Title: WP6 (Hydrological Service)

Ben Gouweleeuw (GFZ)

EGSIEM General Assembly

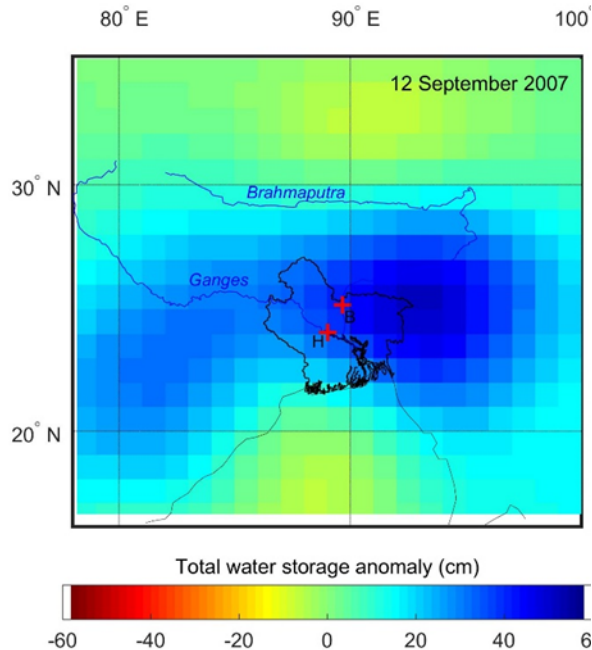**U Bern**

Jan 18-19.2017

Other activities & outlook

- Revise and re-submit paper on evaluation of GRACE daily gravity solutions for hydrological extremes in selected river basins (Gouweleeuw et al., GRL, in review)
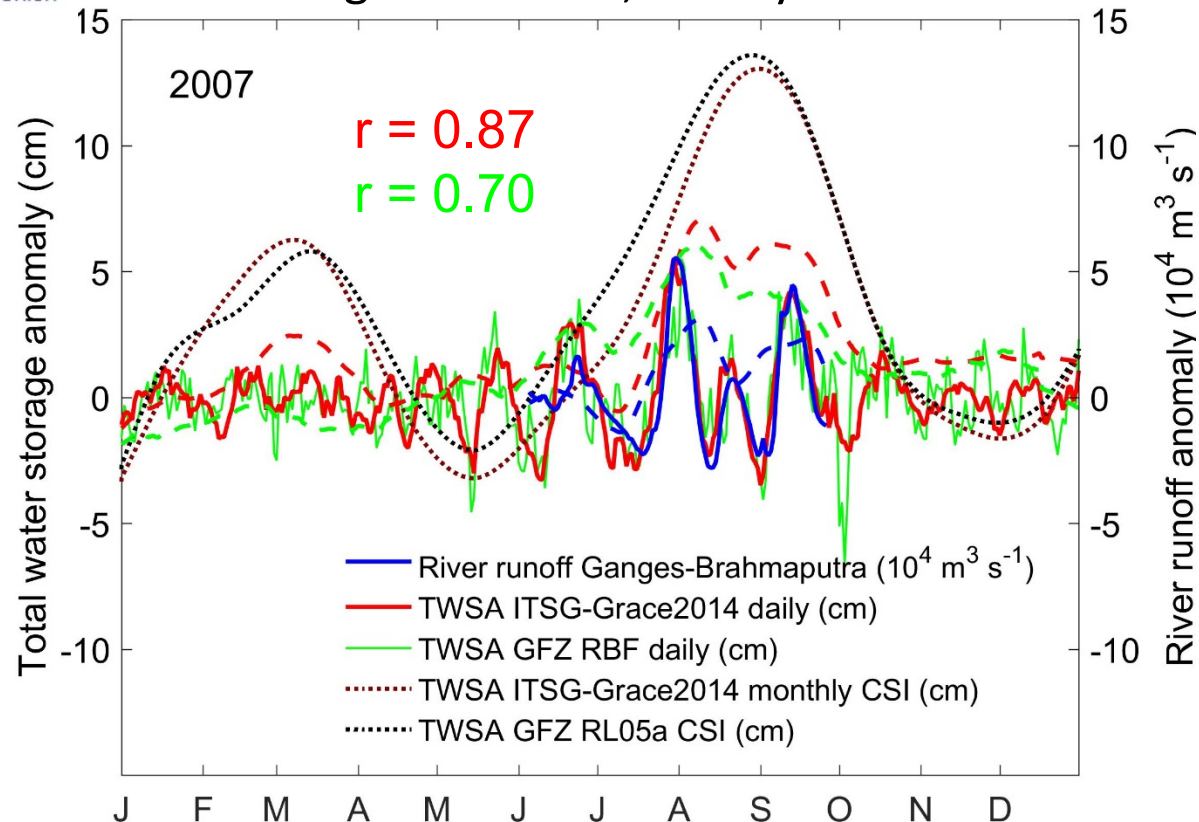
WP6: Hydrological Service

EGSIEM

European Gravity Service for Improved Emergency Management

Hydrology and Earth System Sciences
An interactive open-access journal of the European Geosciences Union

High Pass Filter, 31-day cut off

Reflects trends over periods of a few days

EGSIEM

Gouweleeuw et al. (in review): Daily GRACE gravity solutions track major flood events in the GB Delta
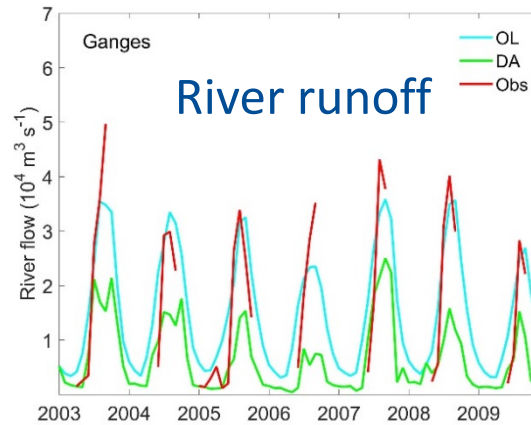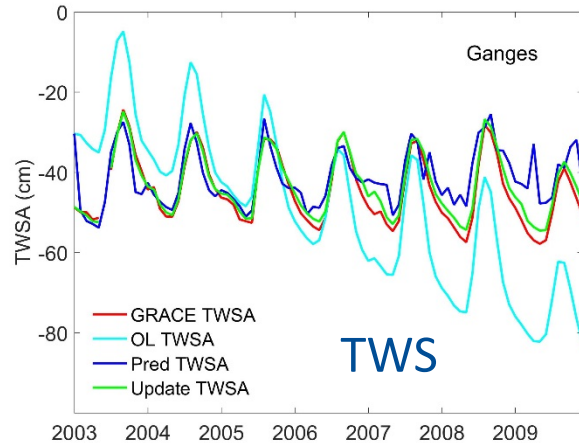
HORIZON 2020

Other activities & outlook of last meeting

- Analyse and extend DA assimilation for Ganges-Brahmaputra-Meghna basin incl. analysis of complimentary hydrological data (groundwater level,
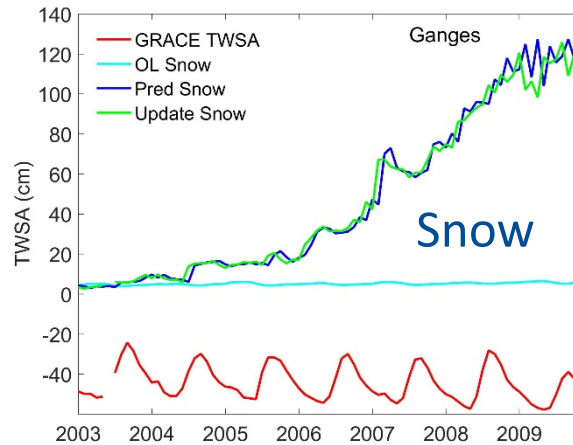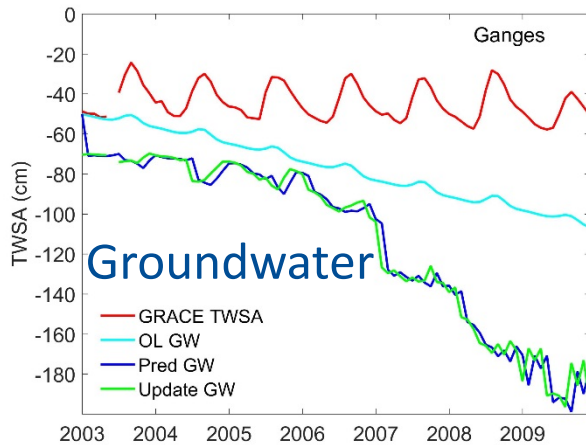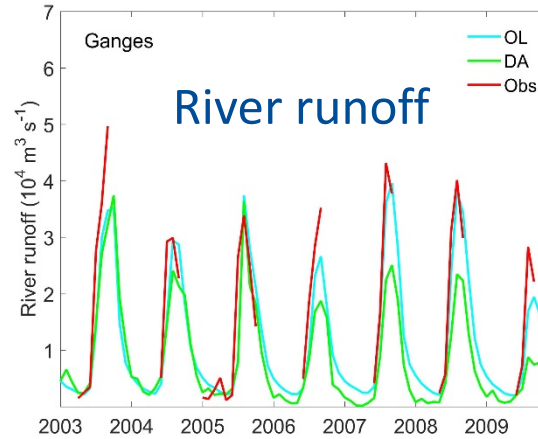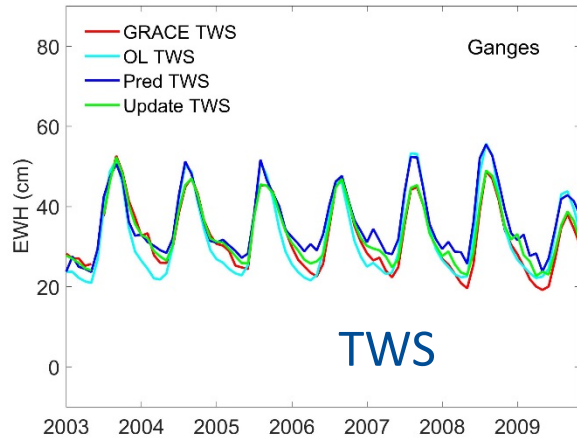
WP6: Hydrological Service

Ganges
of last meeting

EGSIEM
European Gravity Service for Improved Emergency Management
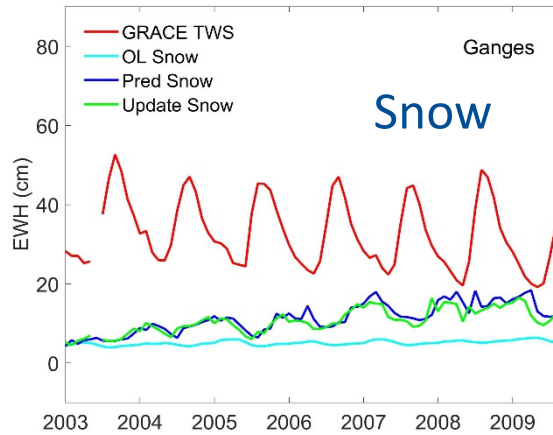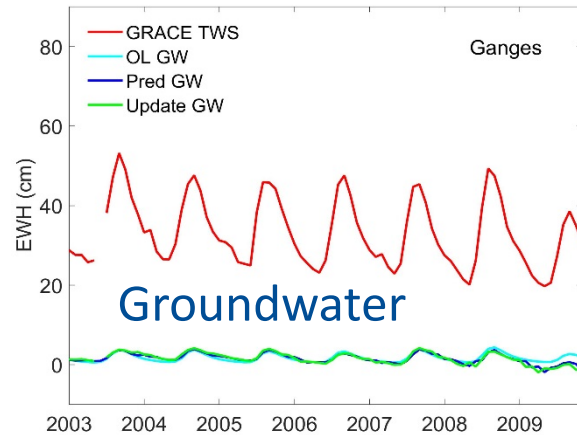

TWS

River runoff

Groundwater

Snow

1. Ensemble size
   30 (100)
2. Groundwater use
   yes (no)
3. Initial conditions
   (no) groundwater use

EGSIEM

Ganges

EGSIEM — European Gravity Service for Improved Emergency Management
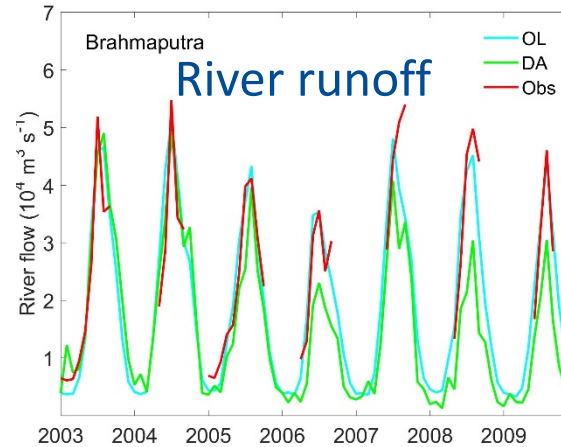
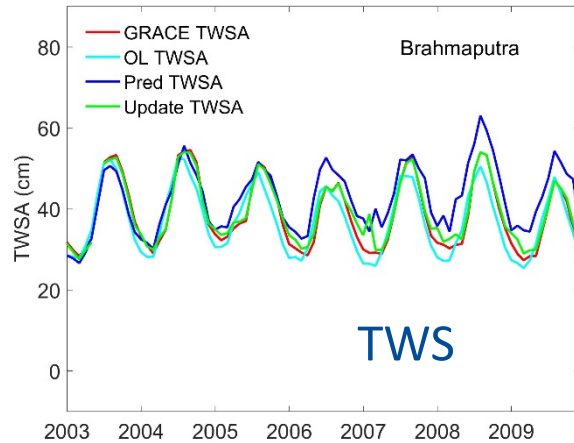1. Ensemble size
   30
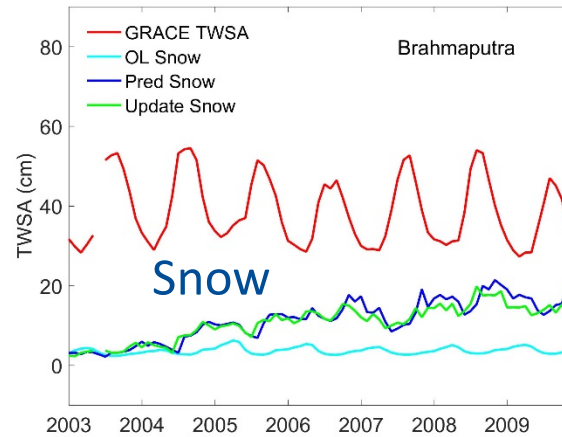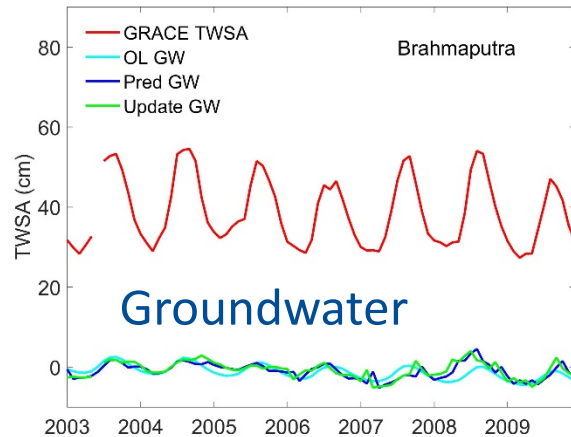2. Groundwater use
   no
3. Initial conditions
   no groundwater use

Way forward:
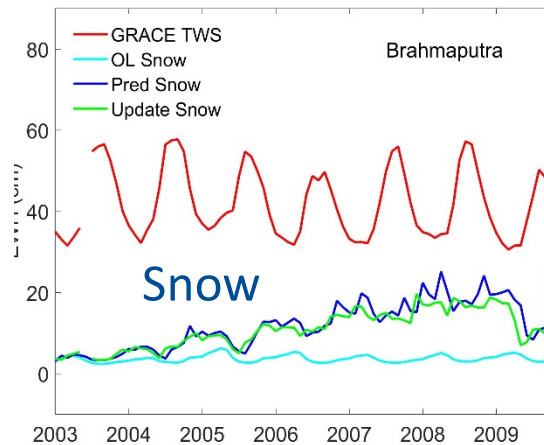• simultaneous C/DA for relevant/sensitive model parameters (GW-1, SL-1, SN-2,..)

HORIZON 2020

Brahmaputra
of last meeting

E**SIEM**
European Gravity Service for Improved Emergency Management

TWS

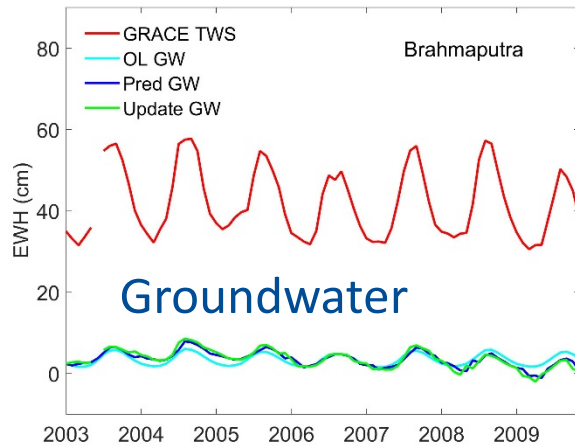River runoff

1. Ensemble size
30 (100)
2. Groundwater use
yes (no)
3. Initial conditions
(no) groundwater use

Groundwater

Snow

Brahmaputra

Ensemble size
30
Groundwater use
no
Initial conditions
no groundwater use

Meghna
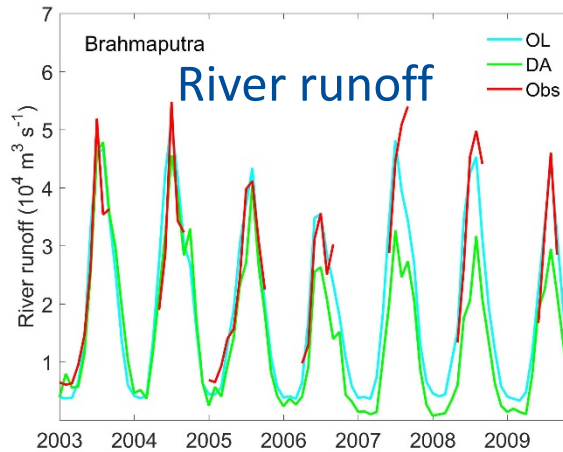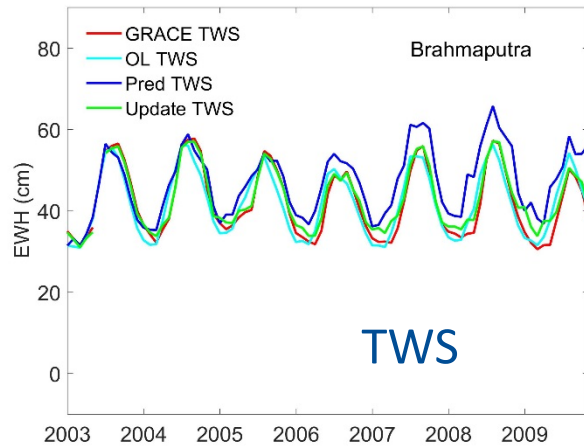## of last meeting

1. Ensemble size
   30 (100)
2. Groundwater use
   yes (no)
3. Initial conditions
   (no) groundwater use

Meghna

TWS

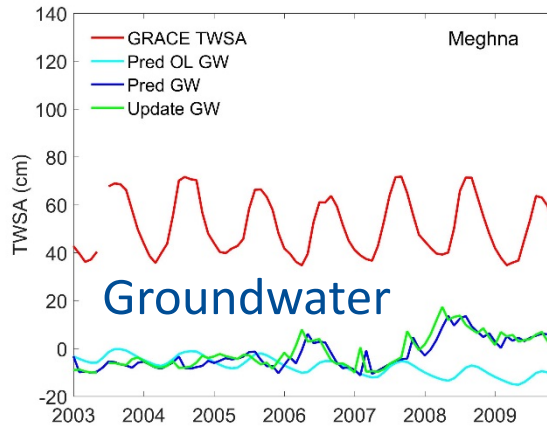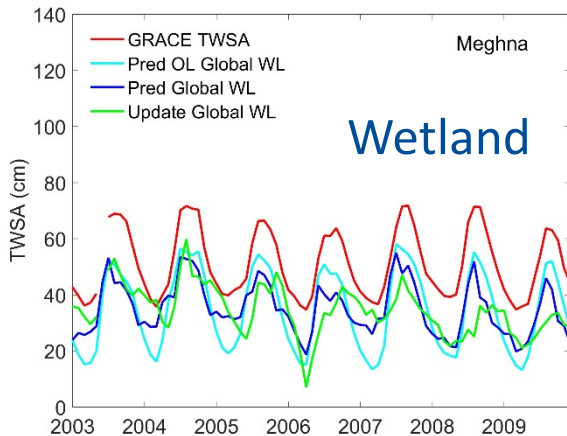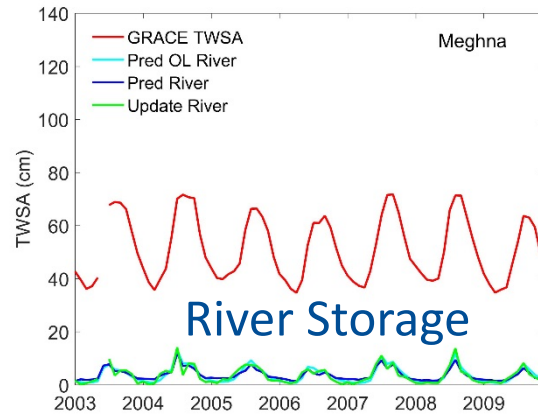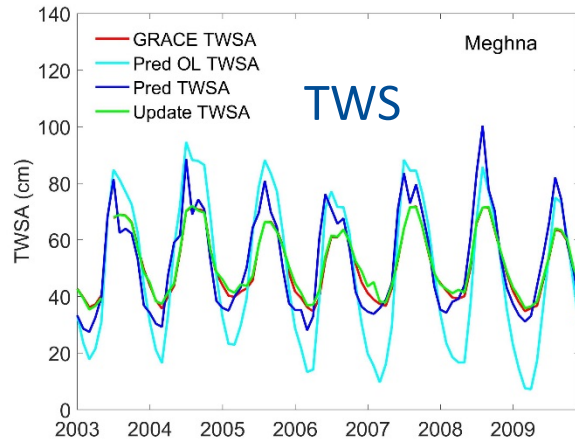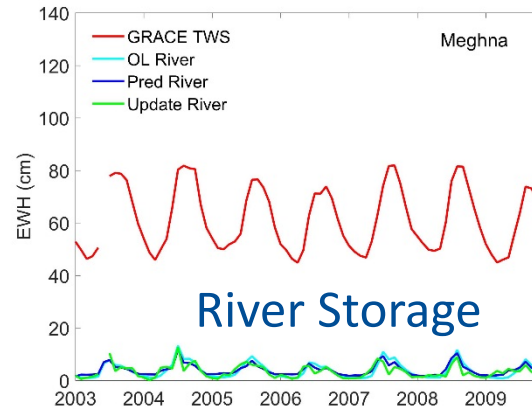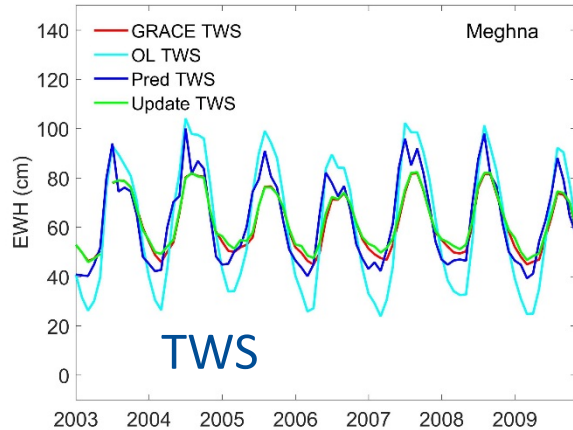
River Storage

Wetland

Compare with SAR/DEM approach

Groundwater

1. Ensemble size
   30
2. Groundwater use
   no
3. Initial conditions
   no groundwater use
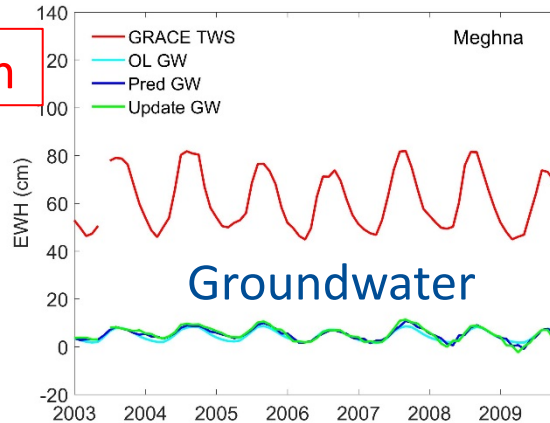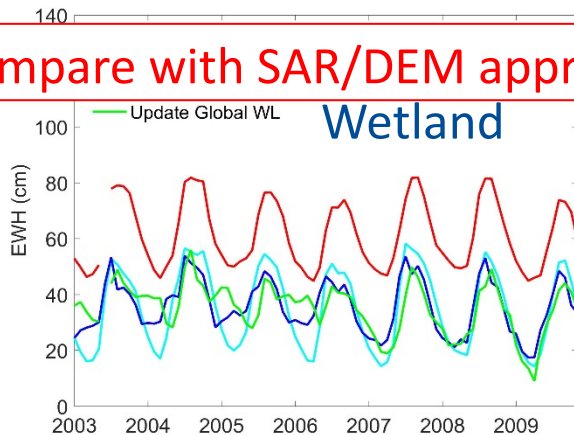
Why again?

- Individual water storage components
- Run model in forward mode & Extend time series (backward)
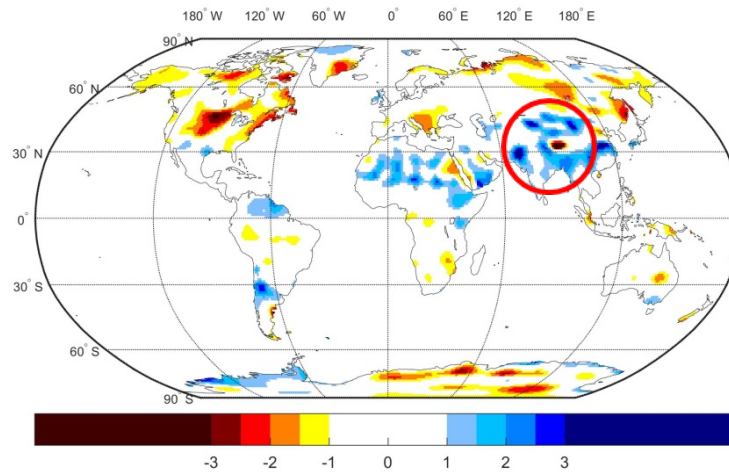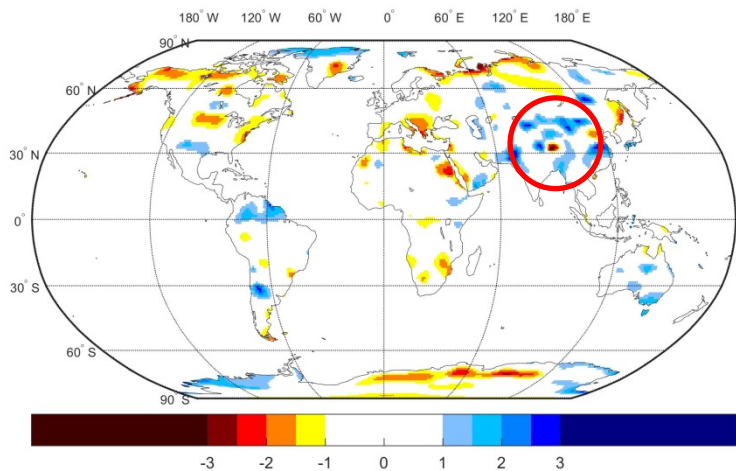
Other activities & outlook of last meeting

- Further development and refinement of global drought and flood indexing in preparation of real-time test.

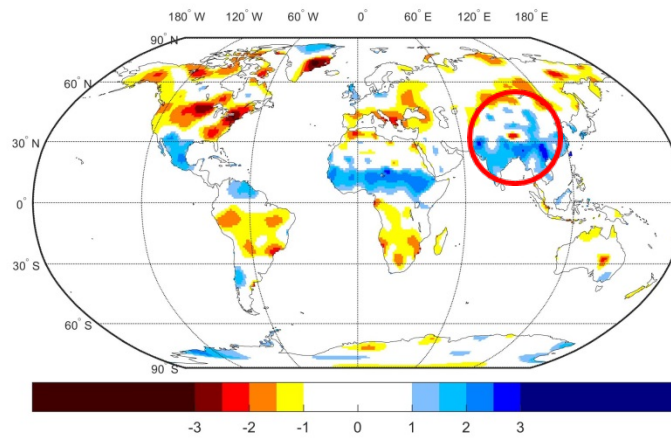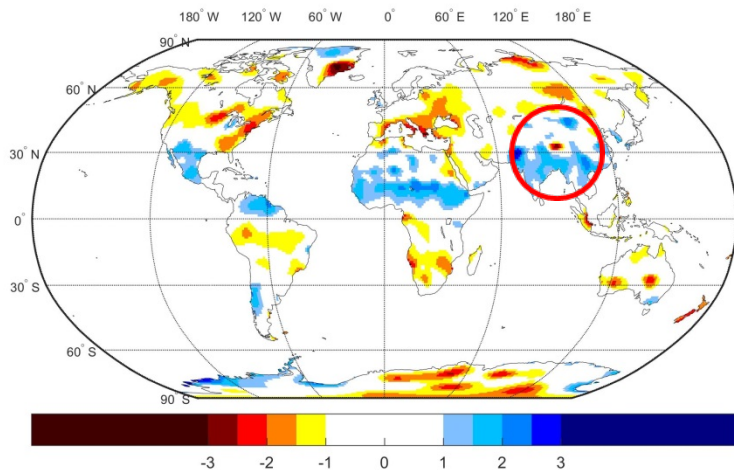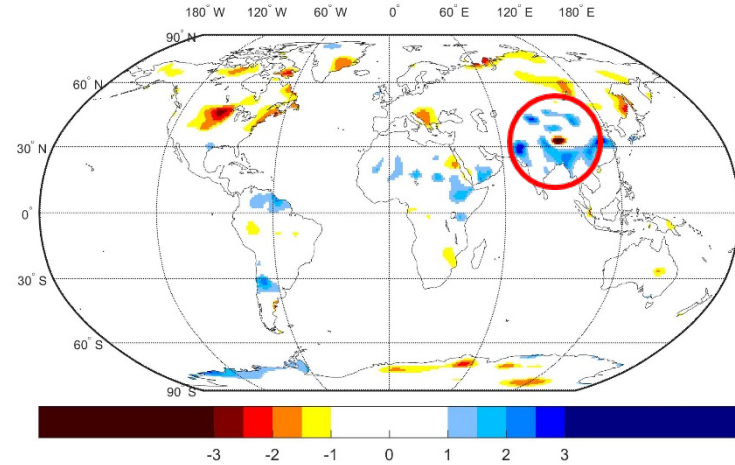# Flood and drought indicator – normalized TWSA

19 July 2007

Last meeting

3 August 2007

28 August 2007

12 September 2007

Ganges-Brahmaputra Delta flood

Flood and drought indicator – normalized TWSA

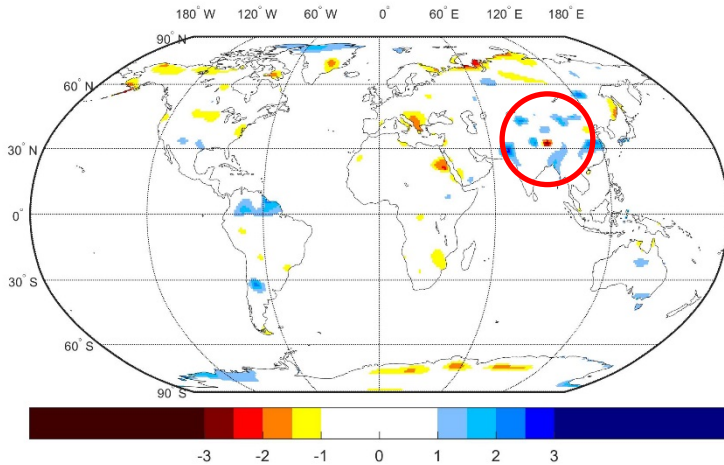Noise reduction

19 July 2007

3 August 2007

28 August 2007

12 September 2007

EOSIEM   Ganges-Brahmaputra Delta flood

HORIZON 2020

Flood and drought indicator – normalized TWSA

Lower threshold

19 July 2007
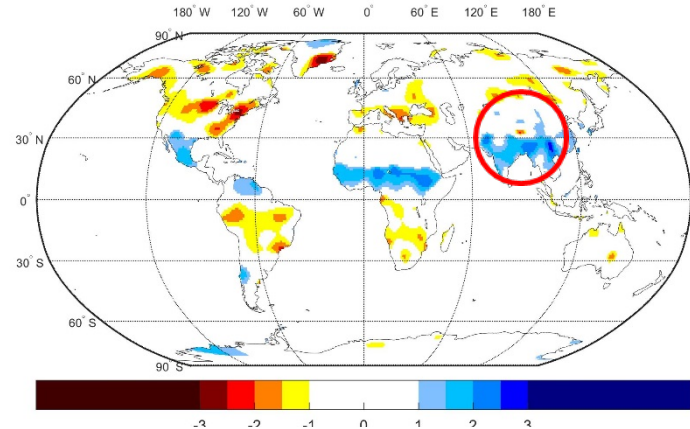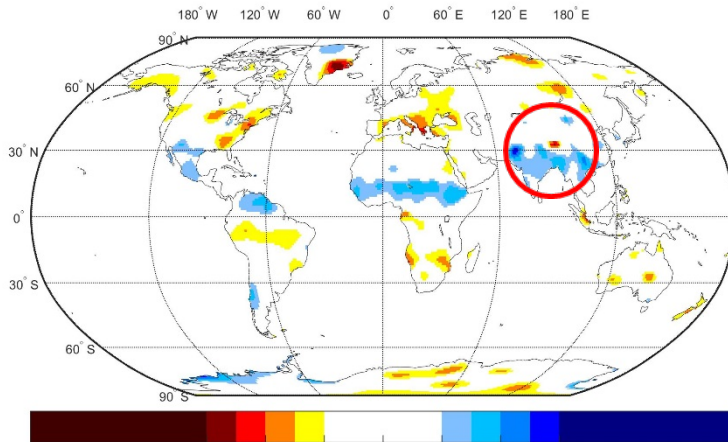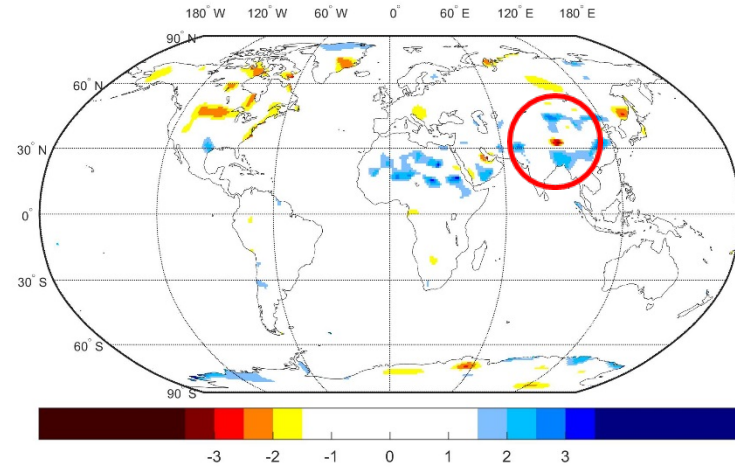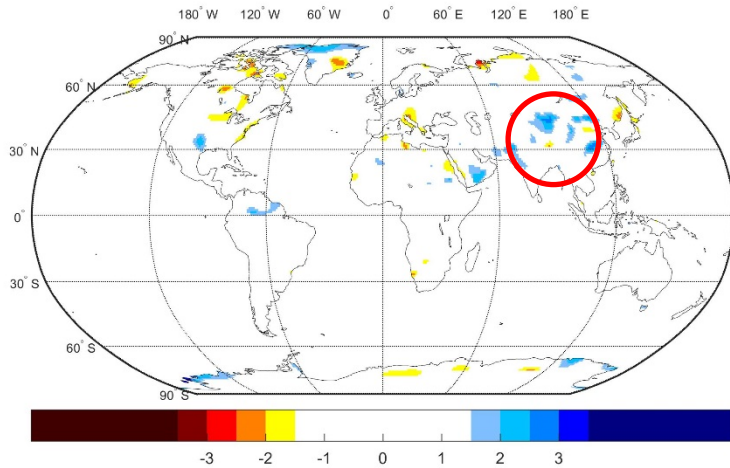
3 August 2007

28 August 2007

12 September 2007

E⊖SIEM   Ganges-Brahmaputra Delta flood
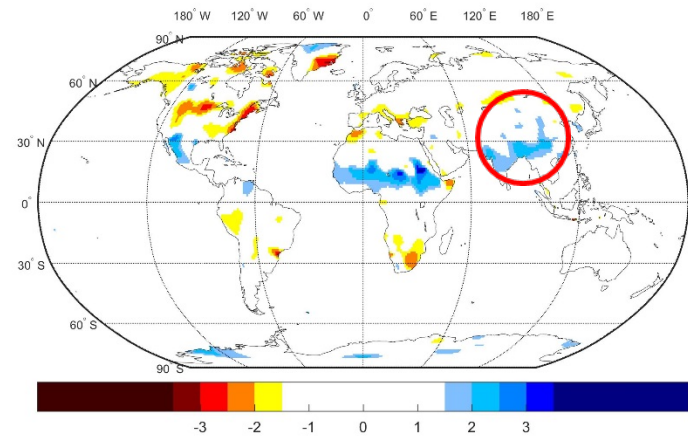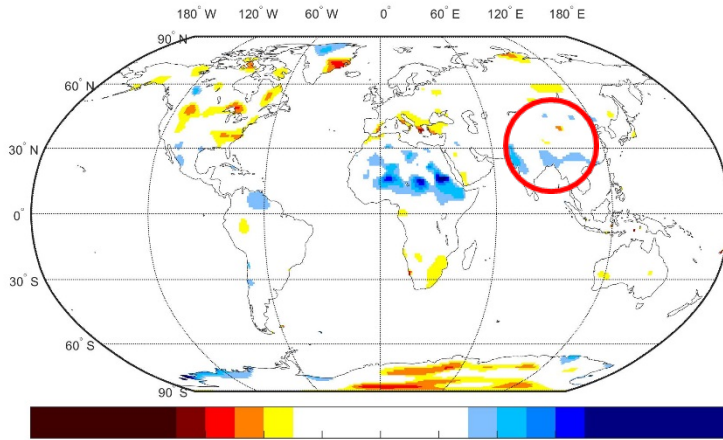
WP6: Hydrological Service

SQL database GLOBAL validation

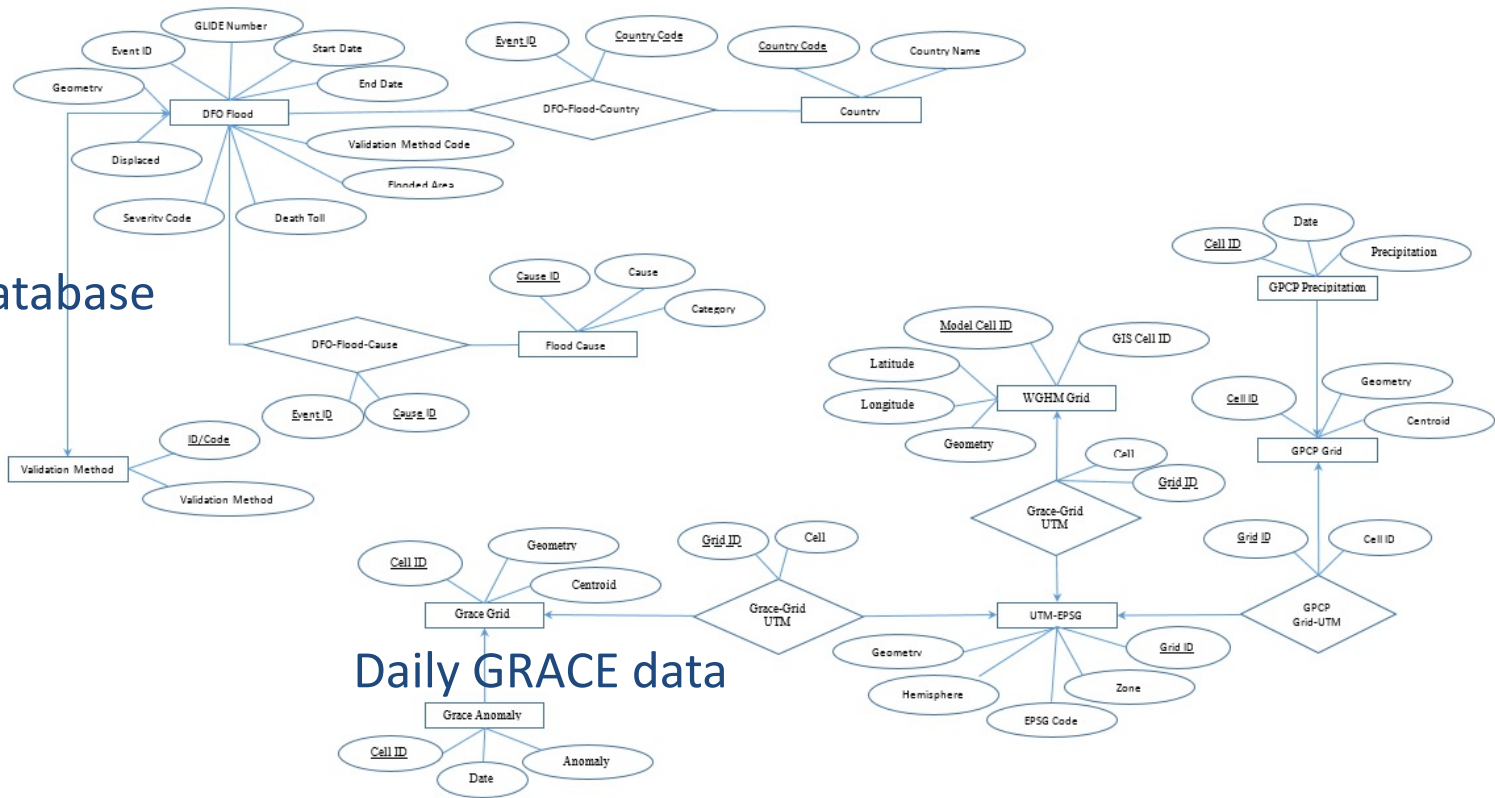DFO database

Daily GRACE data

Figure-1: E-R Diagram of Flood Database

Preliminary results

- Signals for large extreme floods related to heavy/monsoonal rainfall in the Southern Hemisphere and lower Northern Hemisphere (Africa, S-America, Australia, S-Asia) picked up very well.

- Extreme floods in Northern Hemisphere (Russia) related to snow melt often not flagged. Possibly related to lack of mass movement over long distances, e.g. due to river ice blocking.

WP6: Hydrological Service

Further testing

- GloFAS through WMS-T (near-real time test, DLR)

  - Other databases (EDO, EM-DAT)
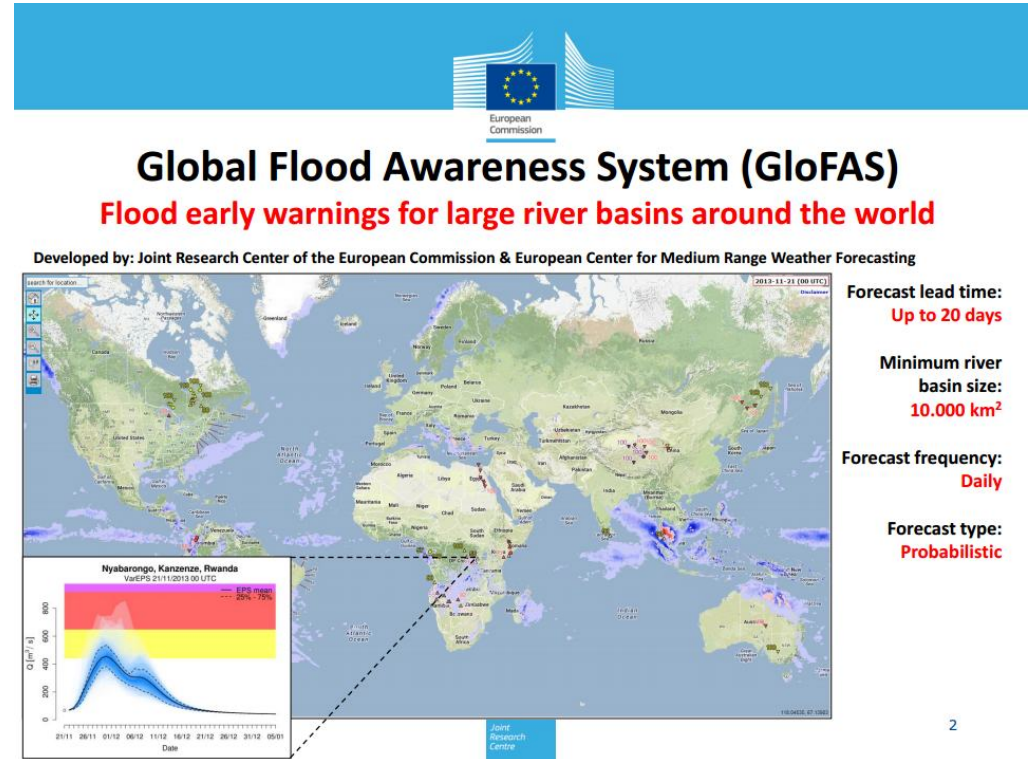
Other activities & outlook

- Extend DA assimilation for Ganges-Brahmaputra-Meghna basin to include model parameter calibration and comparison to complimentary hydrological data (e.g., SAR/DEM approach to estimate surface water).

- Further development and testing (SQL, GloFAS, EDO) of global gravity-based wetness index in preparation of near-real time test, including logistics (WMS-T).
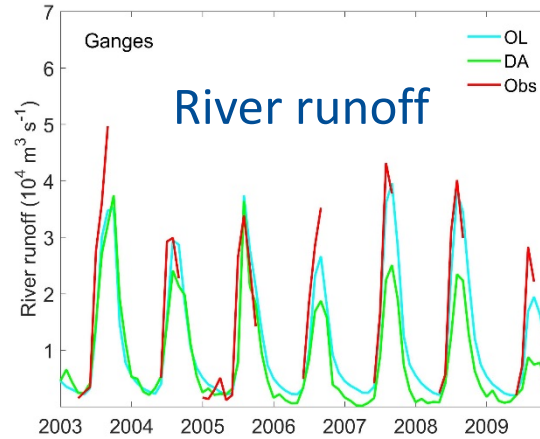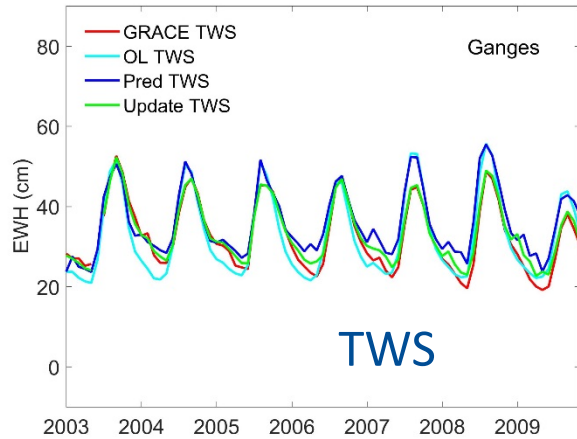
Danube basin

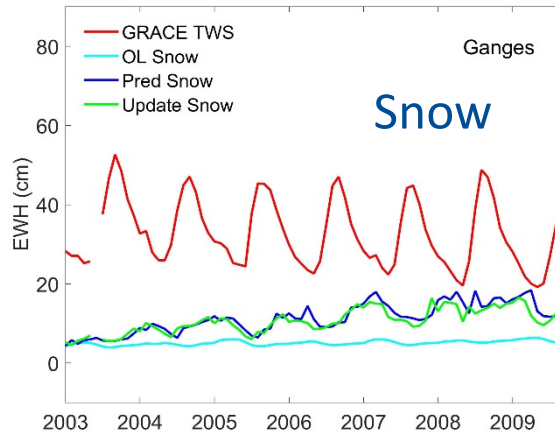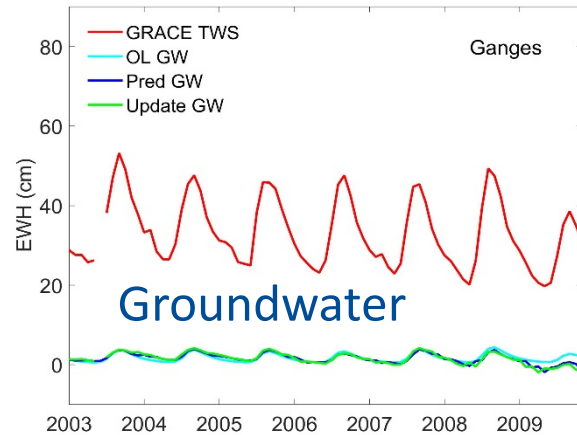**Normalized TWSA, 19 March 2006**
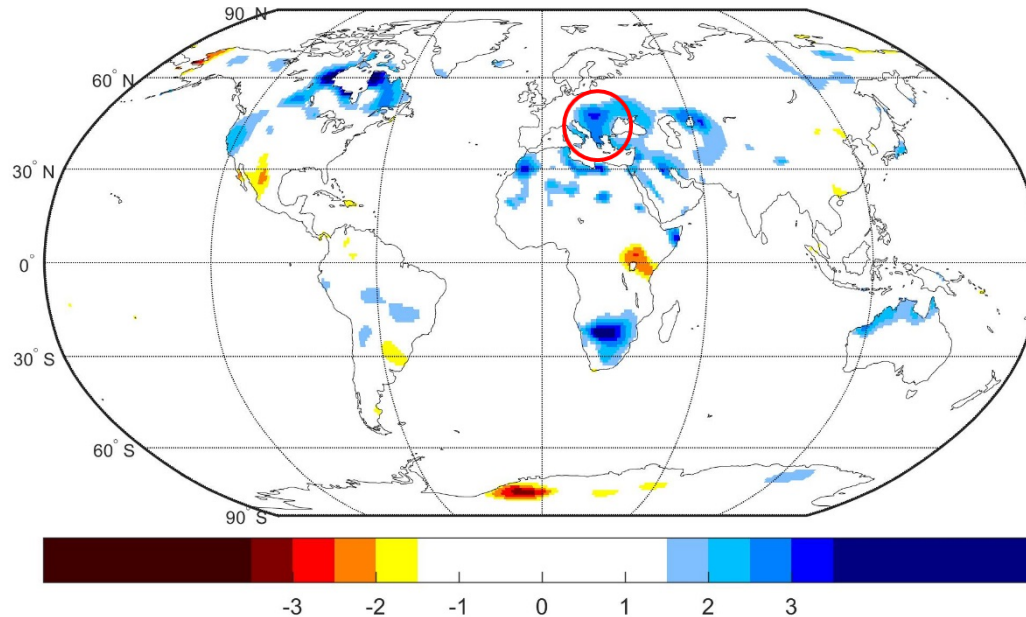
Wetter than normal conditions (2.5-3 times the standard deviation) are indicated for the Danube basin in March 2006, just before the April 2006 flood.
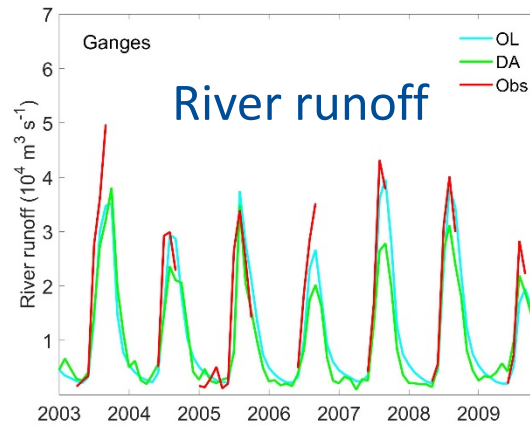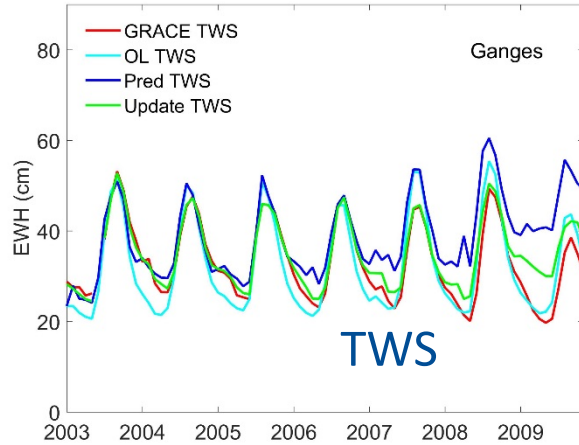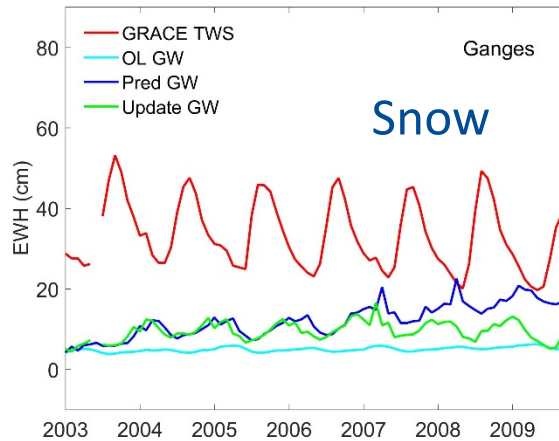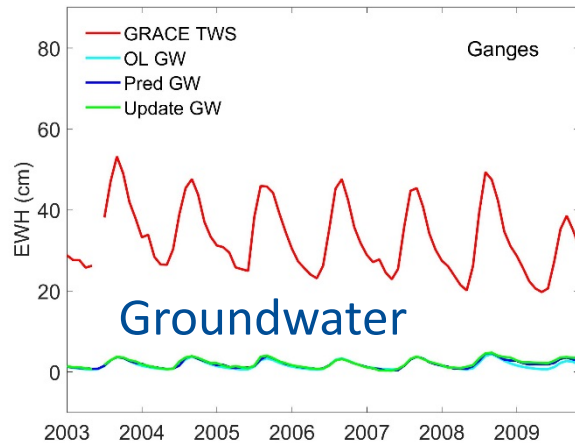
Ganges

1. Ensemble size
   30
2. Groundwater use
   no
3. Initial conditions
   no groundwater use

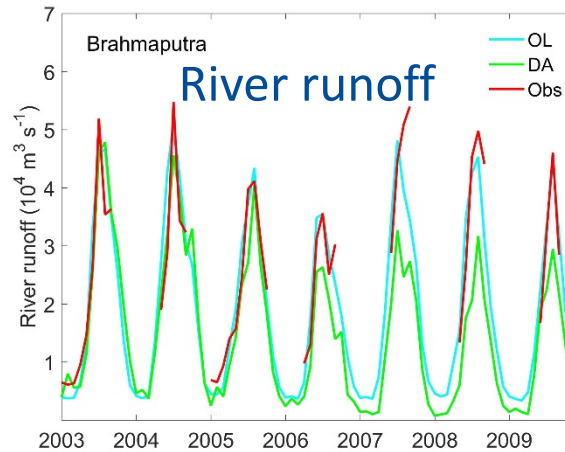# Ganges

EGSIEM

European Gravity Service for Improved Emergency Management

1. Ensemble size
   100
2. Groundwater use
   no
3. Initial conditions
   no groundwater use

EGSIEM

HORIZON 2020

Brahmaputra

European Gravity Service for Improved Emergency Management

TWS

River runoff

Groundwater

Snow

Ensemble size
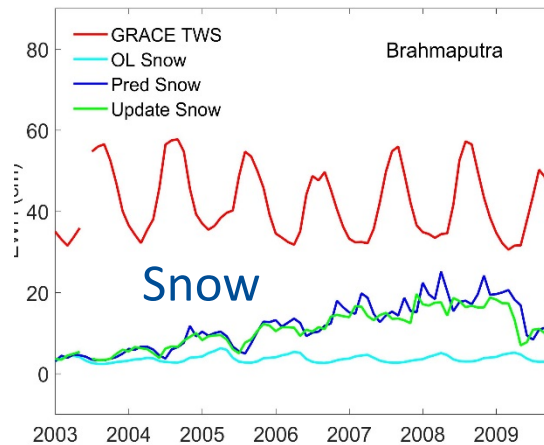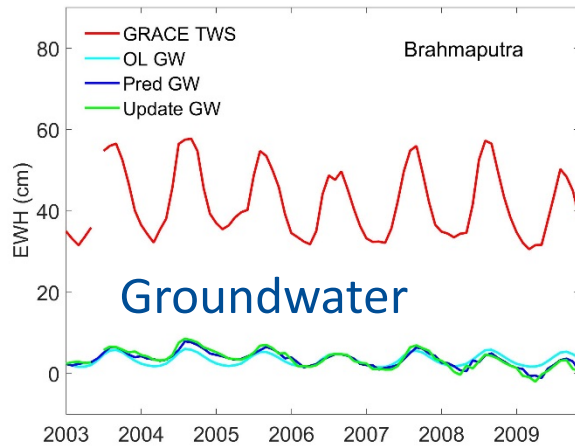30
Groundwater use
no
Initial conditions
no groundwater use

HORIZON 2020

Brahmaputra

European Gravity Service for Improved Emergency Management

TWS
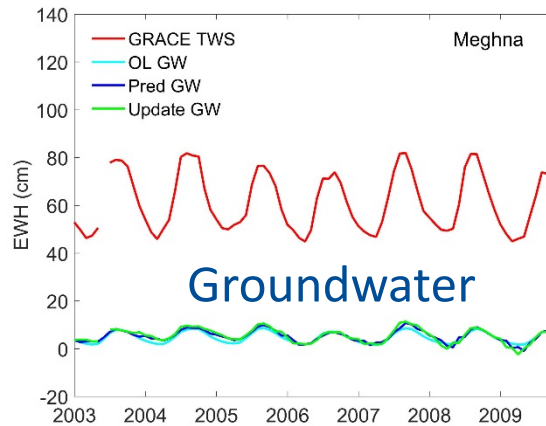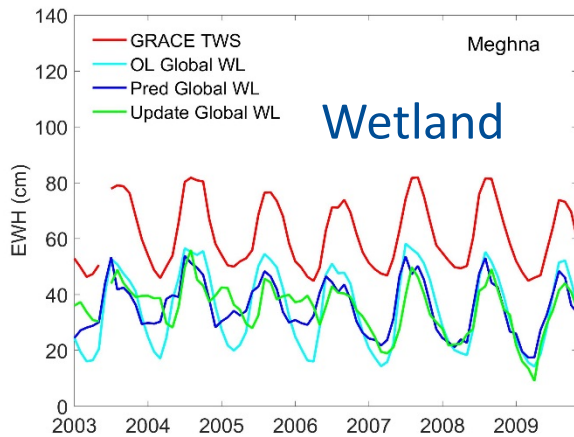
River runoff

Groundwater

Snow
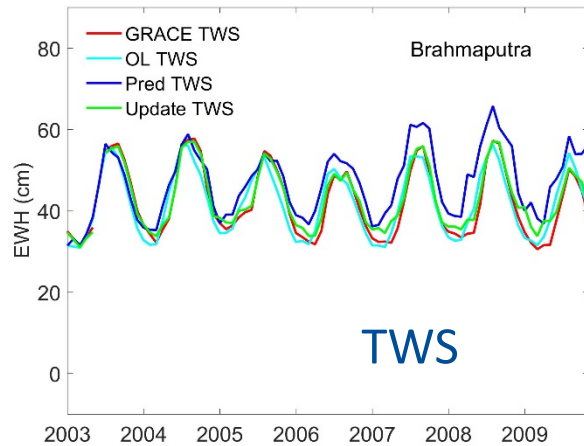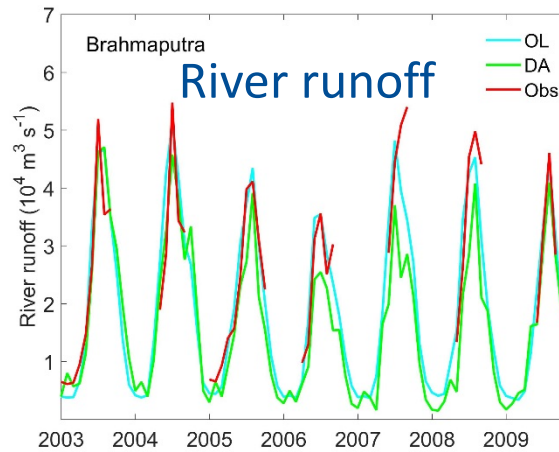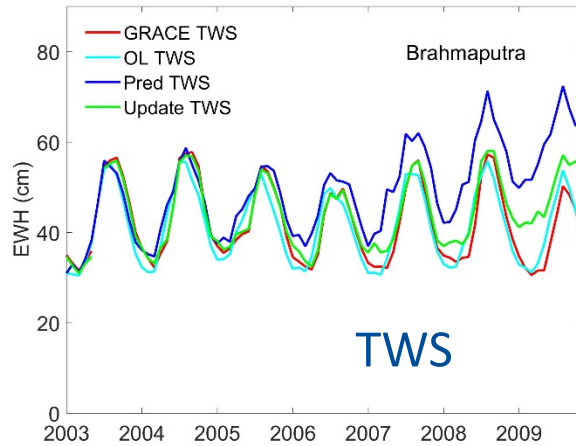
Ensemble size
100
Groundwater use
no
Initial conditions
no groundwater use

Meghna

TWS

River Storage

Wetland

Groundwater

1. Ensemble size
   30
2. Groundwater use
   no
3. Initial conditions
   no groundwater use

Meghna

TWS

River Storage

Wetland

Groundwater

1. Ensemble size 100
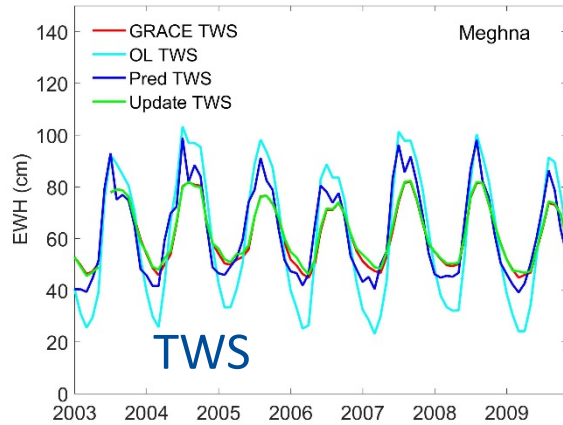2. Groundwater use no
3. Initial conditions no groundwater use