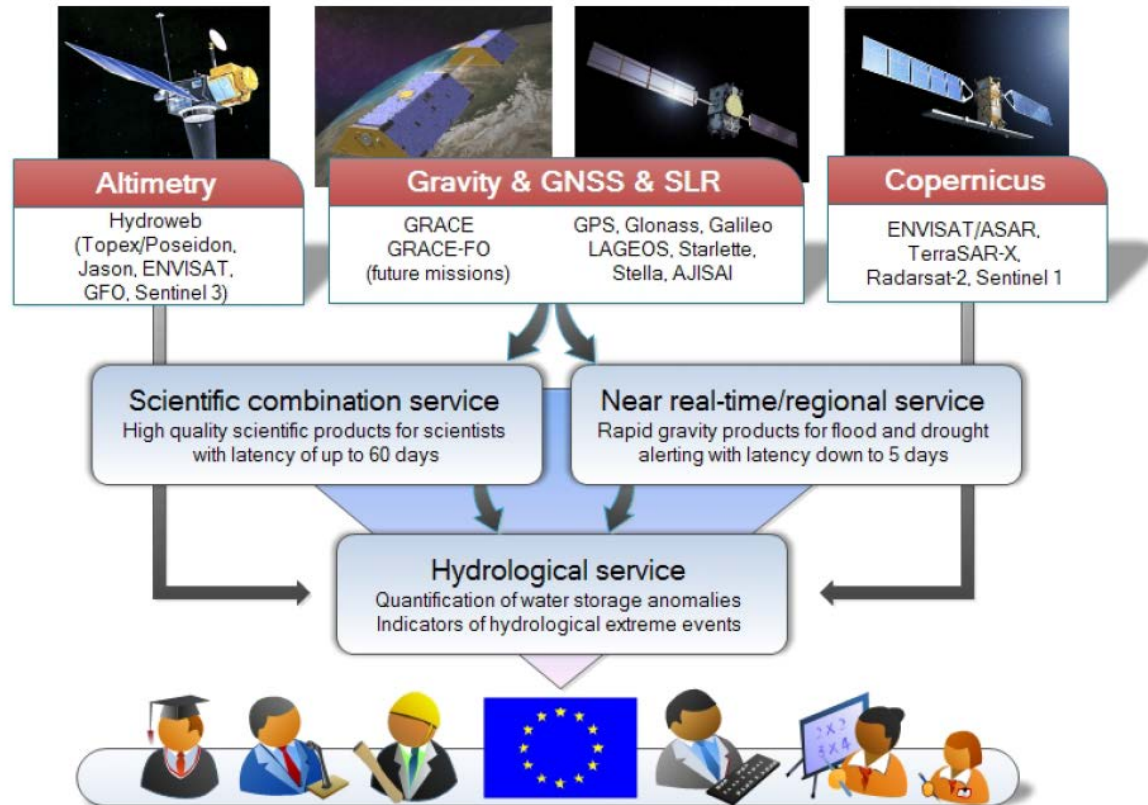
Towards near-real time daily GRACE solutions for global flood and drought monitoring

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EOSIEM

European Gravity Service for Improved Emergency Management



Near-real time/regional service

- Nominal latency of the GRACE Level-1 instrument is **11 days** and of the derived monthly global Level-2 gravity field products is **60 days**.
- The present products allow for a confirmation after the occurrence of an event and an estimation of its severity.
- Reduce latency to **5 days**.
- Increase temporal resolution from **monthly** to **daily**.
- Improve quality by providing regional solutions based on alternative representations of the gravity field, e.g. space localizing radial base functions.
- Half-year operational test-run for the NRT service.

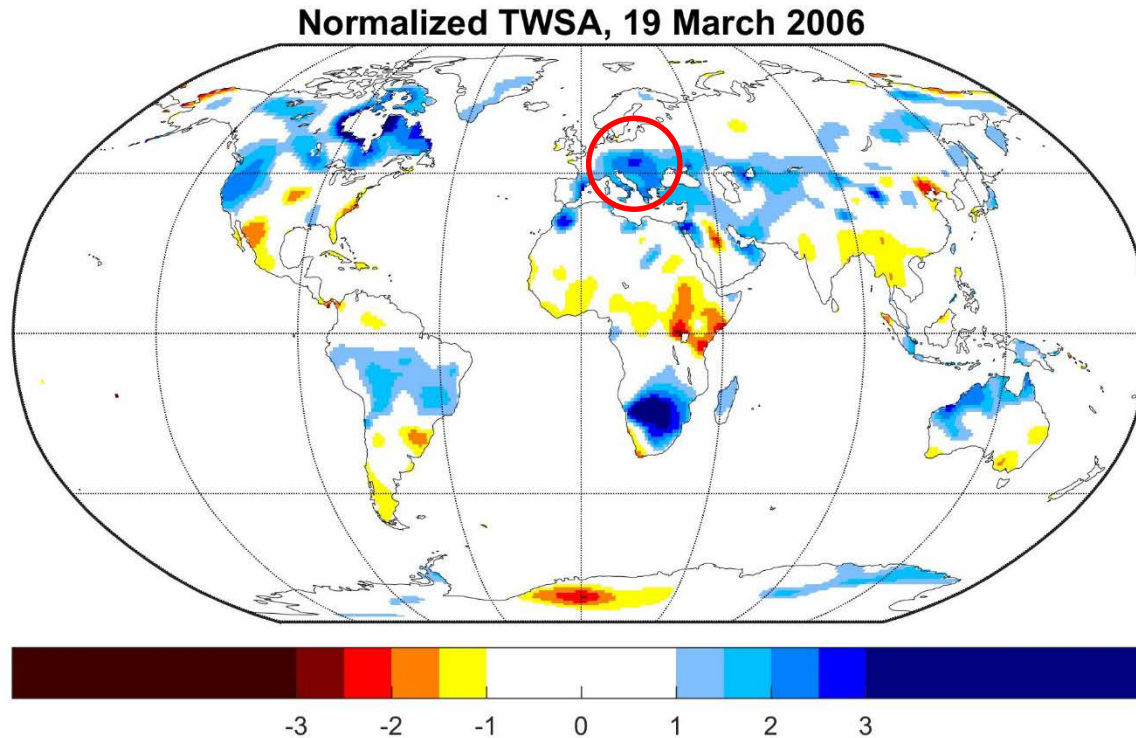
Hydrological service

- Gravity-based time series of total water storage anomalies are an integral descriptor of the wetness status of river basins.
- Possible added value for monitoring and forecasting hydrological extreme events (floods and droughts) as compared to standard indices based on precipitation or soil moisture, due to memory effect.



A simple index (1)

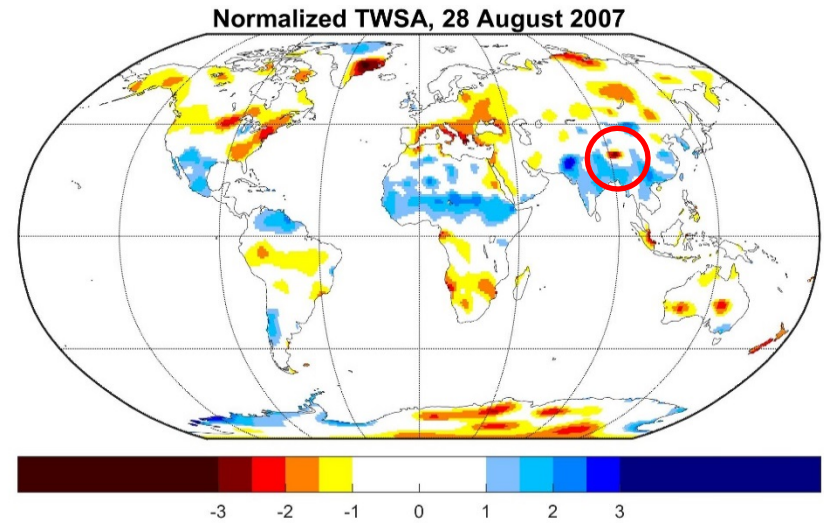
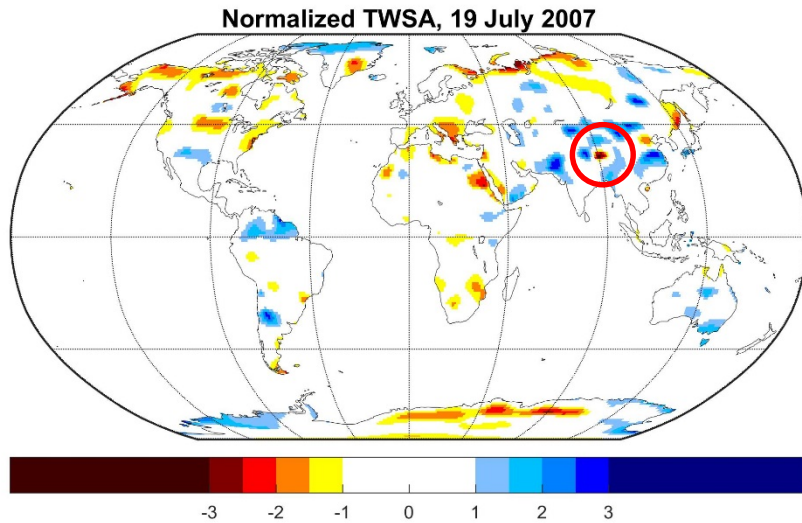
GRACE-derived total water storage anomaly (TWSA) in units of standard deviation.



Wetter than normal conditions (2.5-3 times the standard deviation) are indicated for the Danube basin in March 2006 before the floods during April 2006.

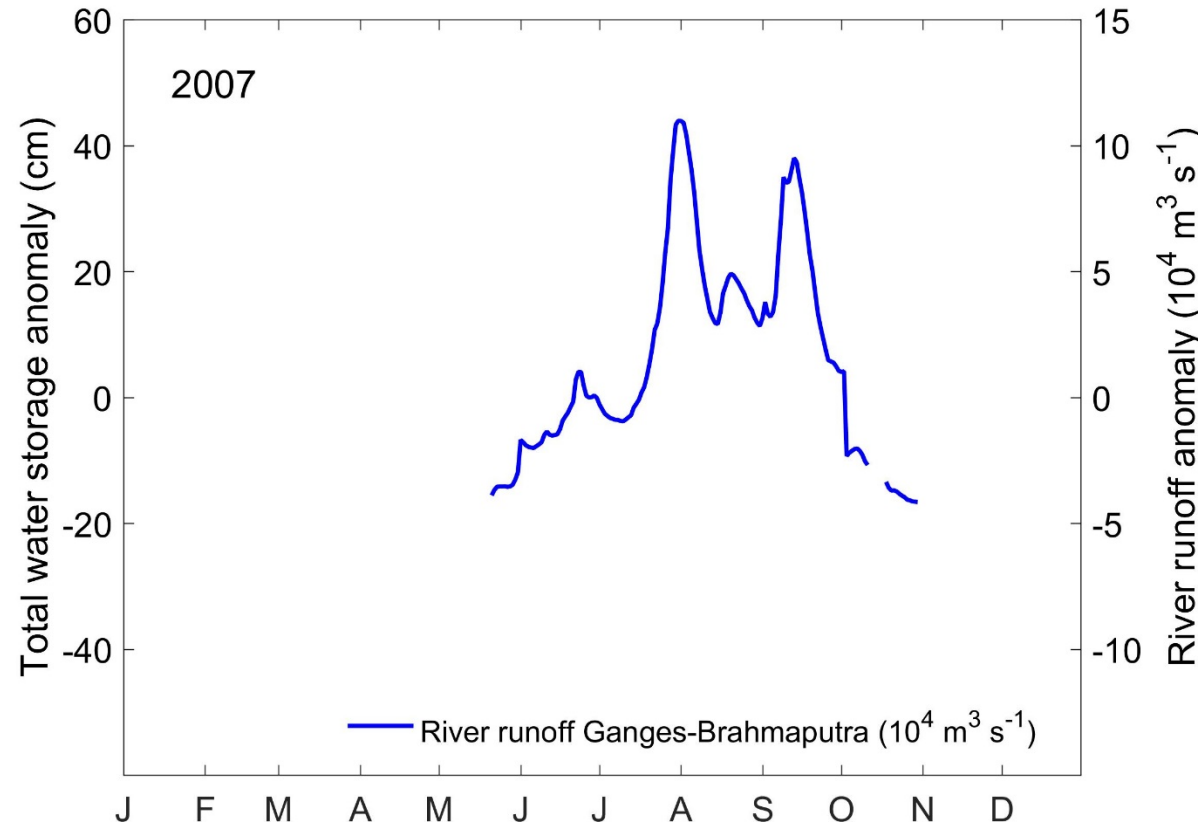
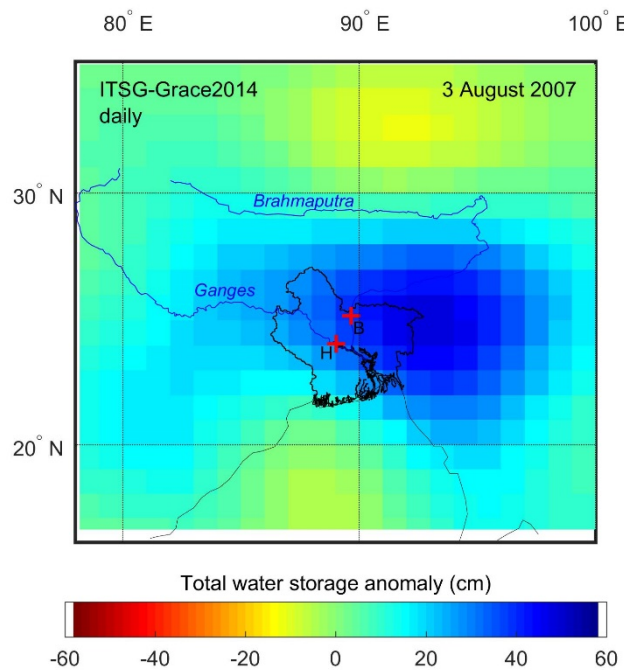
A simple index (2)

GRACE-derived total water storage anomaly (TWSA) in units of standard deviation.

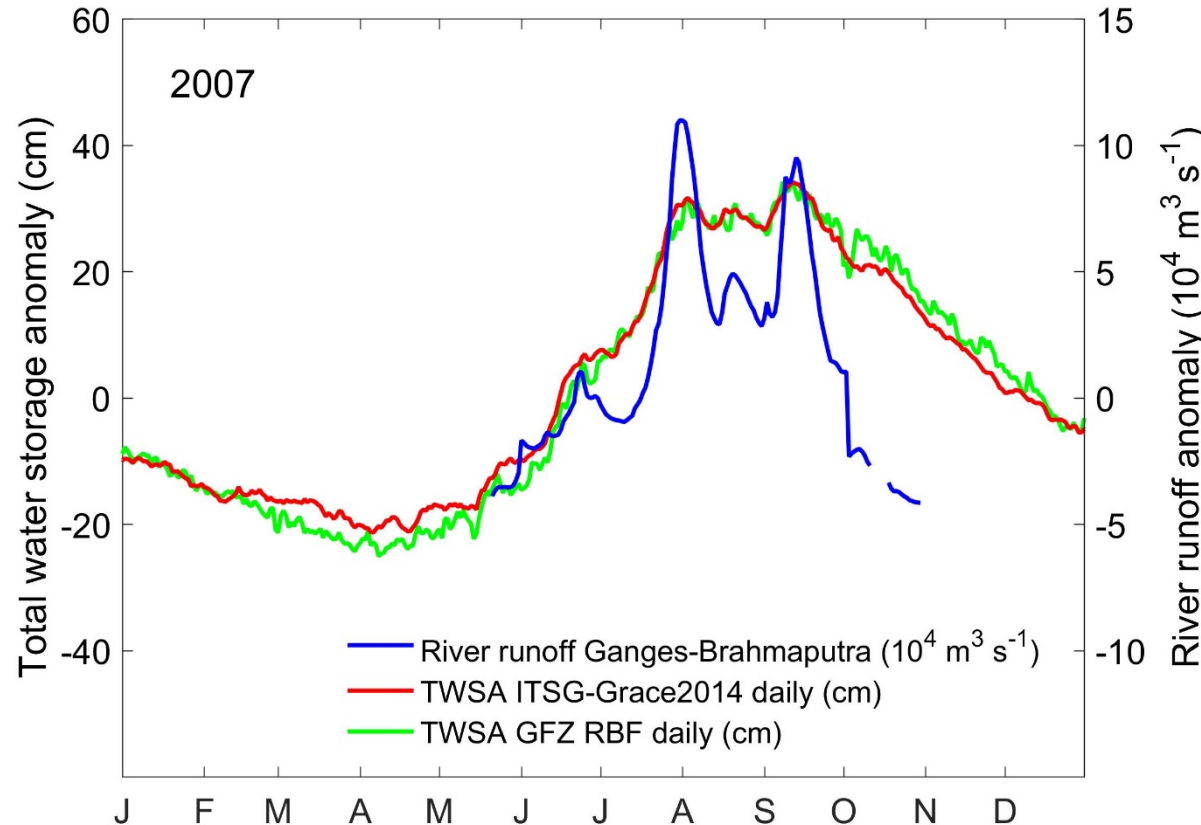
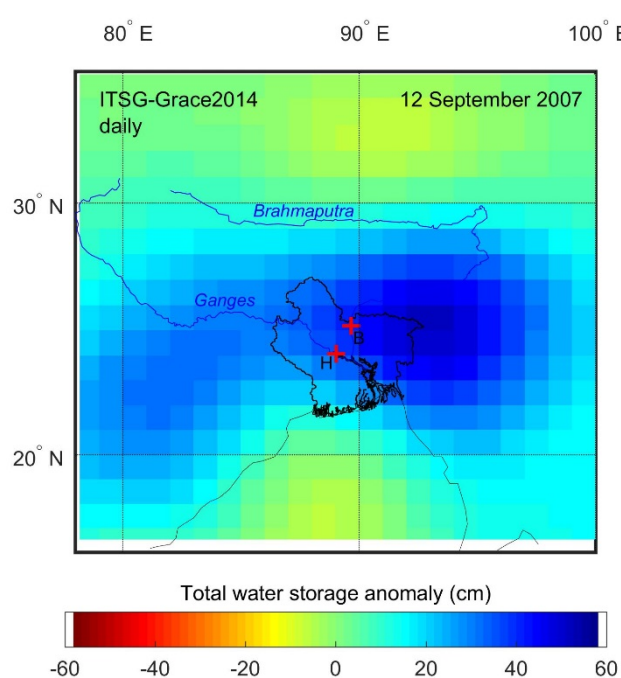


Wetter than normal conditions are indicated for the Ganges-Brahmaputra basin in July and August 2007 before flood peaks on August 3 and September 12.

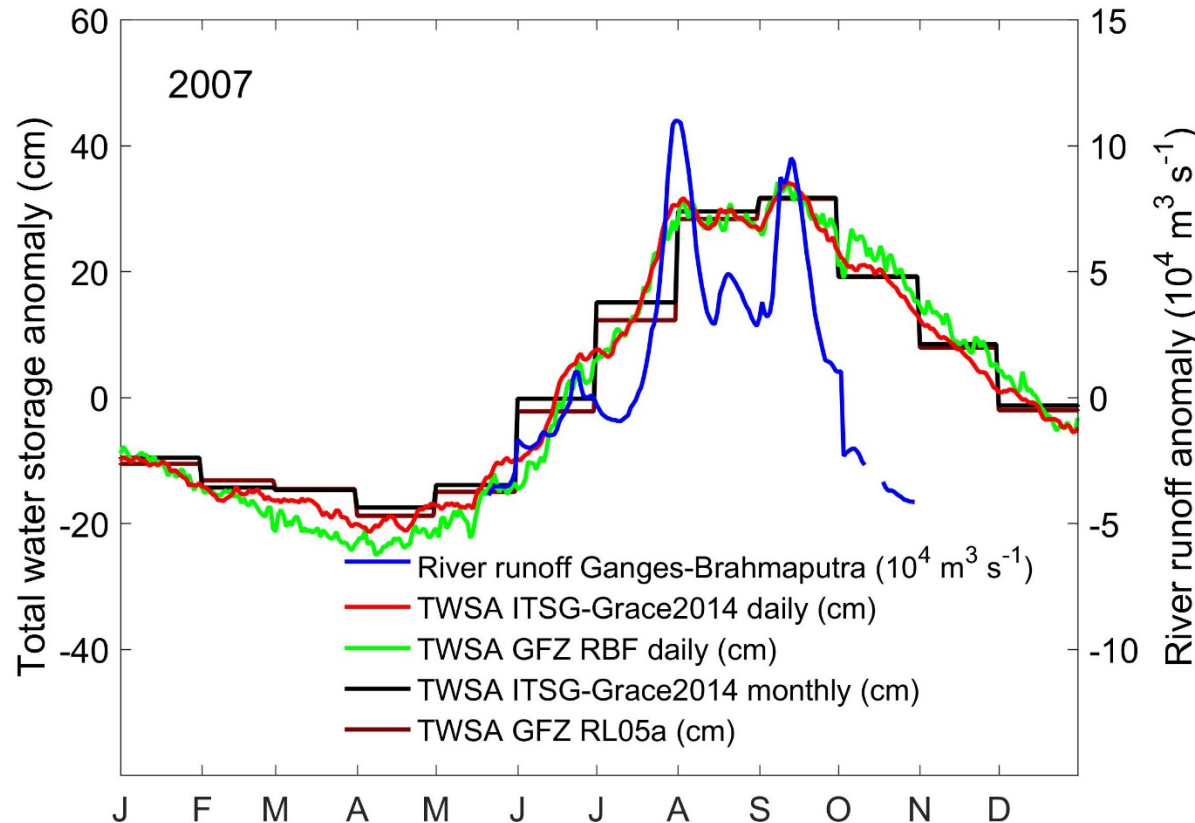
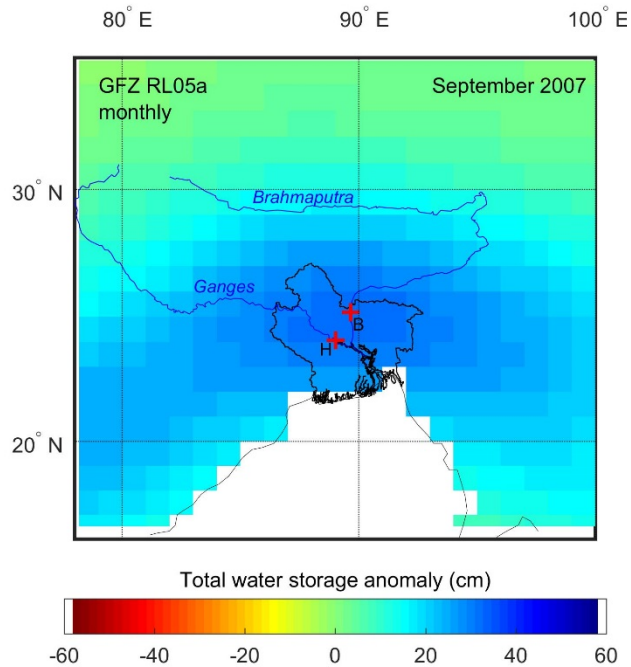
Daily GRACE gravity solutions track major flood events in the Ganges-Brahmaputra Delta



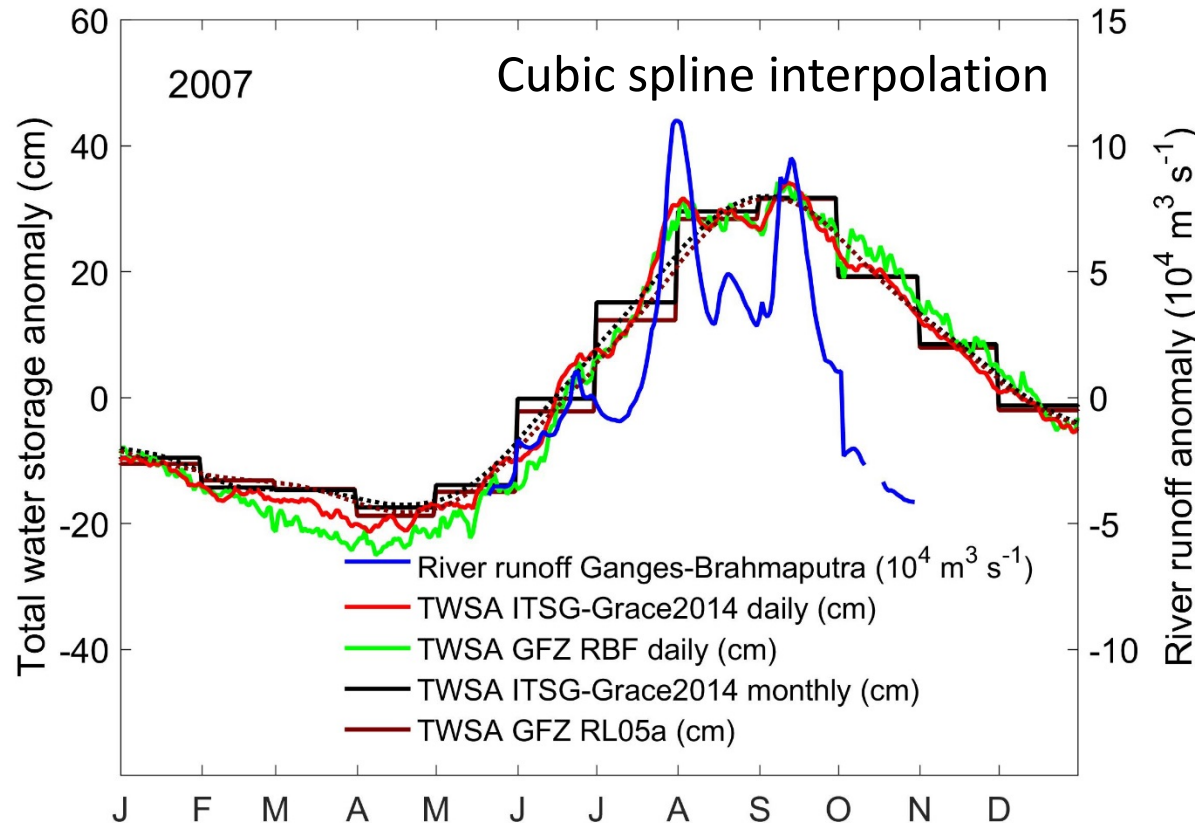
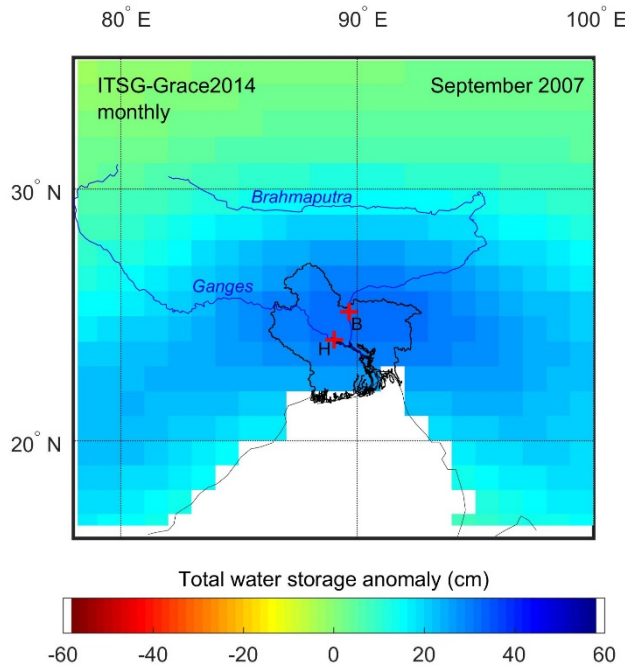
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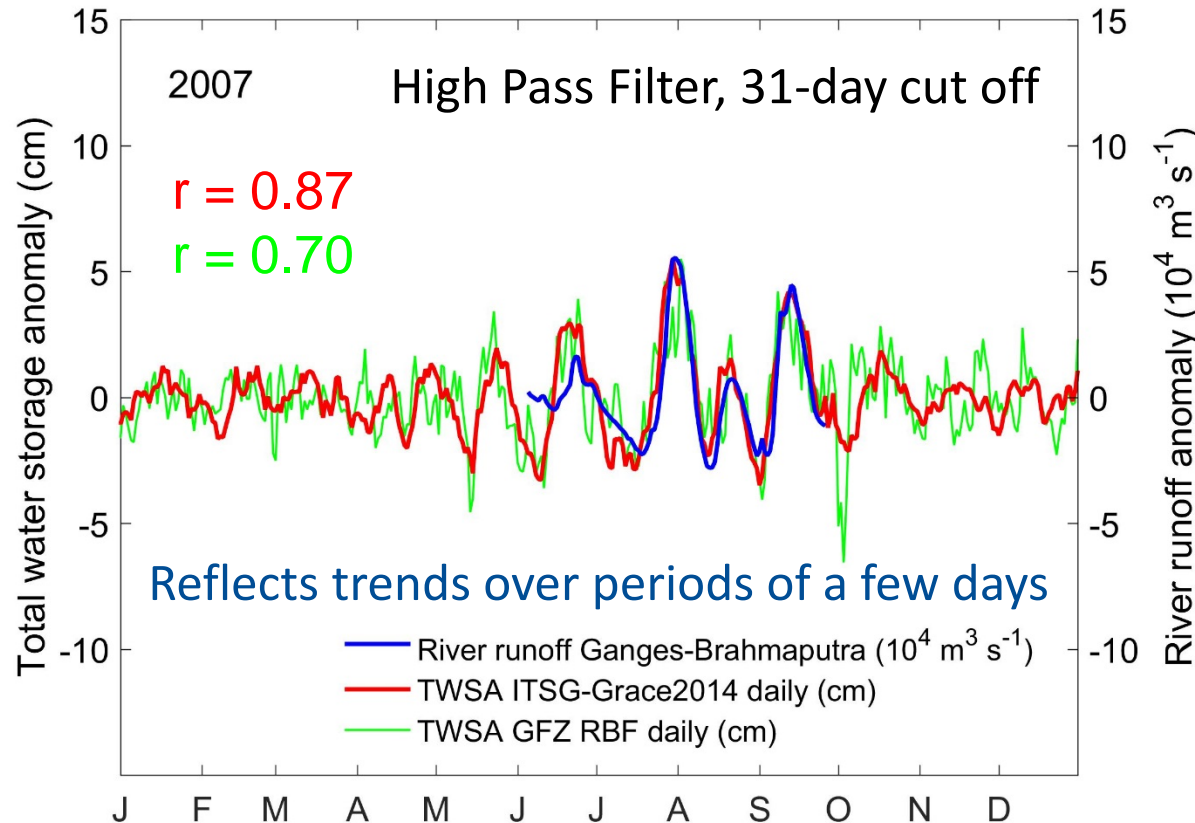
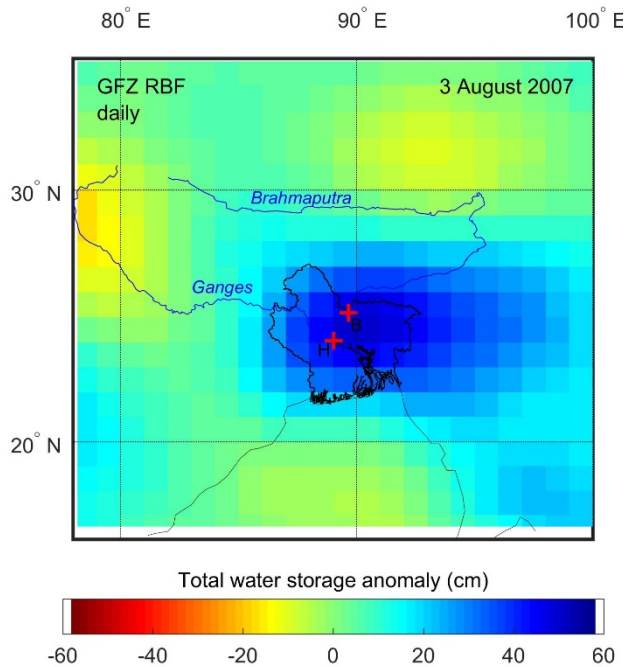
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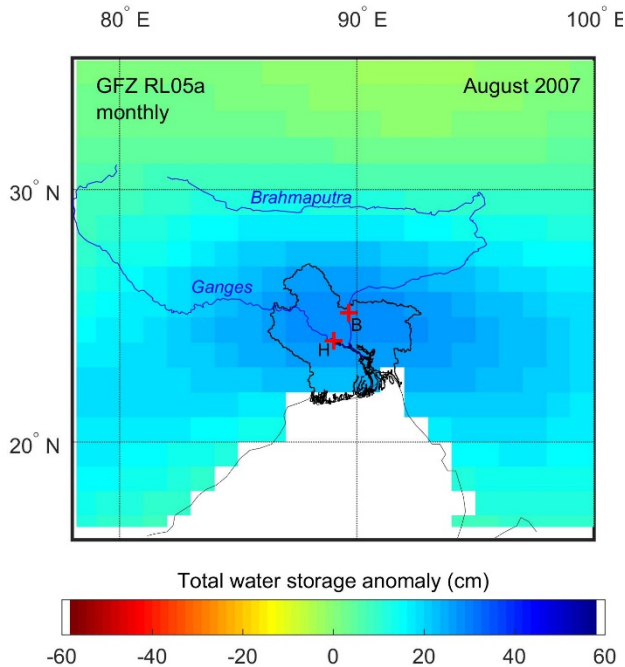
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Daily GRACE gravity solutions track major flood events in the Ganges-Brahmaputra Delta

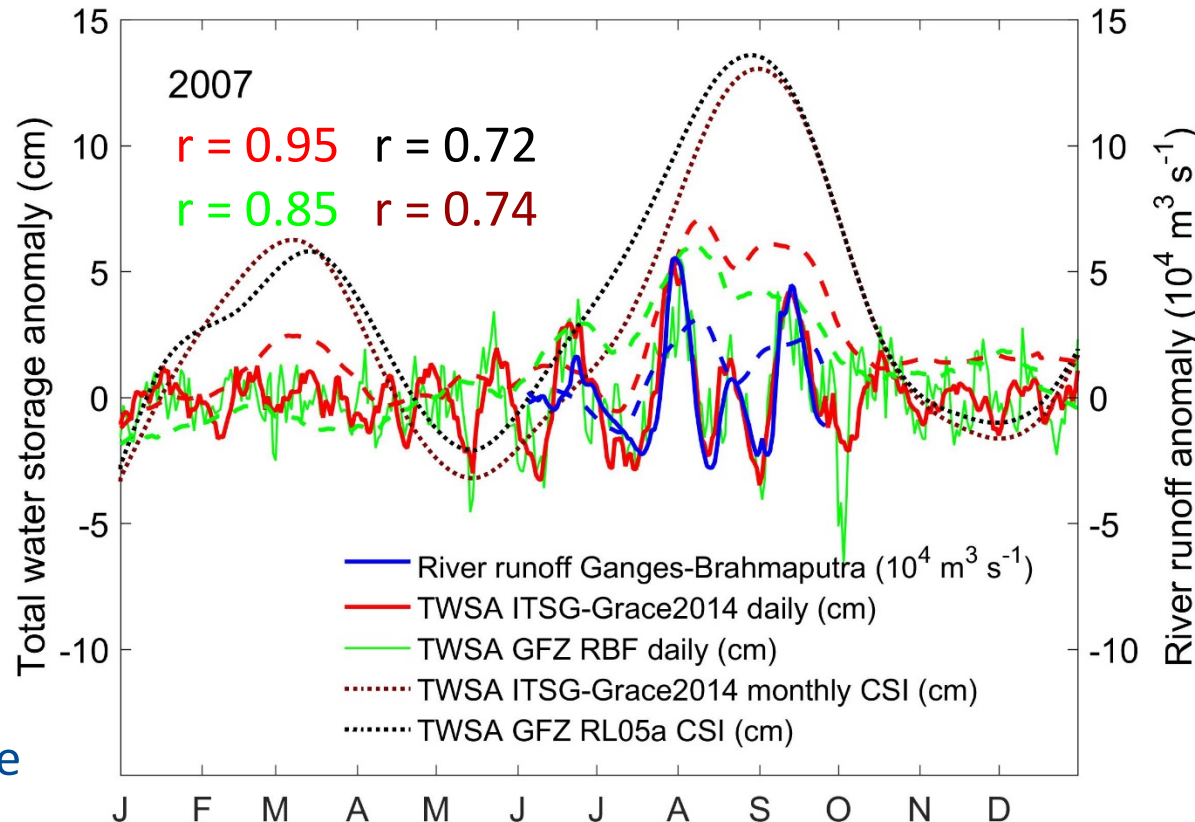


Daily GRACE gravity solutions track major flood events in the Ganges-Brahmaputra Delta



Additional information in the remaining part of daily data

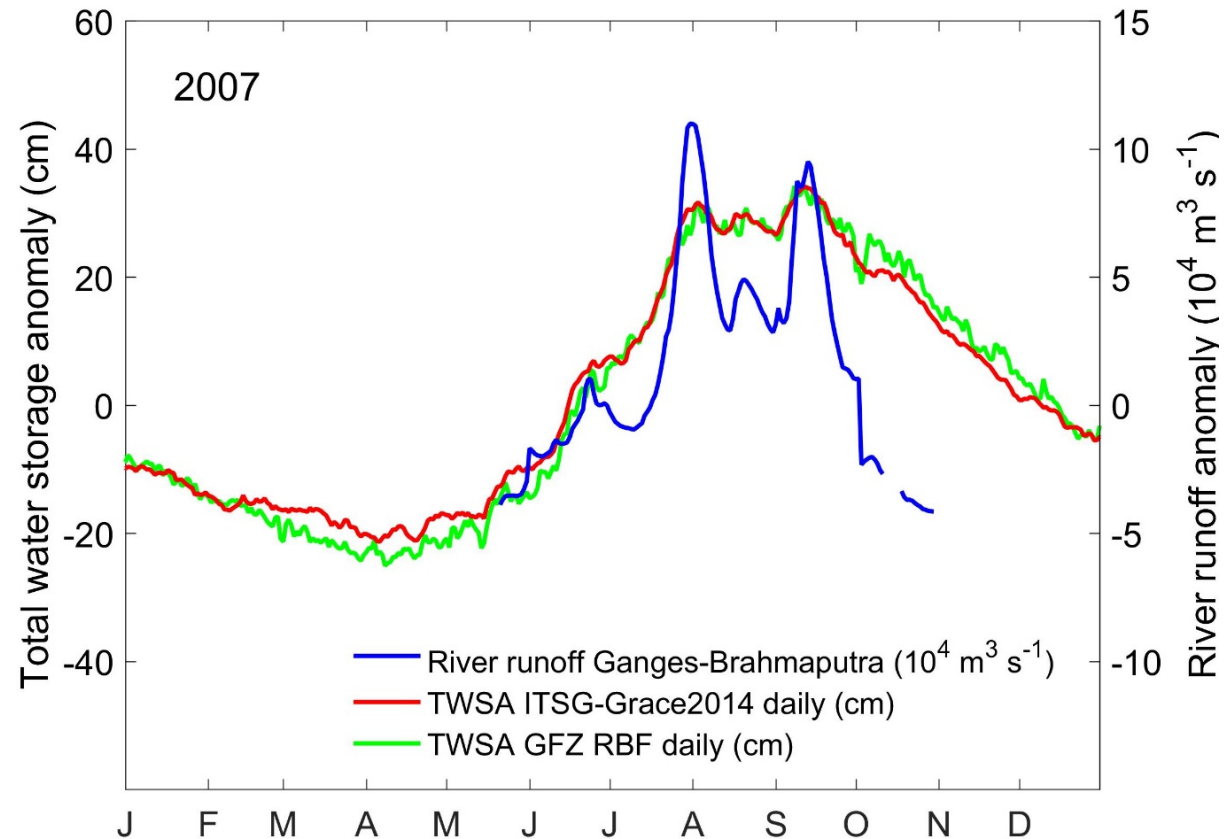
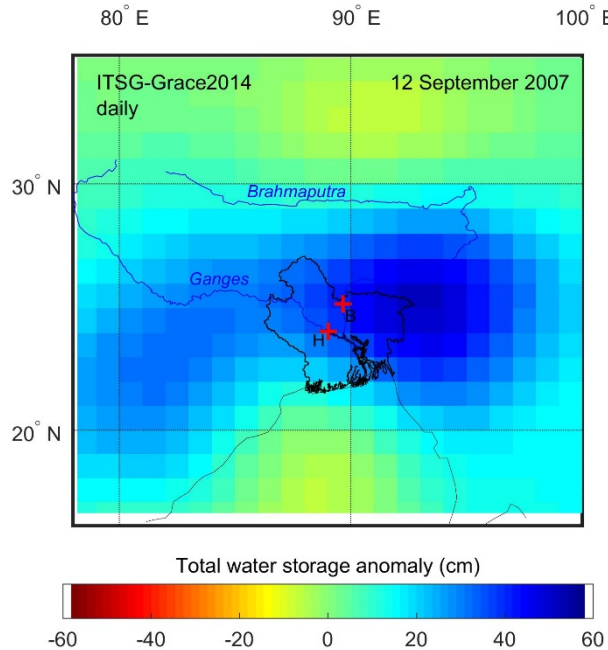
Low Pass Filter component, seasonally corrected



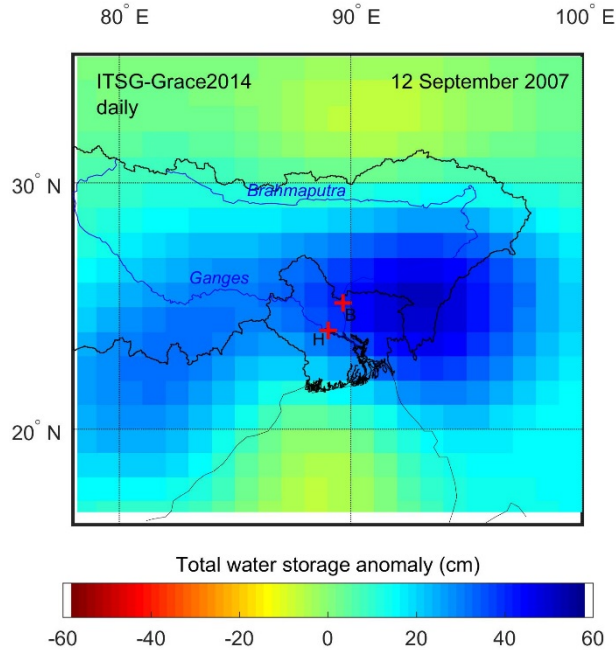
Daily GRACE gravity solutions track major flood events in the Ganges-Brahmaputra Delta

- Trends over periods of a few days in the daily gravity field solutions reflect temporal variations in river runoff during major flood events.
- Correlation of high-pass filtered river runoff and water storage anomalies indicates daily water storage variation in the GBD is mainly driven by river runoff from upstream reaches of GB basin during flooding.
- Additional information in the remaining part of the daily GRACE data, the low-pass filter component of the filter.
- Release of daily gravity field solutions in near-real time may support flood monitoring for large events.

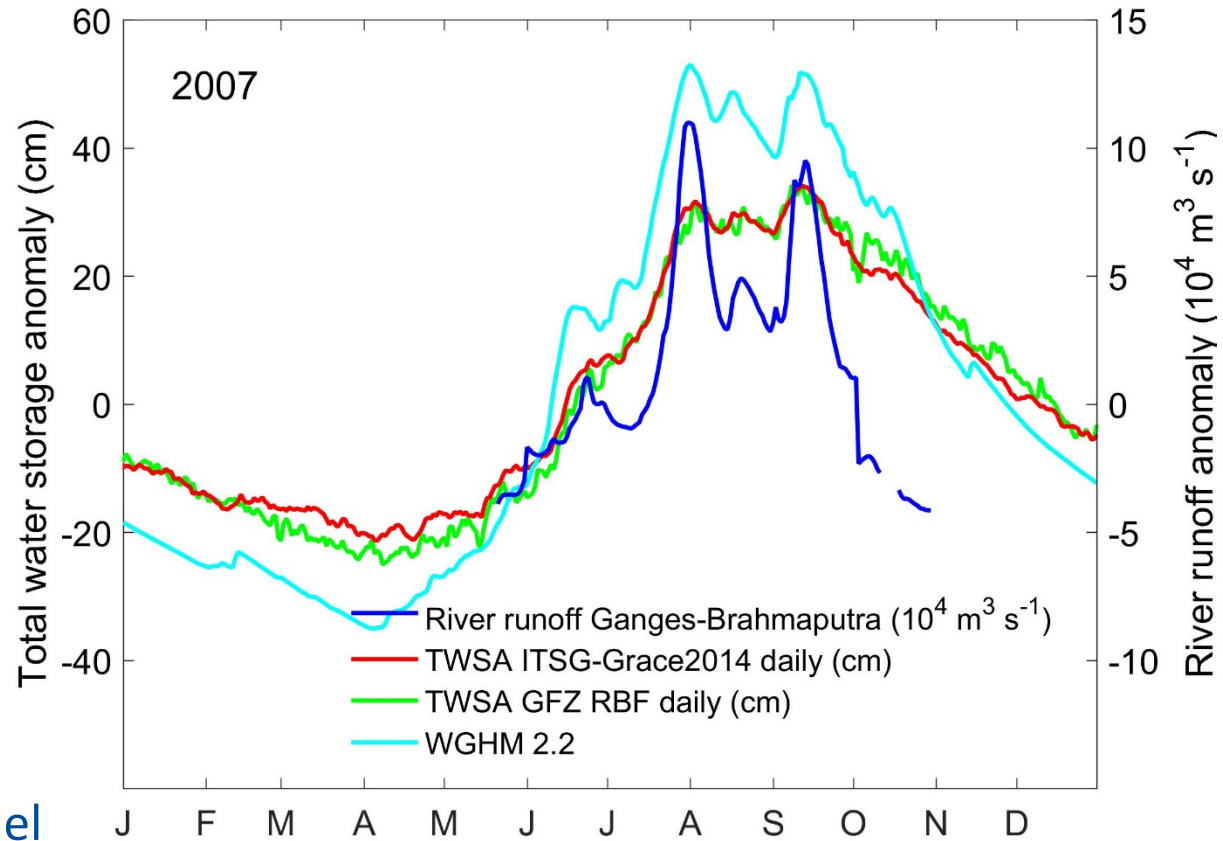
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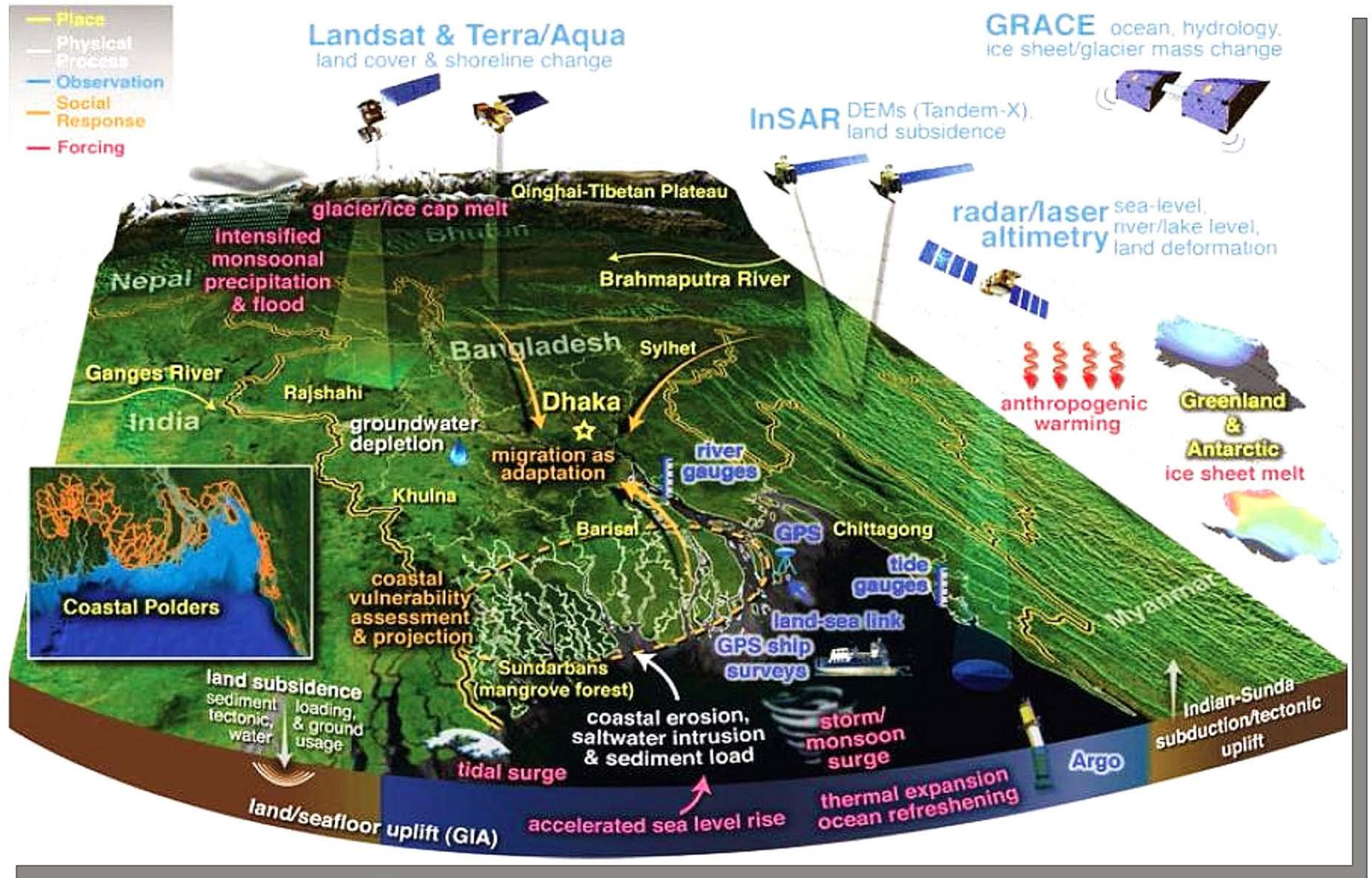
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Assimilate daily GRACE data into global hydrological model

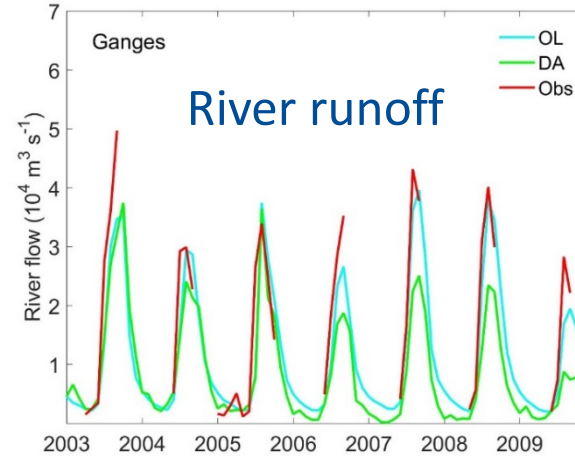
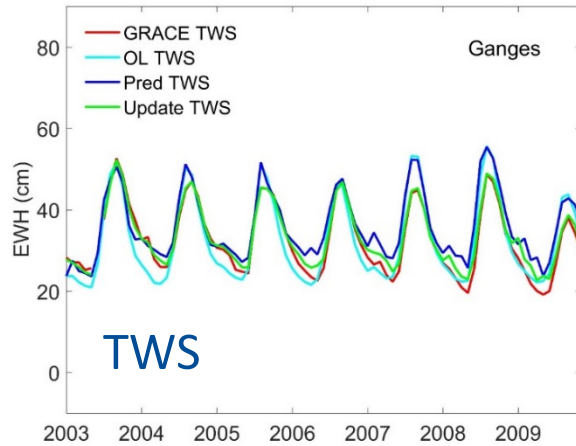


EGSIEM – Band AID

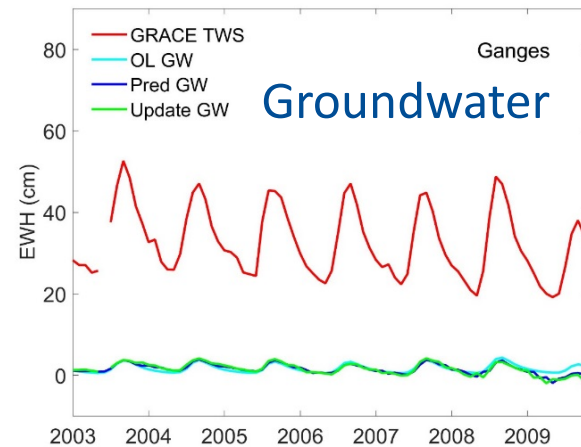
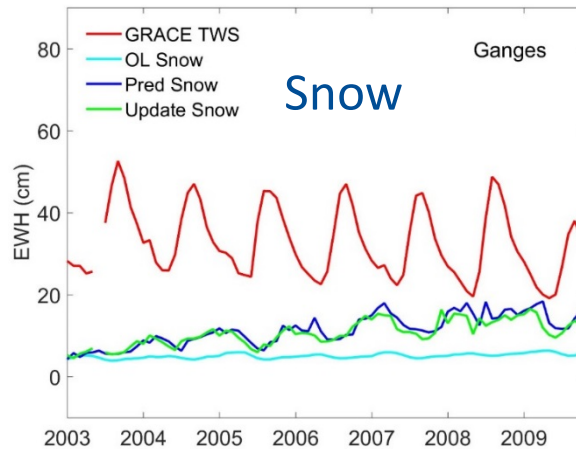


Flood and drought indicators - outlook

Evaluation in a data assimilation scheme of the WaterGAP Global Hydrology Model (WGHM) – preliminary results monthly GRACE data



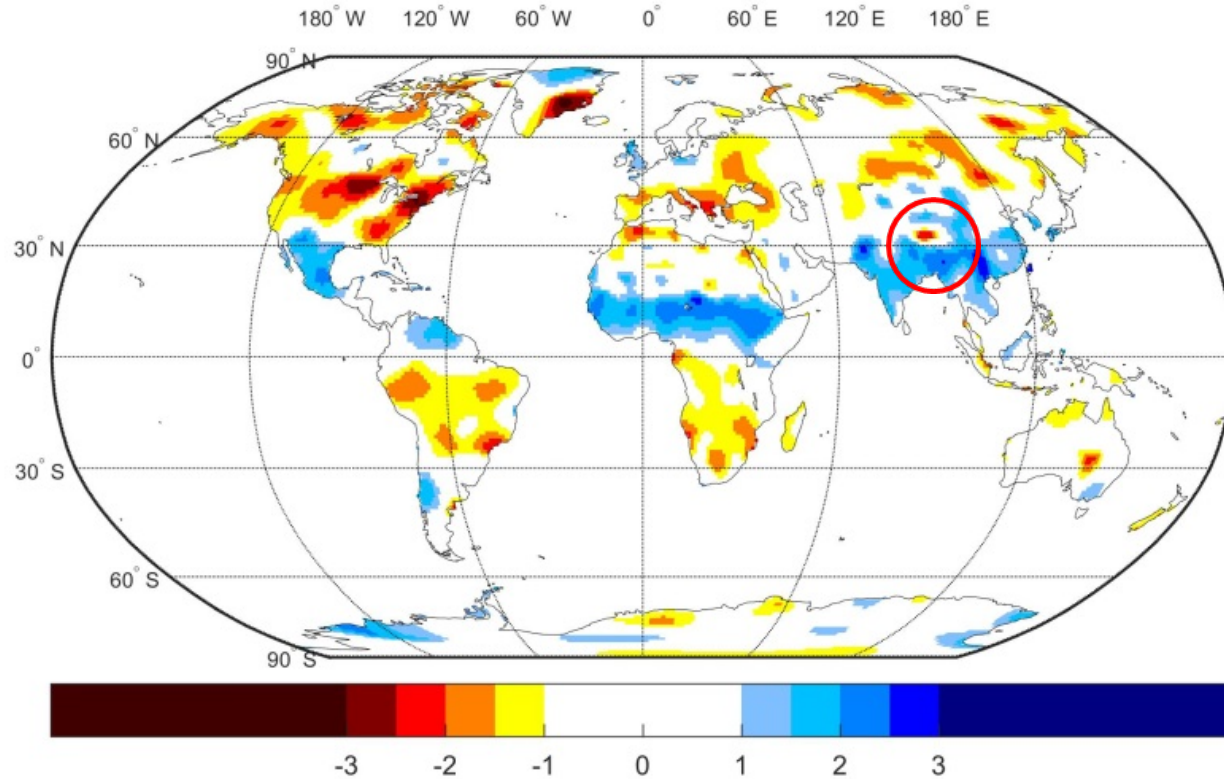
Run model in forward mode



Individual water storage components

Flood and drought indicators - outlook

12 September 2007



Index providing forecast of extremes for the individual water storage components