EGSIEM

European Gravity Service for Improved Emergency Management

Introduction & Overview

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EGSIEM Final Meeting

08. – 09. February 2018, Bern

HORIZON 2020

Introduction

EGSIEM

European Gravity Service for Improved Emergency Management

EGSIEM European Gravity Service for Improved Emergency Management

consisted of eight European partners:

and several associated members:

Project Objectives

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The three ***main objectives*** of EGSIEM were:

- Deliver the best time-variable gravity products for applications in Earth and environmental science research
- Reduce the latency and increase the temporal resolution of the gravity and therefore mass redistribution products
- Develop gravity-based indicators for extreme hydrological events and demonstrate their value for flood and drought forecasting and monitoring services

Challenging Data

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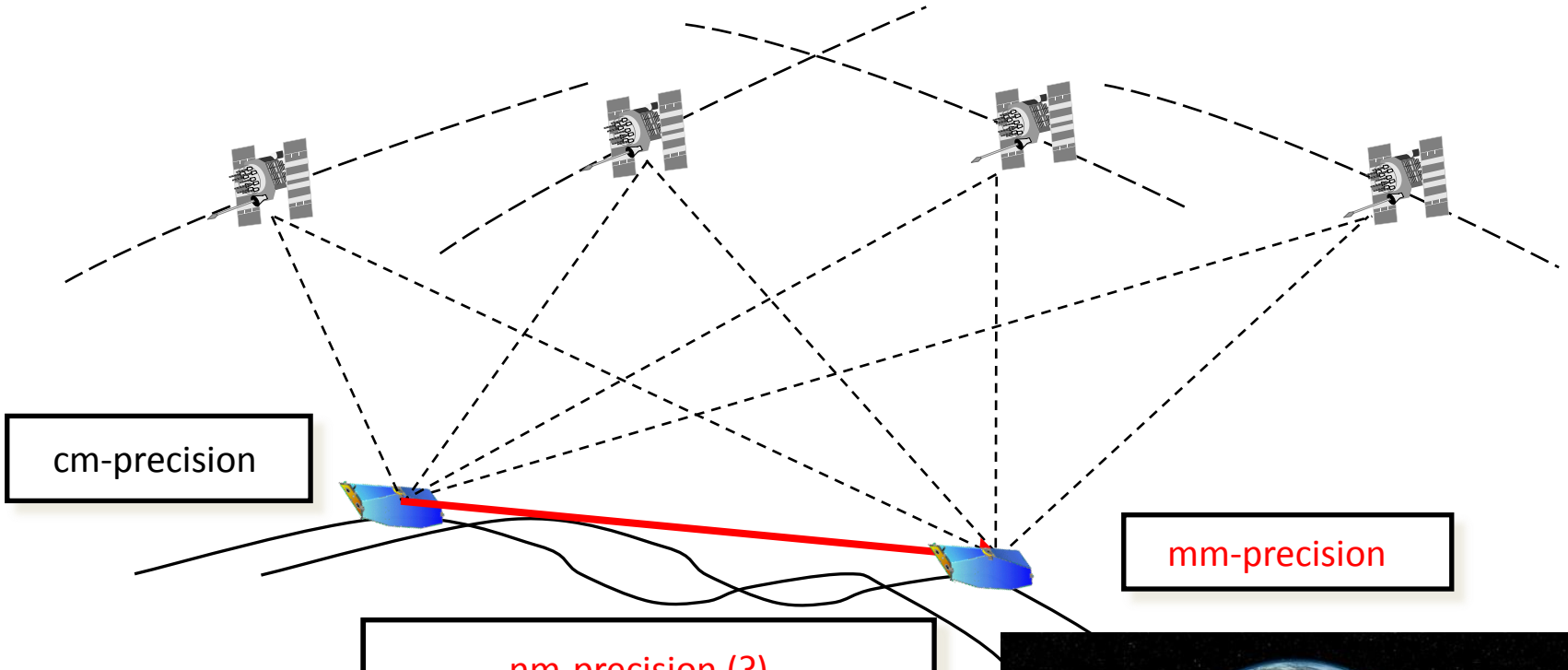

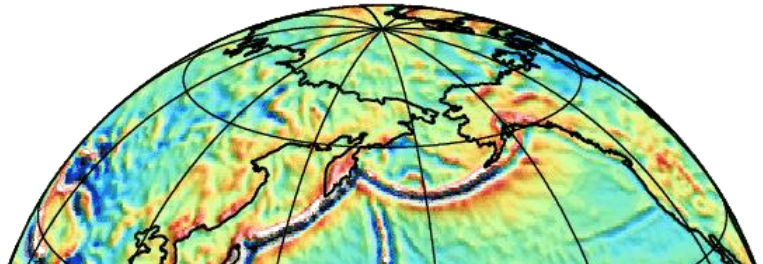

Establishment of three prototype Services

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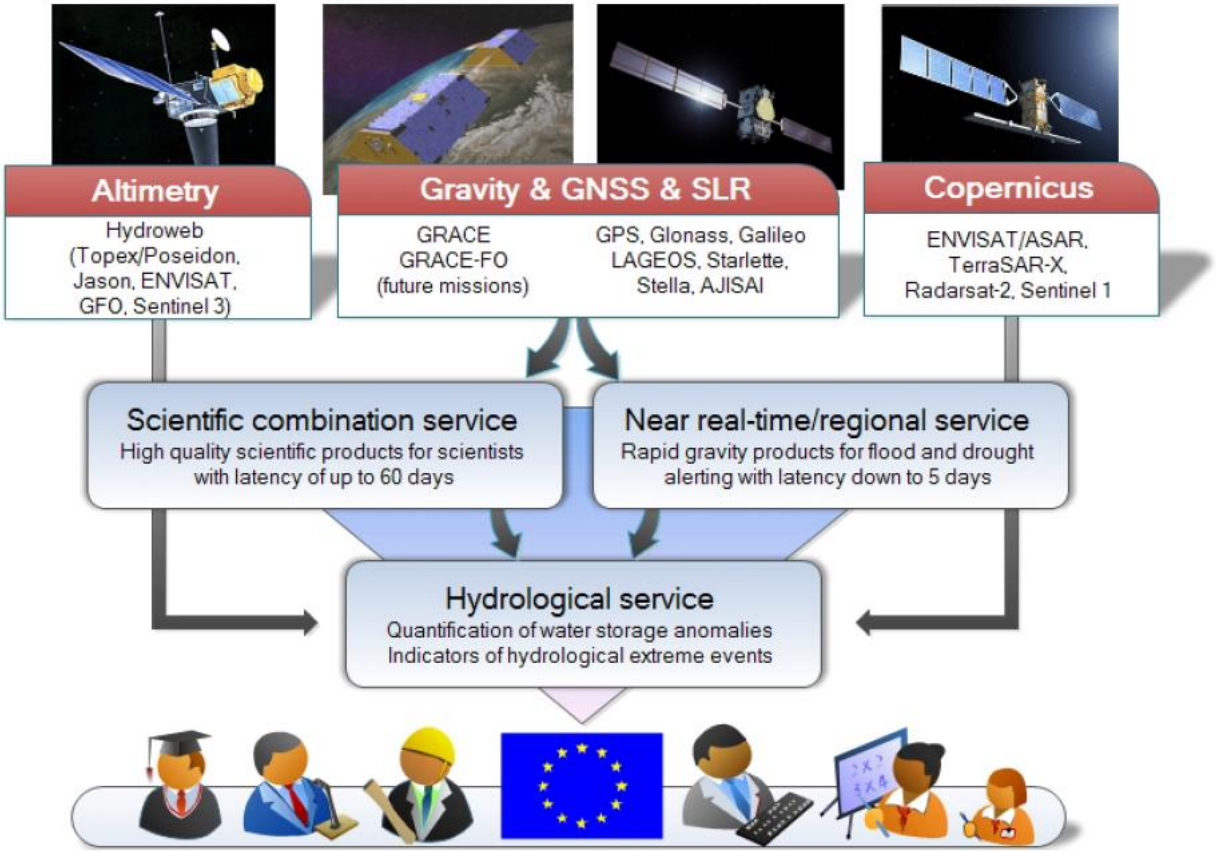

Realisation by WorkPackages

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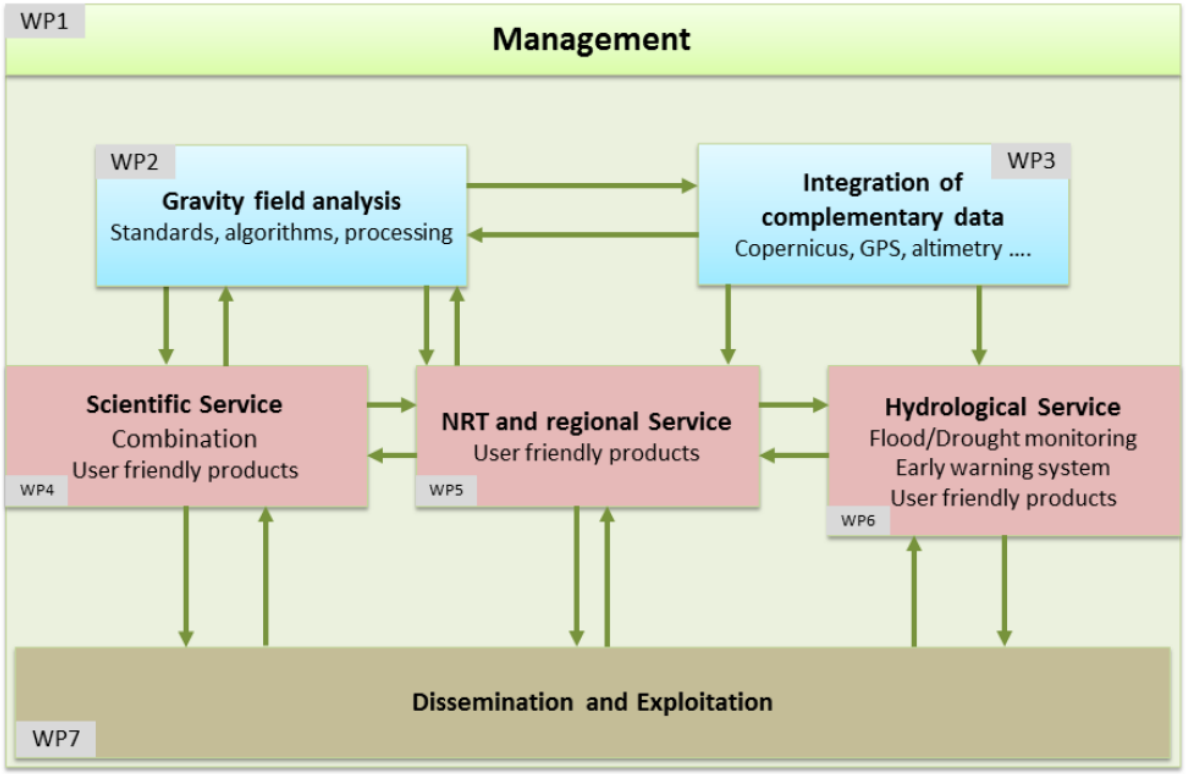

The used input data sources and the anticipated services that were established were reflected in the EGSIEM WP structure.

Timeline at a glance

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	EGSIEM	Duration in months	Year 1												Year 2												Year 3											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
WP1	**Management**	36																																				
T1.1	Legal and financial Management	36																																				
T1.2	Scientific Coordination	36																																				
WP2	**Gravity field analysis**	18																																				
T2.1	Processing Standards and Models	2																																				
T2.2	Improved processing tools	10																																				
T2.3	Data analysis	8																																				
T2.4	Instrumental behaviour and End-to-End Simulator	13																																				
WP3	**Integration of complementary data**	36																																				
T3.1	Reference frame reprocessing	8																																				
T3.2	SLR normal equations	3																																				
T3.3	NRT reference frame processing	4																																				
T3.4	Operational NRT reference frame processing	6																																				
T3.5	Validation of GRACE gravity products with GNSS site displacements	18																																				
T3.6	Validation of GRACE gravity products with Ocean Bottom Pressure	12																																				
T3.7	Preparation of Hydroweb data	4																																				
T3.8	GIA for Hydrology	26																																				
T3.9	Compilation of representative historical flood situations	10																																				
WP4	**Scientific service**	27																																				
T4.1	Design and concept	12																																				
T4.2	Operation	15																																				
T4.3	External Validation	15																																				
WP5	**Near realtime and regional service**	36																																				
T5.1	Requirements and Concept	3																																				
T5.2	NRT Solutions: Processing	24																																				
T5.3	Operational NRT Solutions: Processing	6																																				
T5.4	Regional Solutions: Processing	24																																				
T5.5	Generation of Area Mean Values	18																																				
T5.6	Validation/Feedback	18																																				
WP6	**Hydrological service**	36																																				
T6.1	Evaluation of historical flood events	24																																				
T6.2	Develop. & evaluation of gravity-bas. ind. for flood & drought forecastir	36																																				
T6.3	Rapid mapping concept	30																																				
WP7	**Dissemination and Exploitation**	36																																				
T7.1	Project information	36																																				
T7.2	GRACE plotter	36																																				
T7.3	Competition	36																																				
T7.4	Public education	36																																				
T7.5	Dedicated sessions at conferences	36																																				
T7.6	Summer school	12																																				
	General Assembly meetings																																					
	Consortium meetings																																					
	Advisory Board meetings																																					
	WP meetings																																					
	Periodic reports																																					

WP2: Gravity Field Analysis

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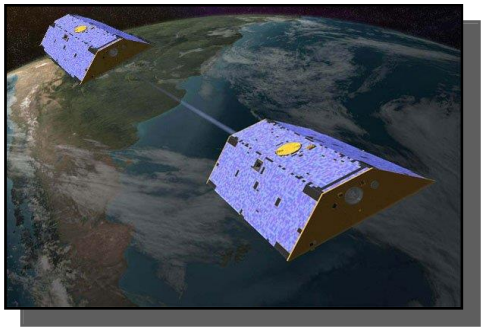

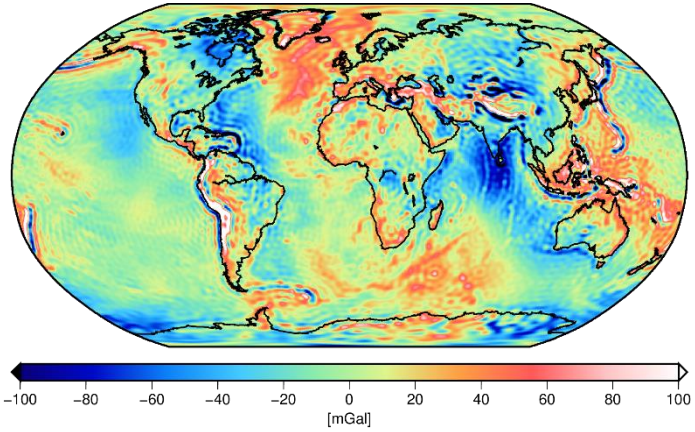

- Improved gravity field solutions by:
  - Harmonization of processing standards
  - Improvements of analysis methods
- EGSIEM Analysis Centers (ACs):
  - GFZ (Direct Approach)
  - CNES (Direct Approach)
  - UBERN (Celestial Mechanics Approach)
  - TUG (Short-Arc Approach)
  - UL (Acc. Approach)
  - More in the future …

==> Provide different solutions for the combination in WP 4

WP2: Gravity Field Analysis

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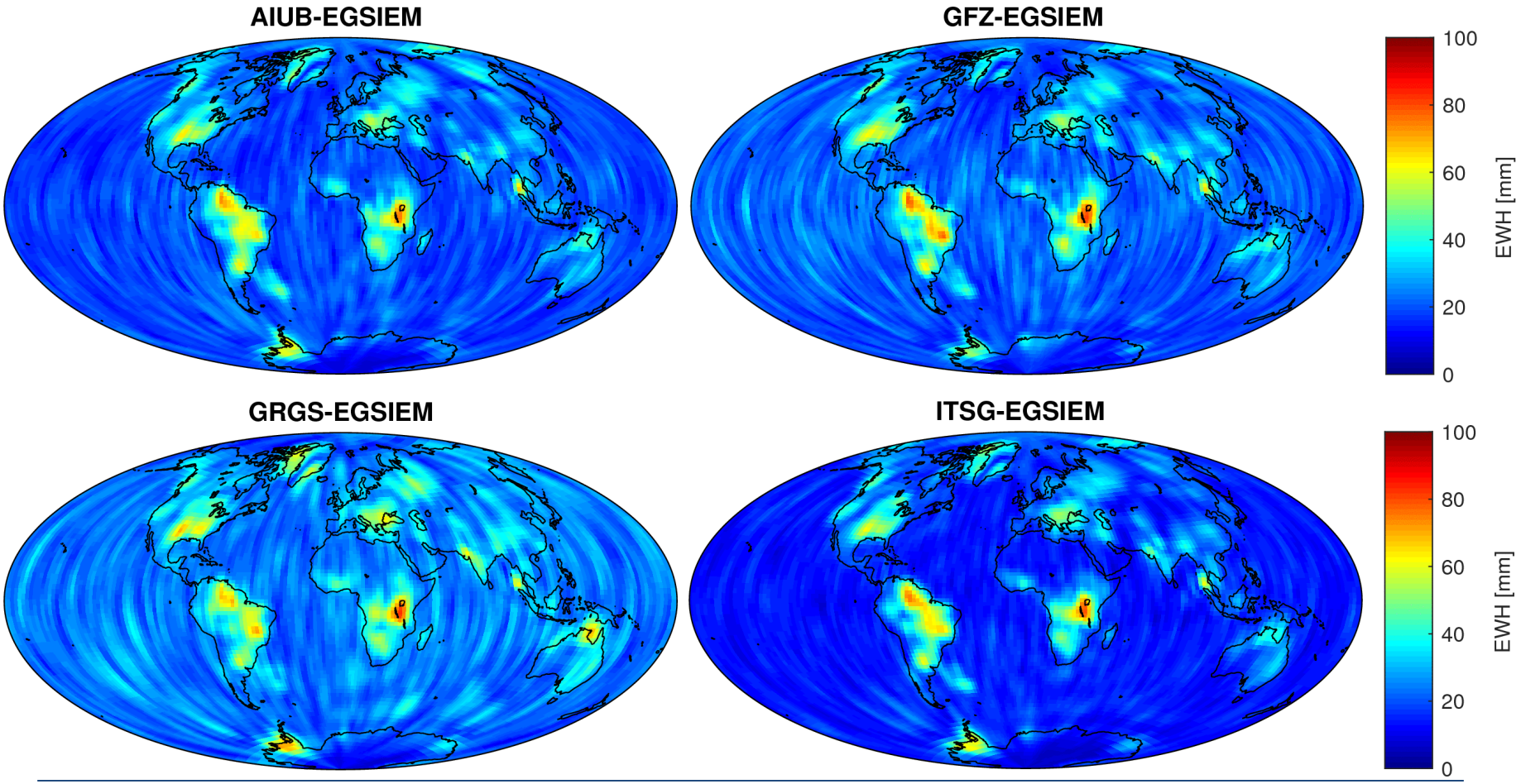

WP3: Integration of Complementary Data

Data	Application
GNSS	Reference frame
SLR	Reference frame + gravity
GNSS loading	Validation
Ocean bottom pressure	
Altimetry data (lake and river levels)	Integration into hydrological service (and validation)
GIA models	Separation of GIA-related trend from hydrological trend (where necessary)
Historical flood situations	Validation of GRACE derived flood and drought indices

WP3: Integration of Complementary Data

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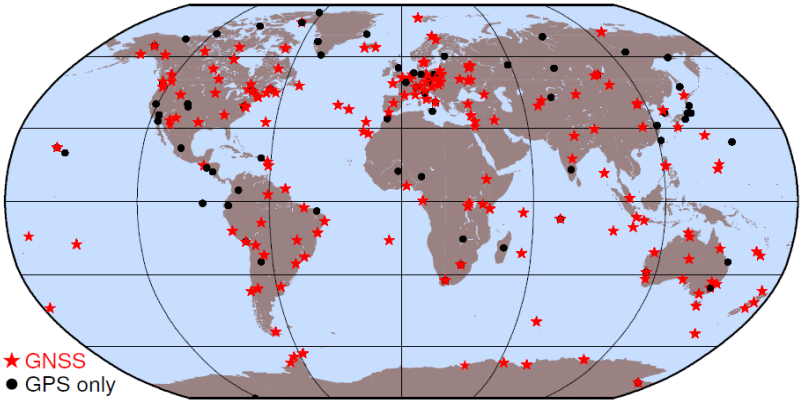
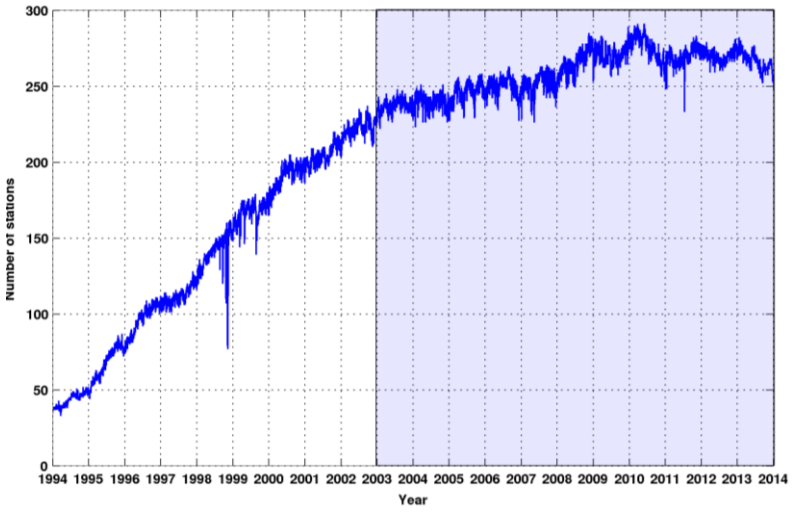
Full GNSS Reprocessing:

- 250 globally distributed tracking stations in the time-frame 2003-14
- combined processing scheme of GPS and GLONASS measurements
- significant improvements due to the new empirical GNSS orbit model
- main products are GNSS satellite clock corrections (30-sec, 05-sec), GNSS satellite orbits, Earth rotation parameters, station coordinates





WP4: Scientific Service

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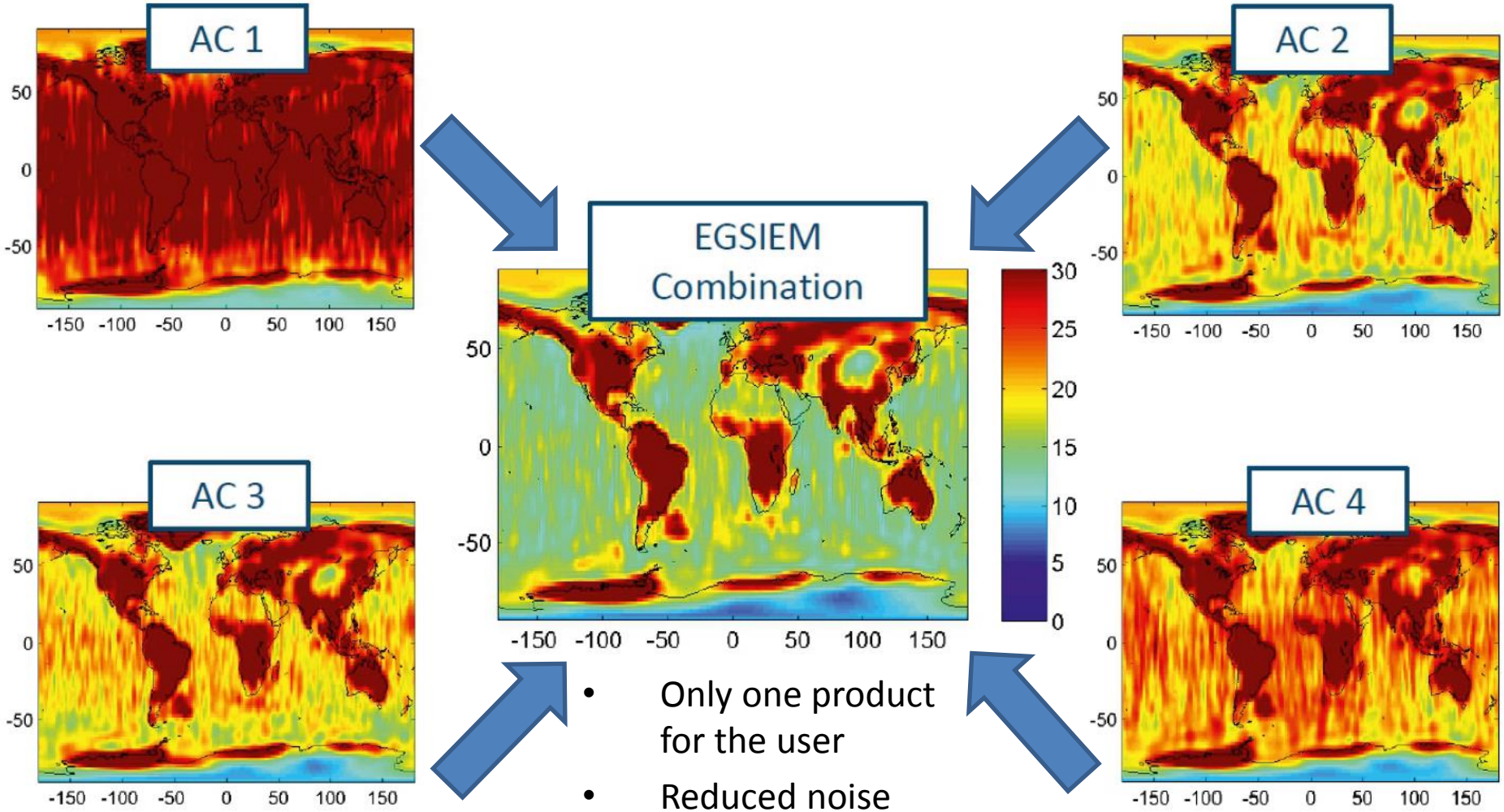

- Only one product for the user
- Reduced noise

WP4: Scientific Service

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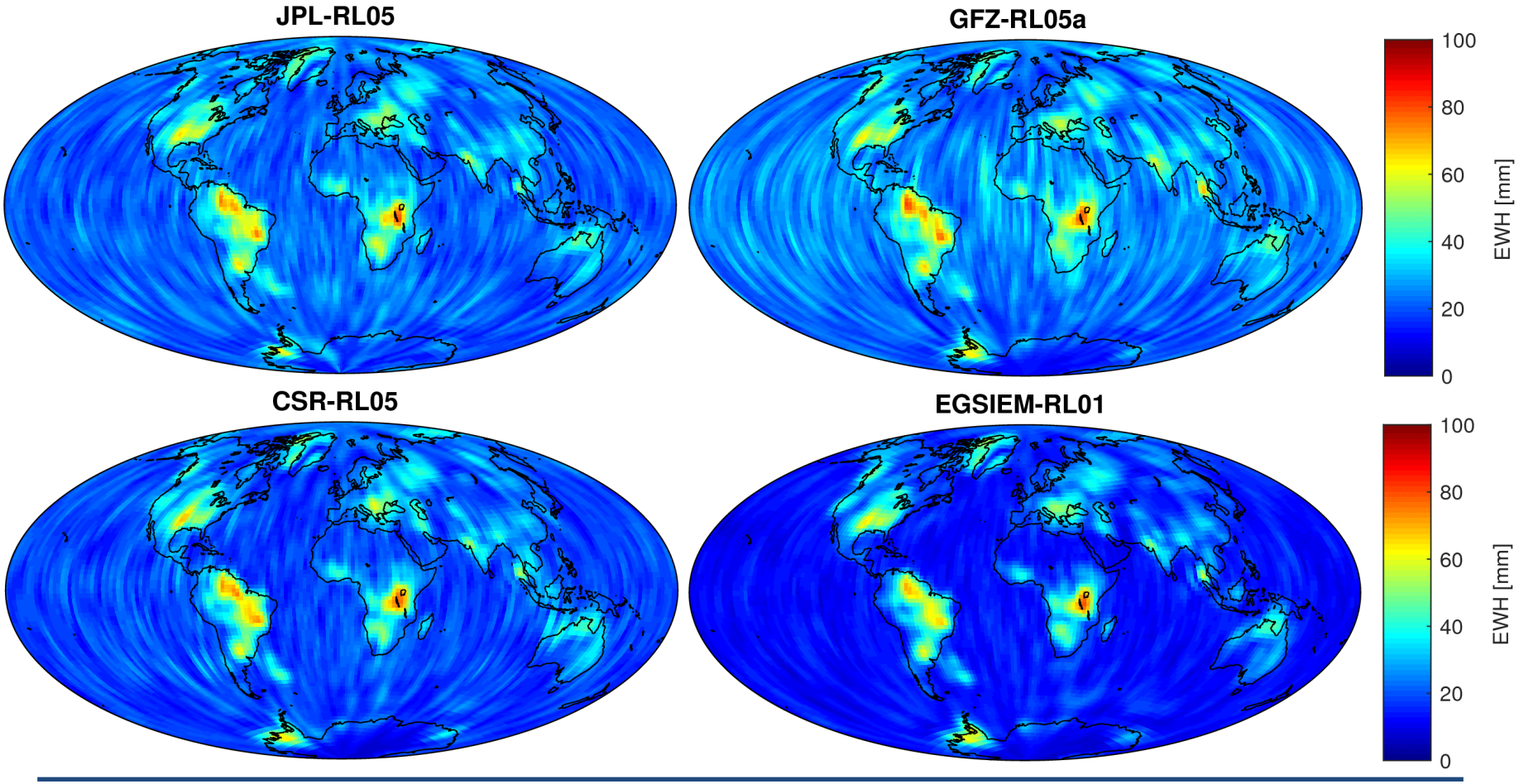

WP5: NRT and Regional Service

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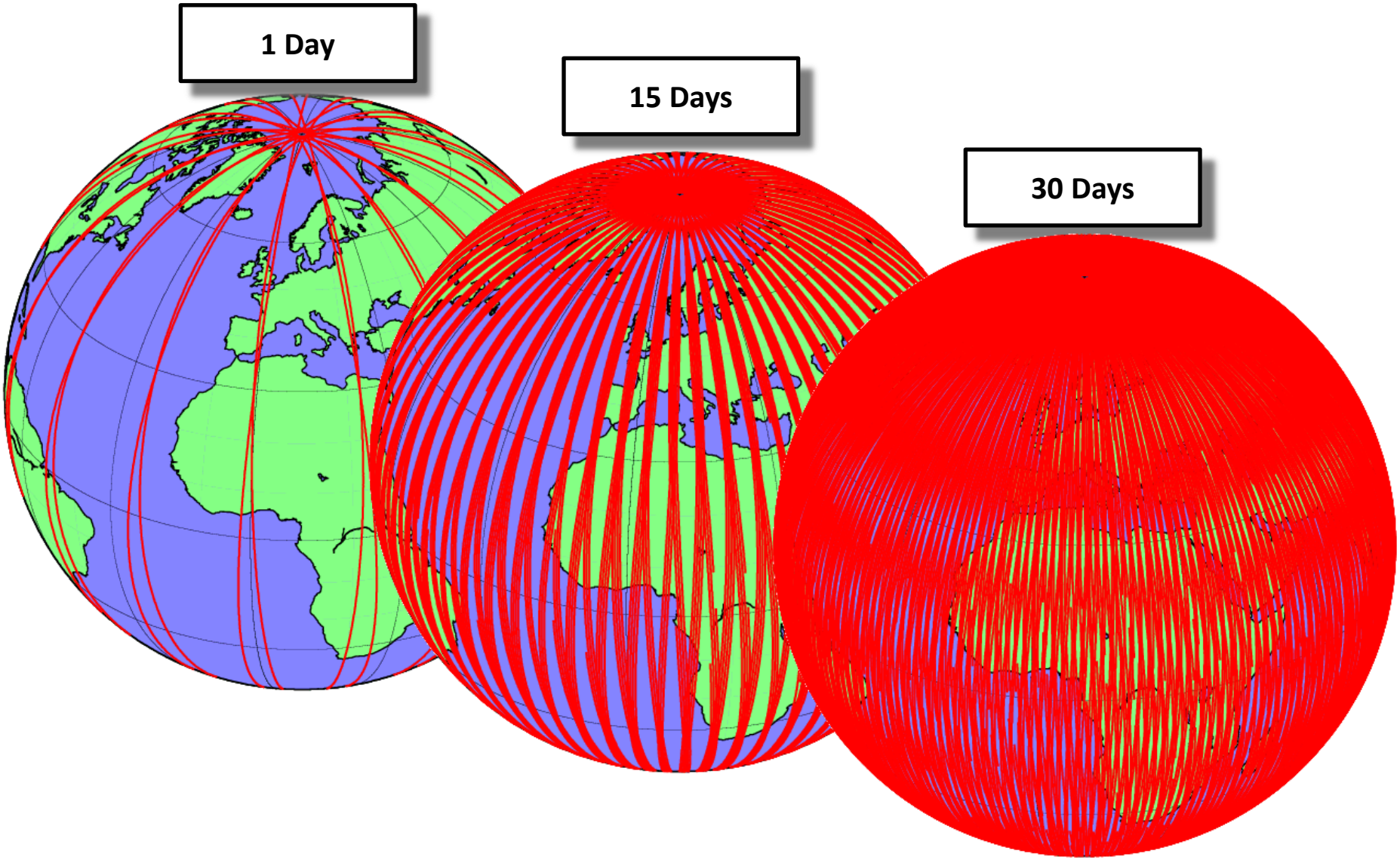

WP5: NRT and Regional Service

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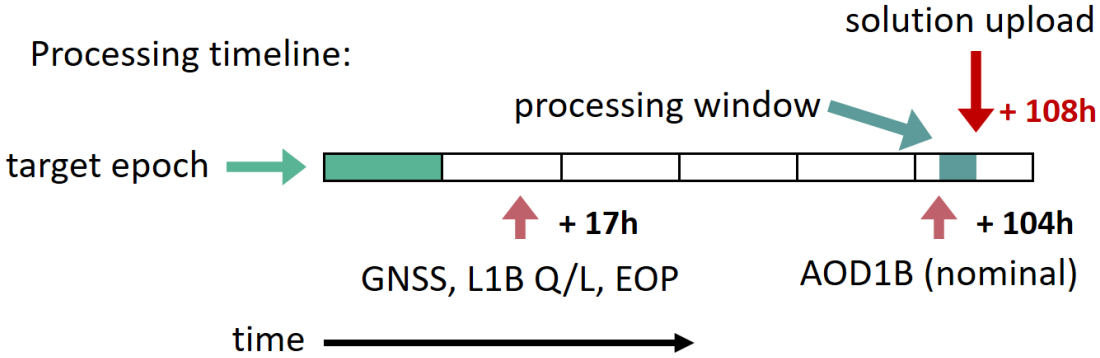
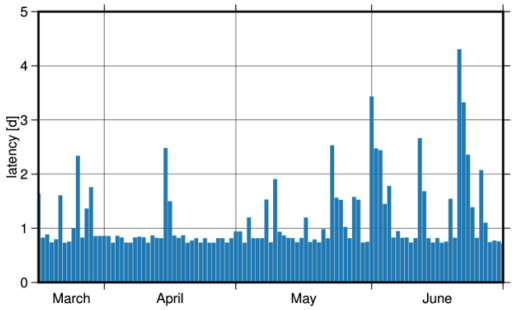
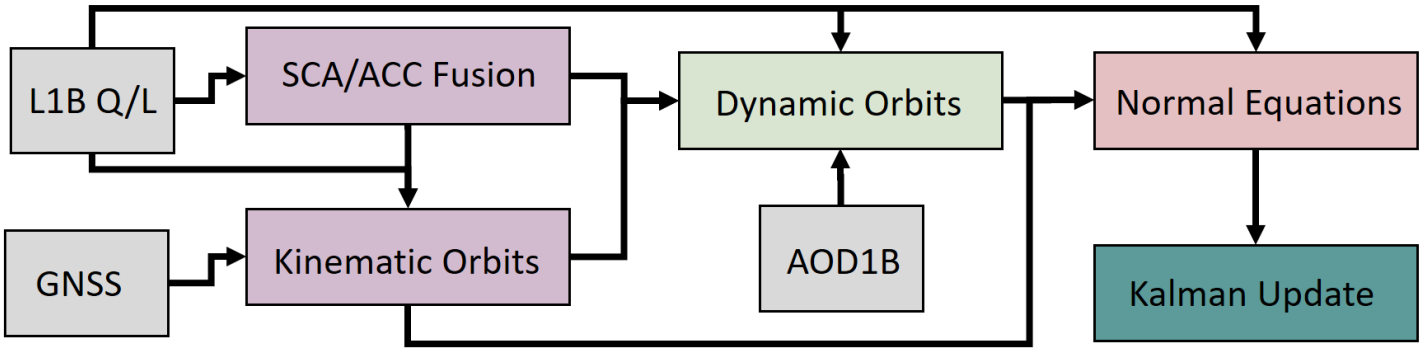
- Processing timeline:



During NRT Test



- Processing steps from raw data to final solution:



WP5: NRT and Regional Service

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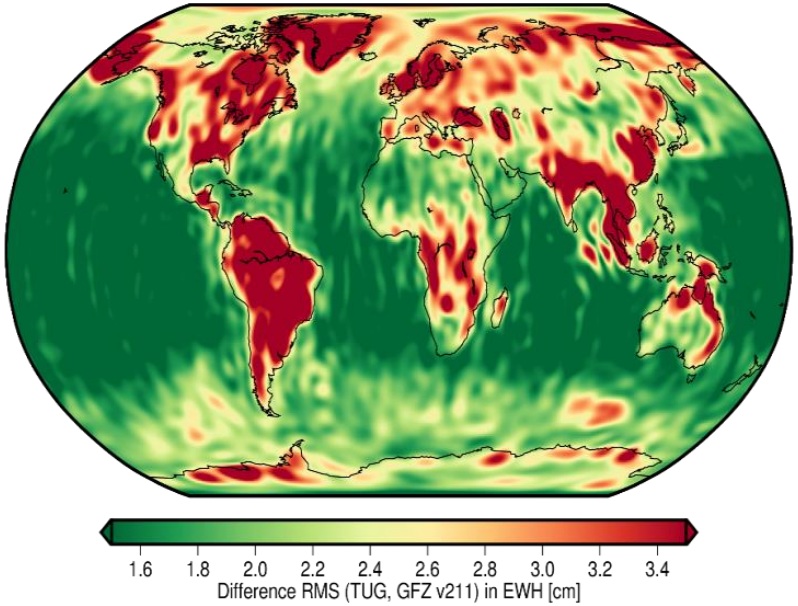
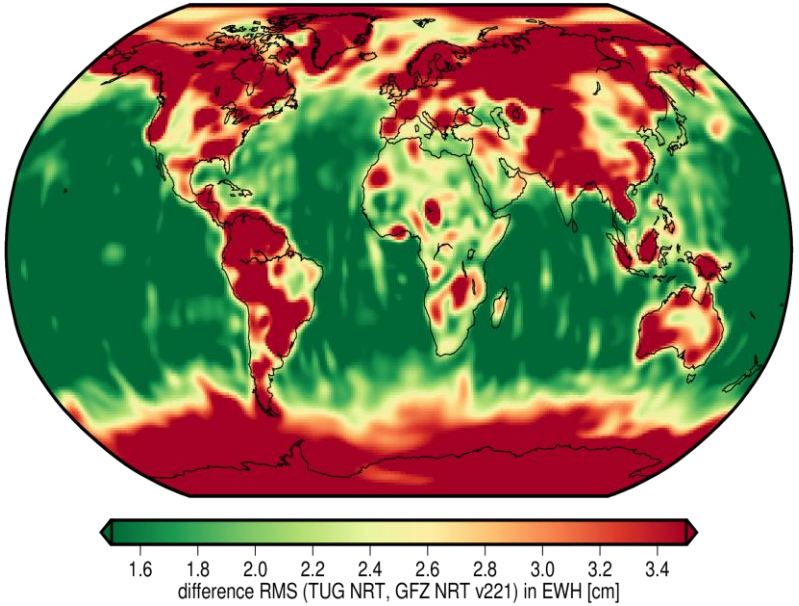
Daily updated solution (Near real-time with max. 5 days delay)

- Comparison of two approaches (TU Graz, GFZ)



Historical Time Series



NRT Time Series

WP6: Hydrological Service

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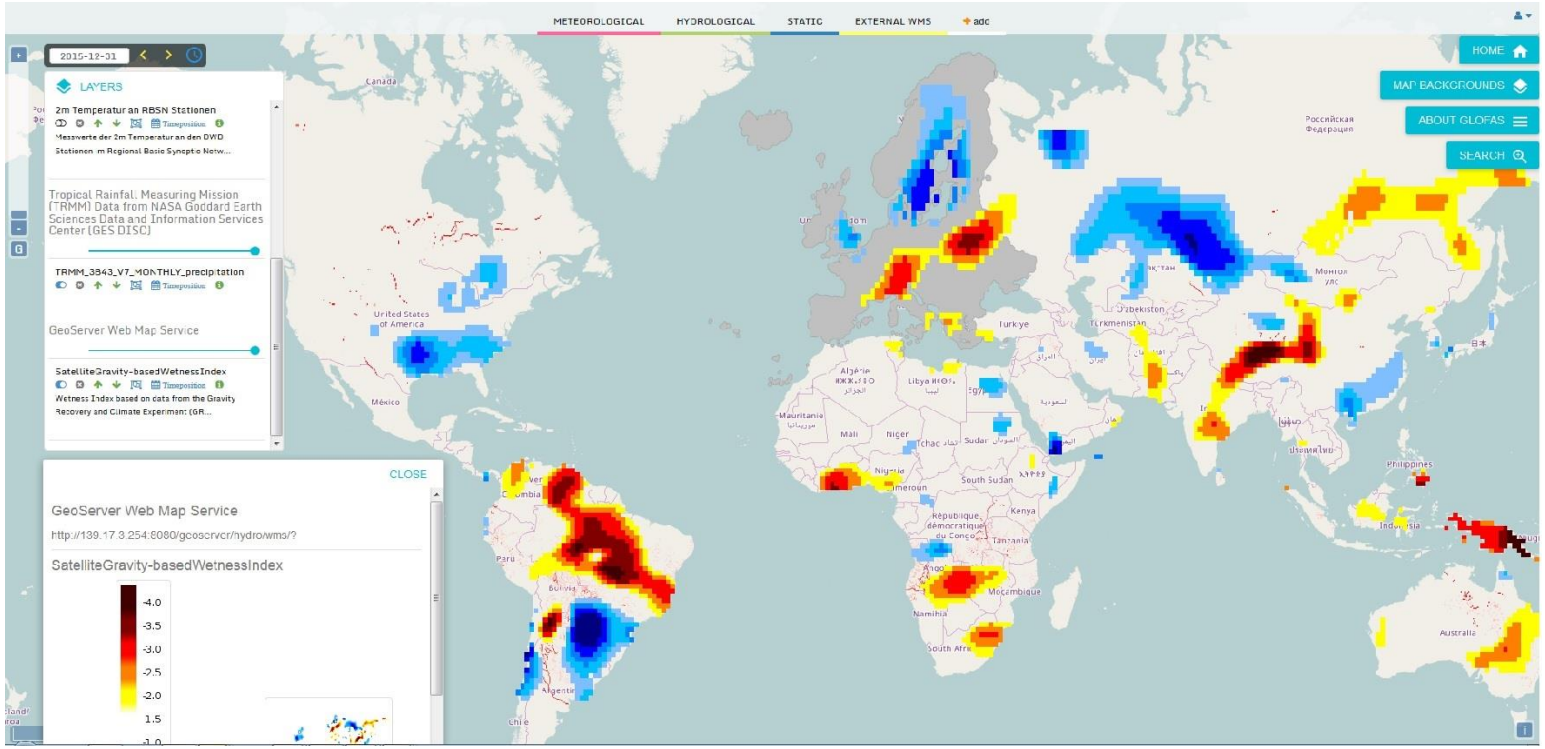
- Development of GRACE-derived flood indicators
- Integration into automatic flood emergency management services



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WP6: Hydrological Service

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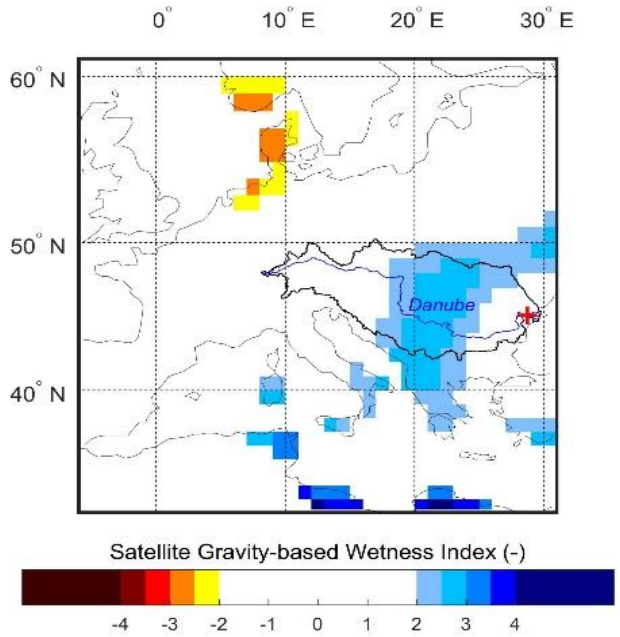
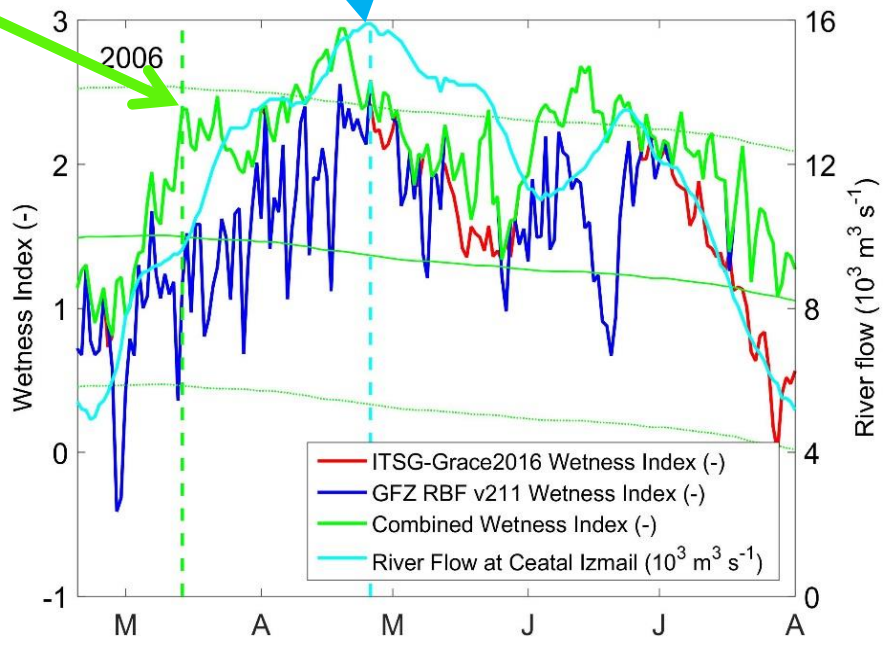
A first WI peak over the presumed threshold of 2 could be selected on 14 March, marked as a (green) vertical line. Leadtime of 43 days

River flow at Ceatal Izmail station at the outlet of the Danube Basin peaks on 26 April 2006.



14 March 2006



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WP6: Hydrological Service

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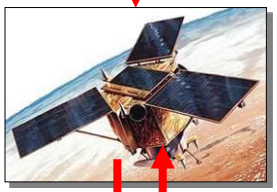
ZKI: Zentrum für satelliten-gestützte Kriseninformation

ZKI

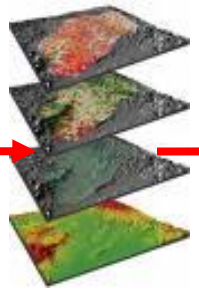
Alarm

Rapid Mapping Concept:
Improved Awareness due to Gravity-based Indicators



Data acquisition

Pre-processing



Analysis

Map Generation

Information

WP7: Dissemination and Exploitation

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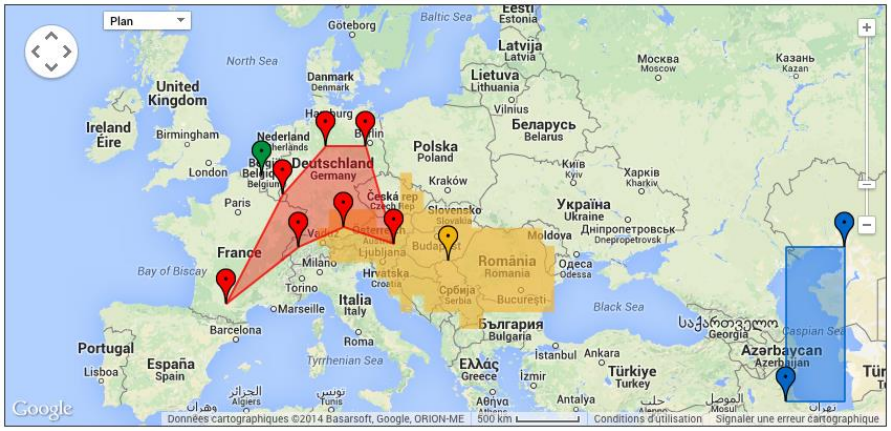
EGSIEM Plotter: Easy Visualization of GRACE Data

Data selection center, type, version…

Multiple possibilities for extraction areas, custom or predefined

Interactive plots

Series title	Data center	Version	Area	Address	Latitude	Longitude	Apply
Series 1	CNES/GRGS	RL03-v1	7-Heptagon	Bern, Switzerland	46.947922	7.444608	All
				Oberpfaffenhofen, Germa	48.074400	11.262200	
				Graz, Austria	47.070714	15.439504	
				Potsdam, Germany	52.390569	13.064473	
				Hannover, Germany	52.375892	9.732010	
				Luxembourg	49.815273	6.129583	
				Toulouse, France	43.604652	1.444209	
Series 2	GFZ	RL05-DDK5	Point	Brussels, European Comm	50.842317	4.370471	All
Series 3	CSR	RL05-DDK5	Danube	Danube basin	46.121053	19.994737	All
Series 4	JPL	RL05-DDK5	Rectangle	Iran, Province d'Ardabil	37.385404	48.373454	All
				Kazakhstan, District de Jy	46.937235	53.227348	



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WP7: Dissemination and Exploitation

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The EGSIEM Autumn School, 11–15 Sept 2017

WP7: Dissemination and Exploitation

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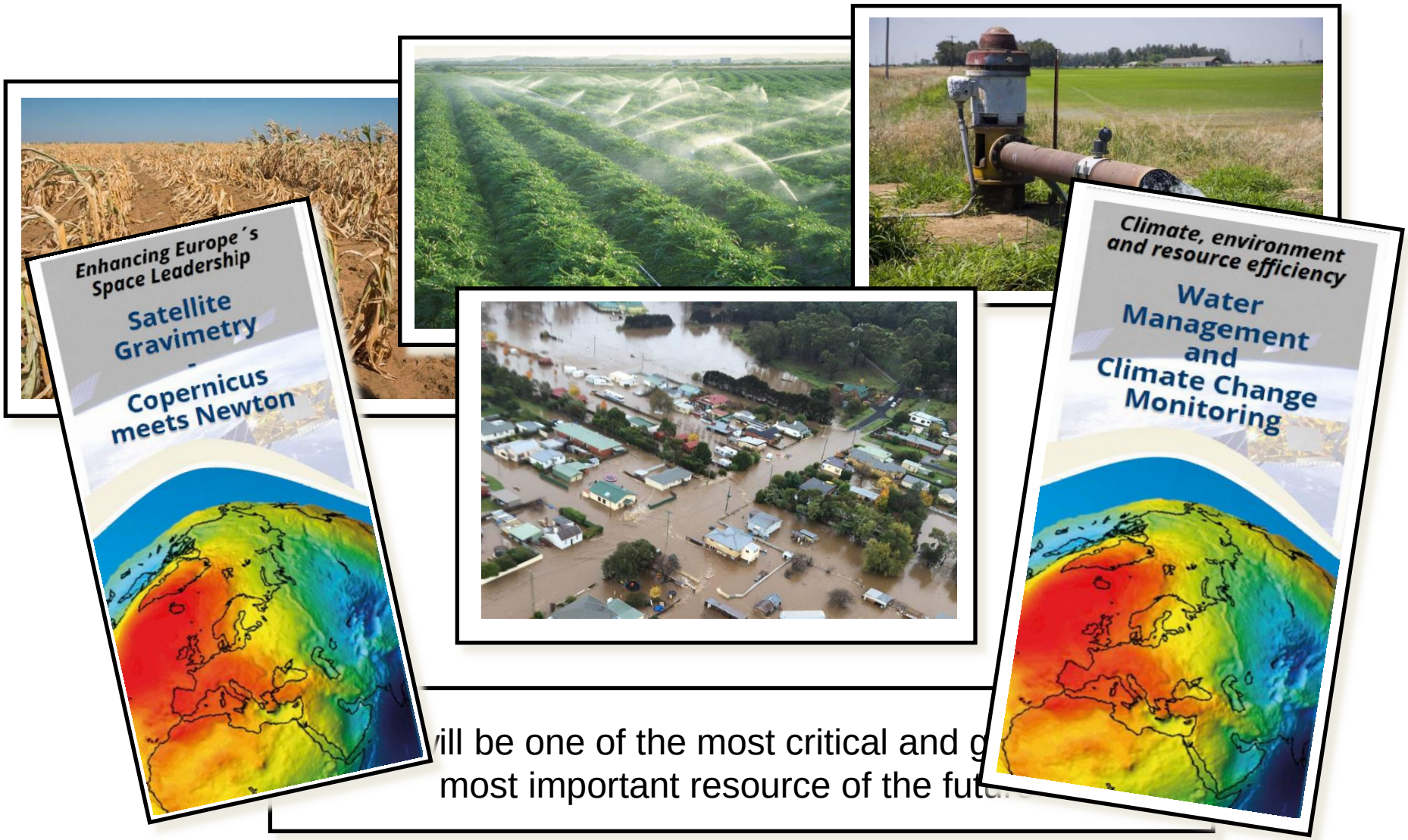

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most important resource of the futu

WP7: Dissemination and Exploitation

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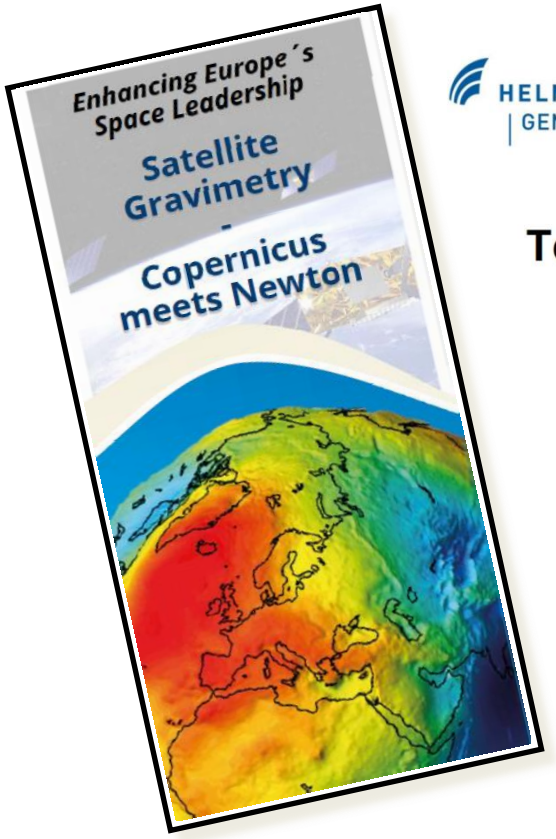

HELMHOLTZ GEMEINSCHAFT

GFZ Helmholtz Centre POTSDAM

SwissCore
Contact Office for European Research Innovation and Education

Tea Time Event on March 2nd, 2017

at
Helmholtz Brussels Office,

6th Floor, 98 Rue du Trone, 1000 Brussels

14.00 – 15.30

and other lobbying activities have been organized

The future of EGSIEM

European Gravity Service for Improved Emergency Management

IUGG IAG AIG International Association of Geodesy

International Association of Geodesy
of the International Union of Geodesy and Geophysics

President

Prof. Dr. Riccardo Barzaghi
Chair of IGFS

Potsdam, 2018-02-06

Ref.: your letter about the future COST-G Combination service within the IFGS

Dear Prof. Barzaghi,

From IAG side I fully support the procedure to establish COST-G as a Combination Service for Time-variable Gravity Field Solutions as a Product Center of the IFGS.

Sincerely yours,

Prof. Dr. Dr. h.c. Harald Schuh

- The EGSIEM Scientific Combination Service shall continue as **COST-G** (**CO**mbination **S**ervice of **T**ime-variable **G**ravity field solutions). COST-G will be a Product Center of the International Gravity Field Service (**IGFS**) of the International Association of Geodesy (**IAG**).
- Full support is given by the IGFS chair and the IAG president.

Many Thanks to

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European Commission

for funding EGSIEM 2015-2107.

Many thanks to

EGSIEM

European Gravity Service for Improved Emergency Management

the entire EGSIEM Team, the Advisory Board Members, the Project Officers, the Reviewer

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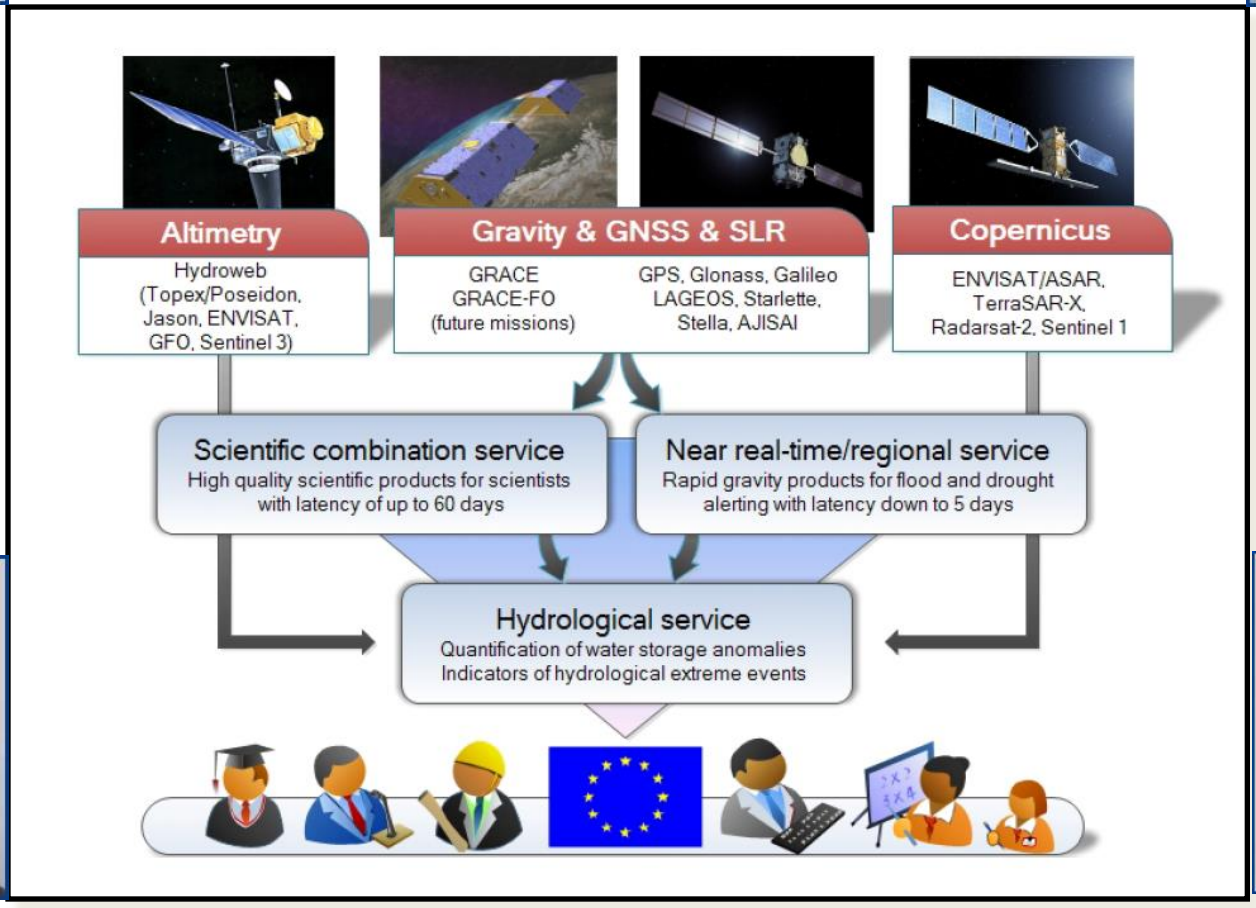

Special thanks in particular to my colleagues from the EGSIEM Executive Board

And last but not least

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Many thanks to Keith Cann-Guthauser, the EGSIEM Administrator