H SAF
Support to Operational Hydrology and Water Management

IMGW

H-SAF hydro-validation programme

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Workshop on hydrological modelling, forecasting and warnings
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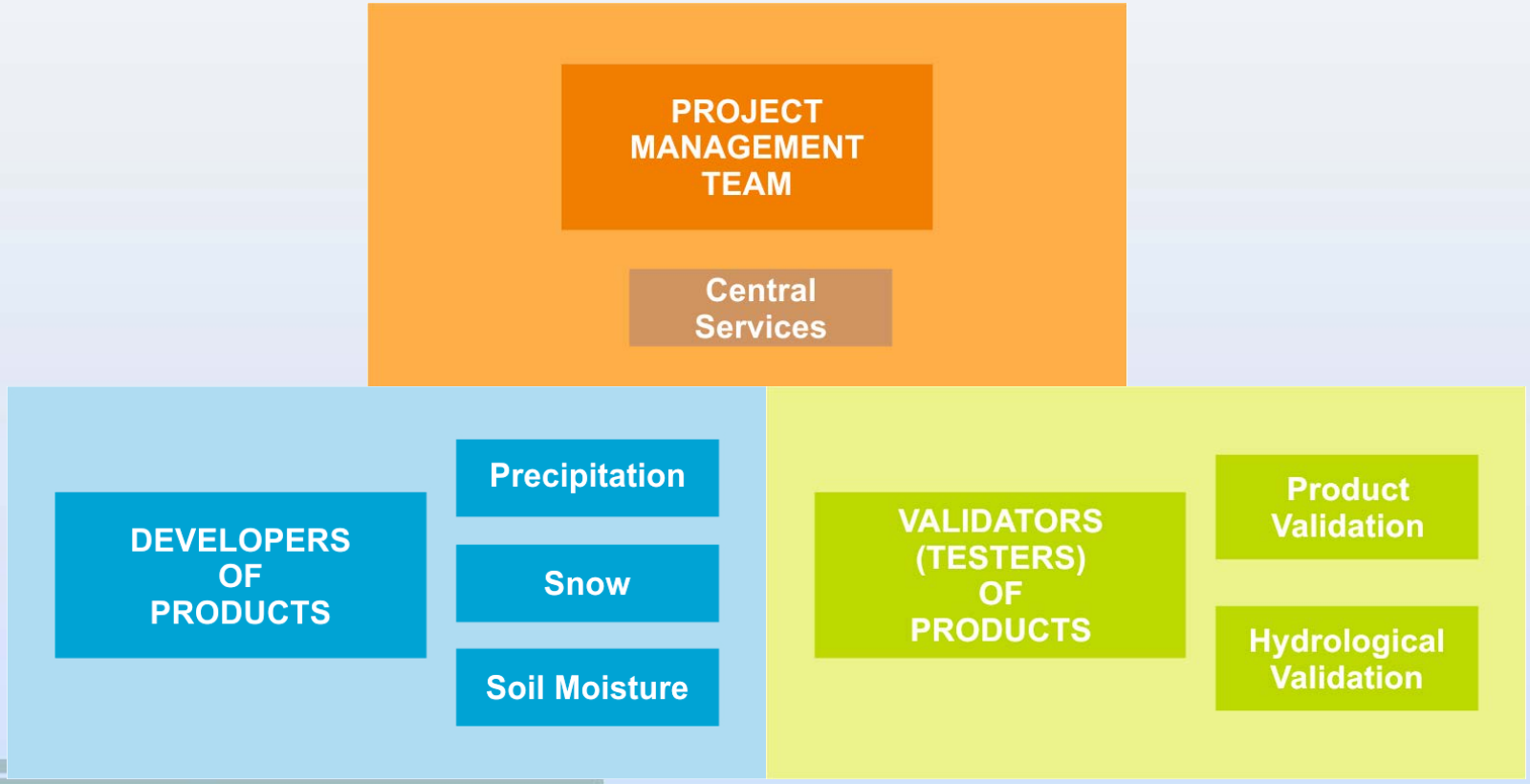
Content

- overview of the programme
- common tasks
- specific applications for different products
- case-studies

Hydrological SAF and the place of HV

H-SAF:

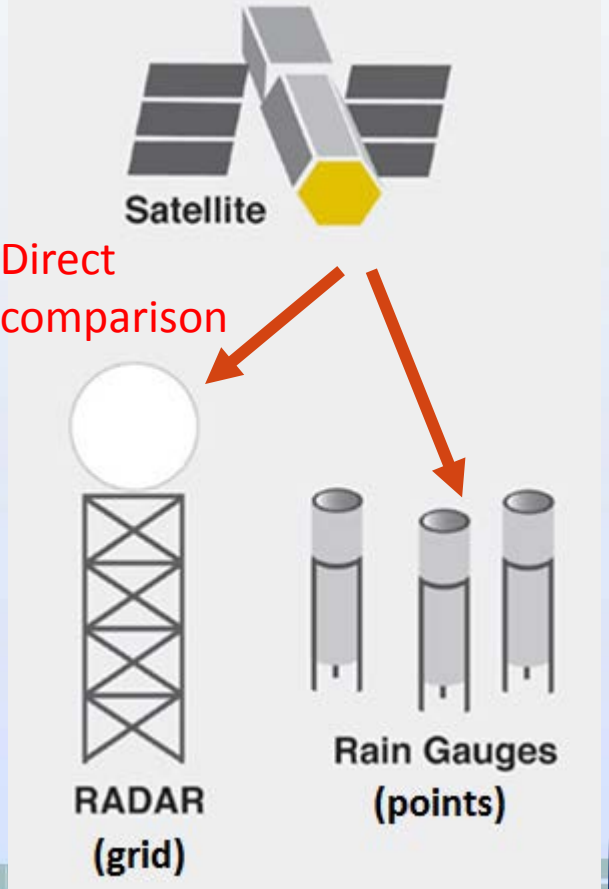
Satellite Application Facility on suport to operational hydrology and water management

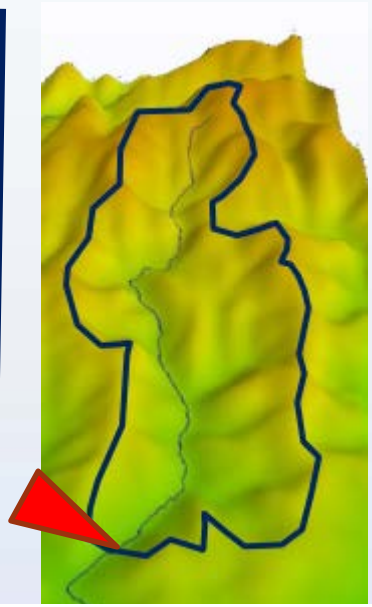


Product validation vs. Hydrological Validation

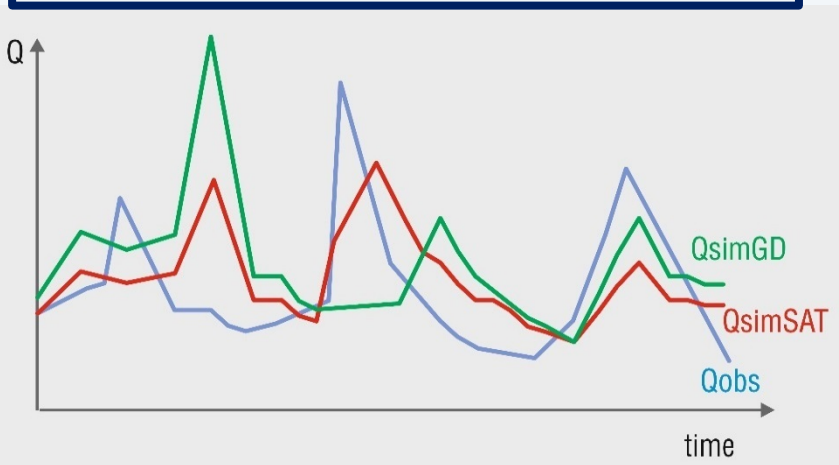
What is treated as a **"ground truth"** or **"reference data"?**

Product validation

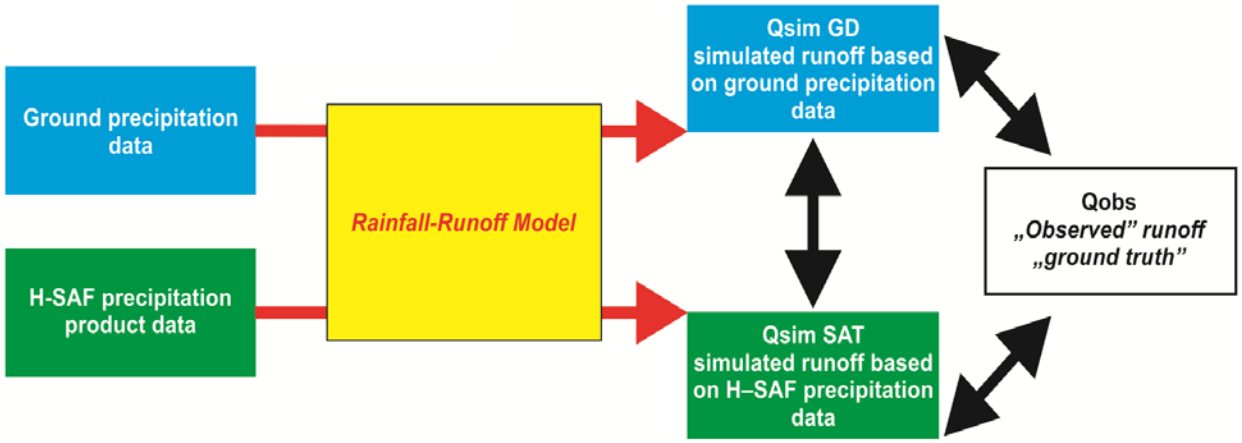




Hydrological validation



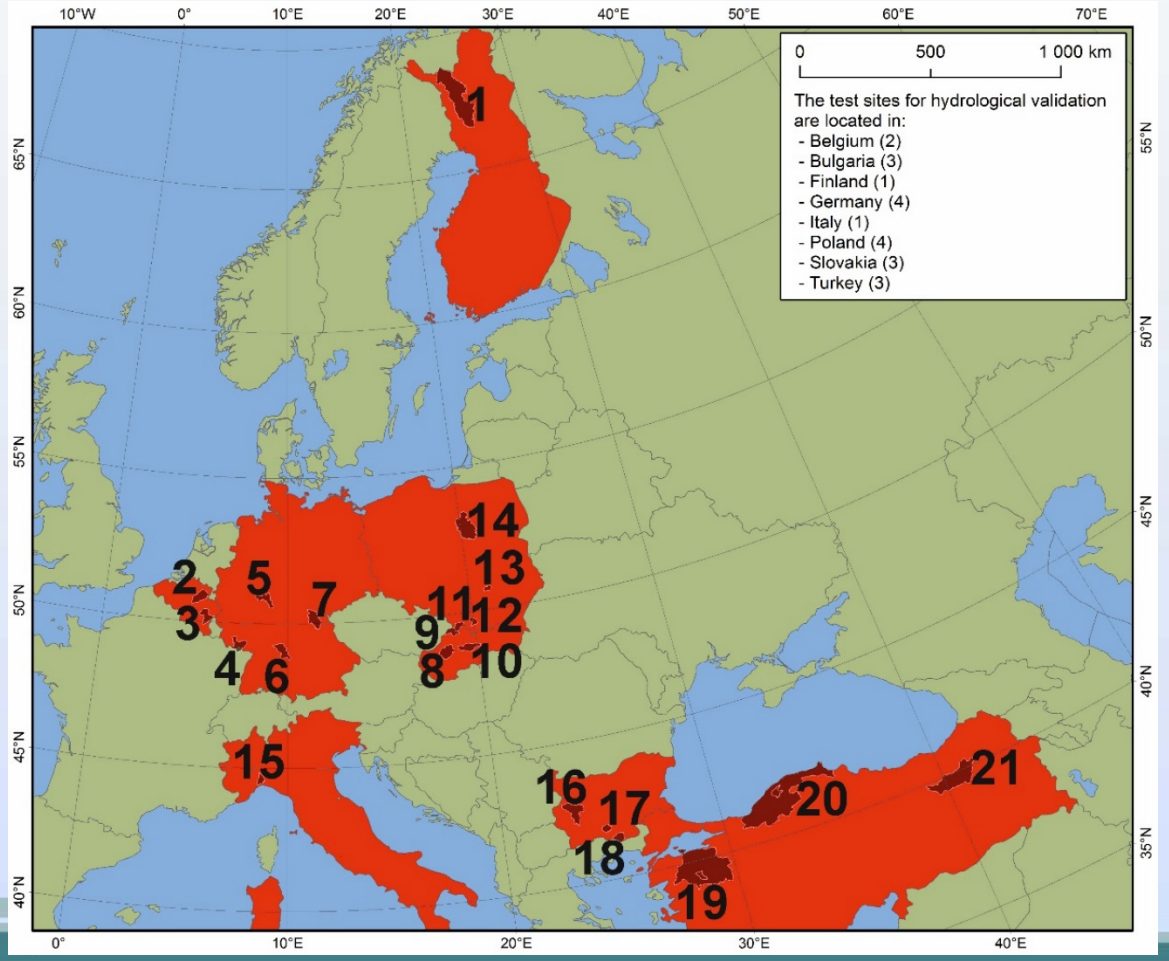
Indirect comparison, end user point of view



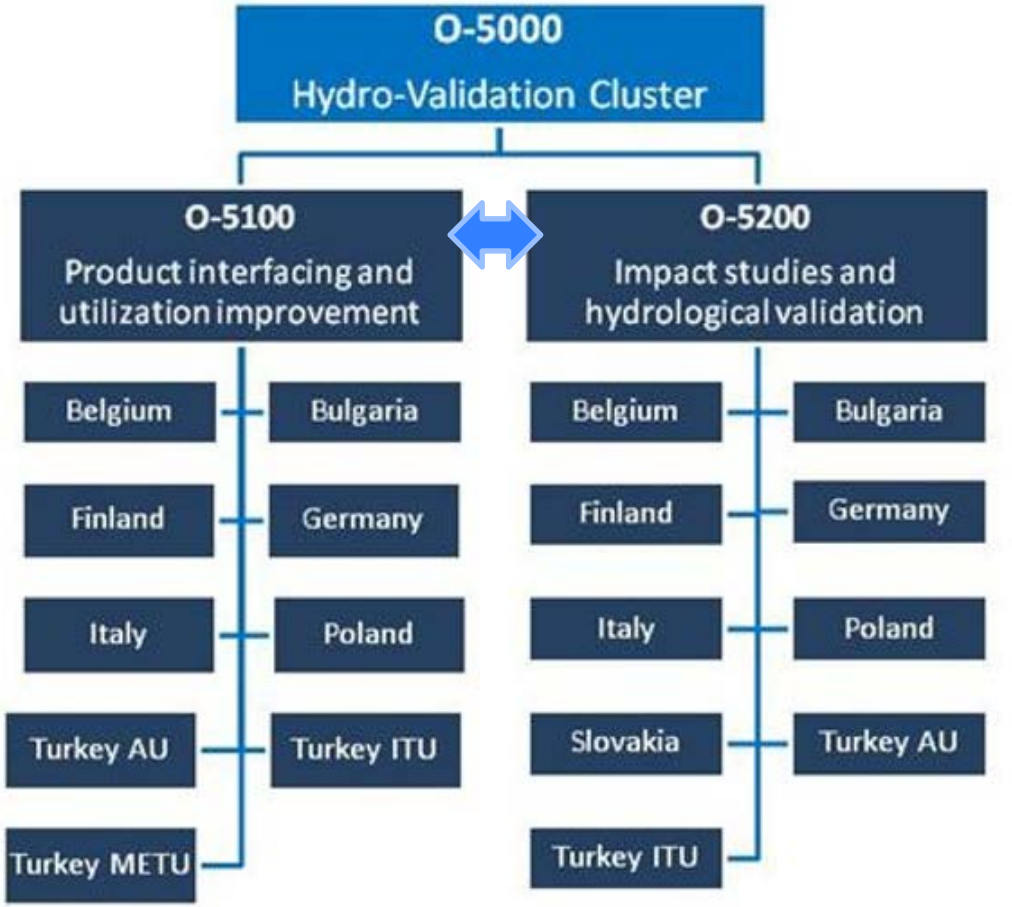
Test sites and models

Country	Basin	Model
Finland	Ounasjoki	HOPS
	Simojoki	
	Kiiminkijoki	
Belgium	Demer-Scheldt	SCHEME
	Ourthe-Meuse	
Germany	Blies	HBV
	Lahn	
	Kocher	
	Main	
Slovakia	Nitra	Hron-NAM
	Kysuca	
	Hron	HBV
Poland	Soła	
	Raba	
	Wkra	
	Czarna	
Italy	Orba	Continum
Bulgaria	Iskar River	ANN
	Chepelarska	Isba-Modcou
	Varbica river	Mike-11/NAM
Turkey	Killi	ANN
	Ulus	
	Karasu (Upper Euphrates)	SRM
		HBV

Ounasjoki (no 1), Demer-Scheldt (no 2), Ourthe-Meuse (no 3), Blies (4), Lahn (5), Kocher (6), Main (7), Nitra (8), Kysuca (9), Hron (10), Soła (11), Raba (12), Czarna and Lagowianka (13), Wkra (14), Orba (no 15), Iskar River (no 16) , Chepelarska (no 17), Varbica river (no 18), Killi subbasin in Susurluk Basin (19), Ulus subbasin in Western Black Sea Basin (20), Upper Euphrates (21, Karasu)



HV Structure and the main tasks



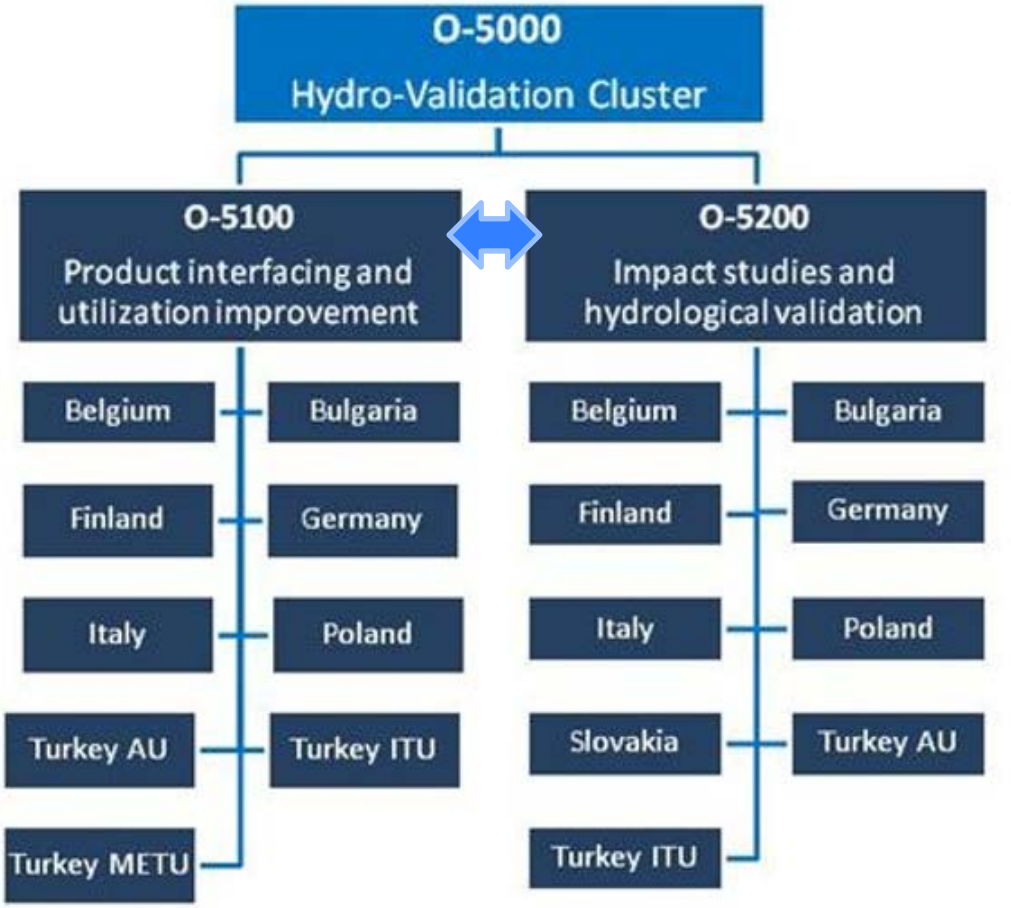
How to achieve better results of simulated discharge when using H-SAF products in the hydrological applications?

OE 5100

Product interfacing and utilization improvement

- Development of tools to assimilate soil moisture and snow cover products to hydrological models
- Tools (methods) for product correction /blended products
- Sensitivity analysis – influence of each product on final output data
- Perform the analysis of possible product utility for hydrological tasks
- Development of tools (software) for data format conversion acceptable by hydrological models

HV Structure and the main tasks



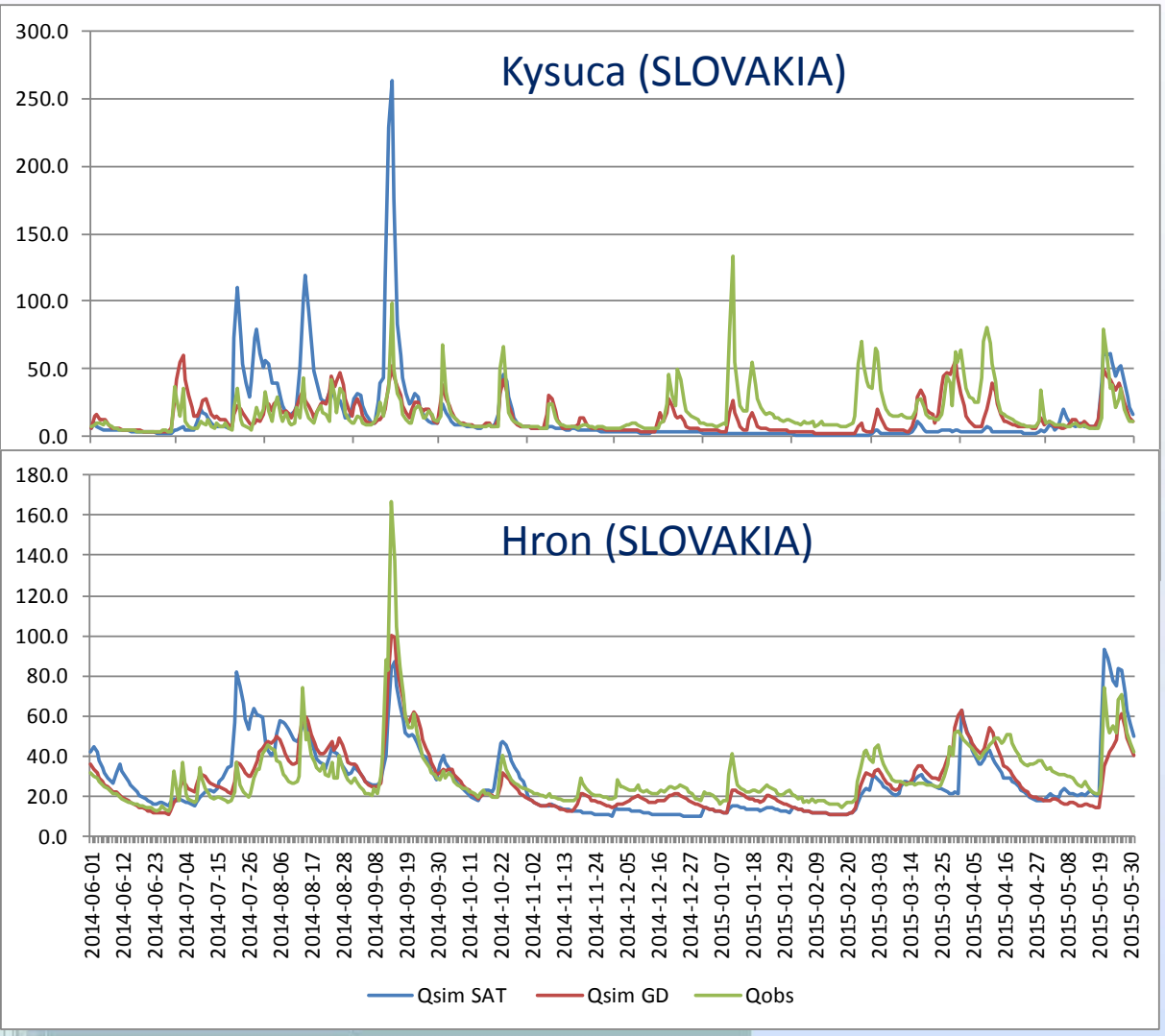
WP O 5200

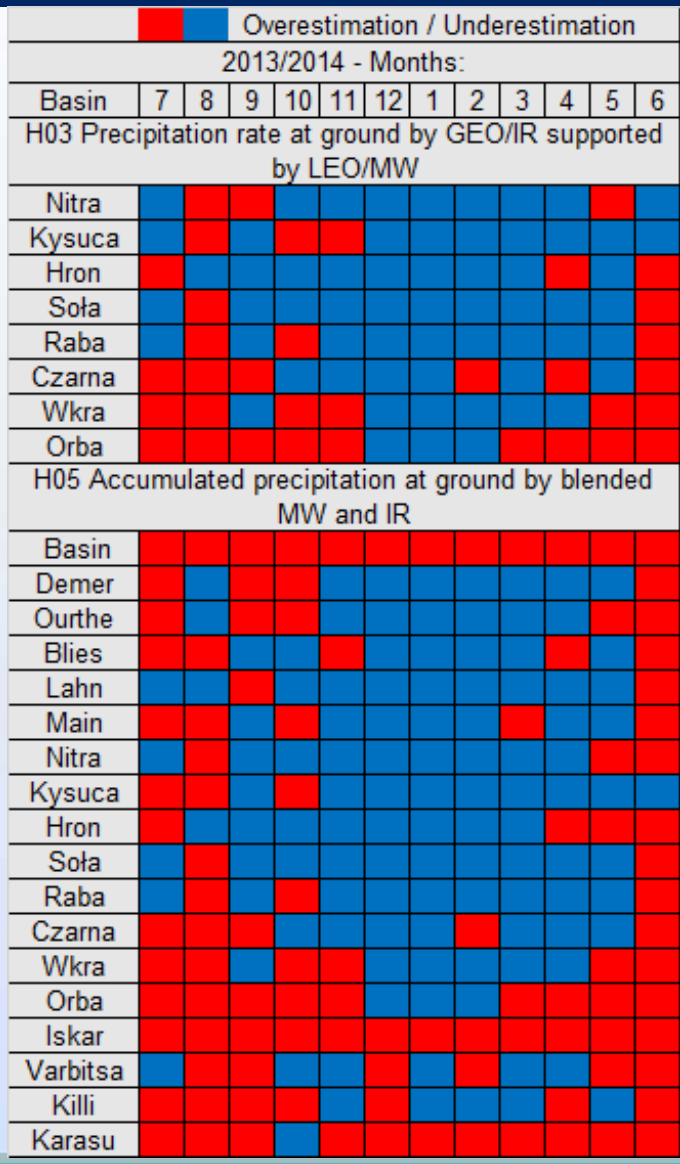
Impact studies and hydrological validation

- Hydrological validation of Products
- Product data assessments and model calibration
- Case studies

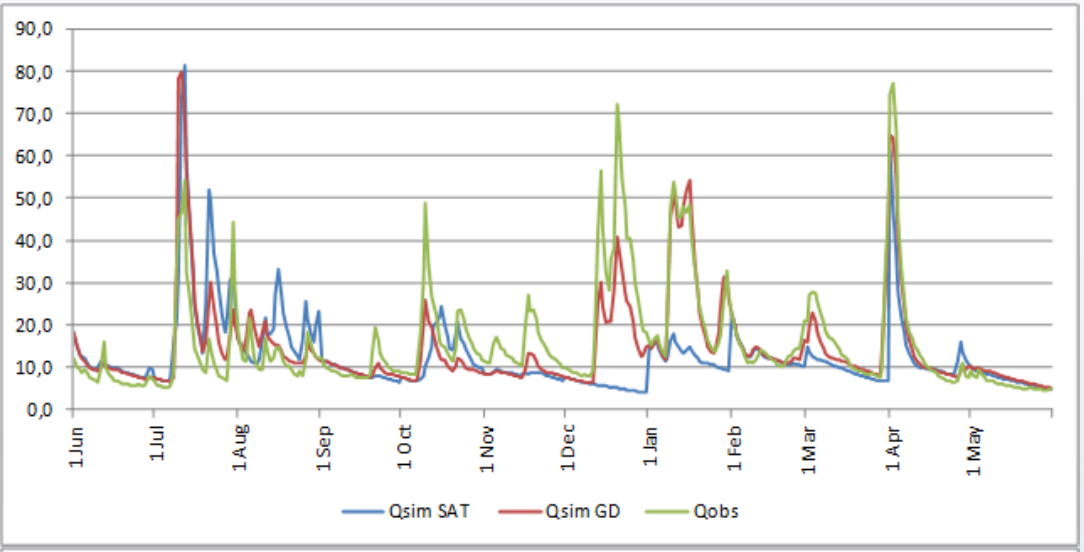
How to assess H-SAF products?

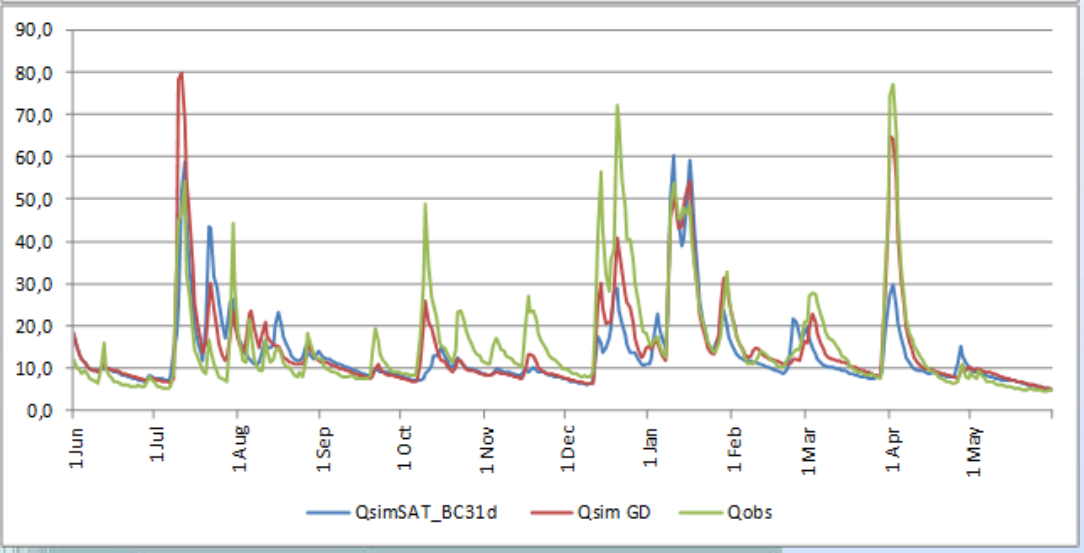
Precipitation products





Precipitation products: BIAS corr





River Lahn 1 (Germany)

Soil Moisture Products

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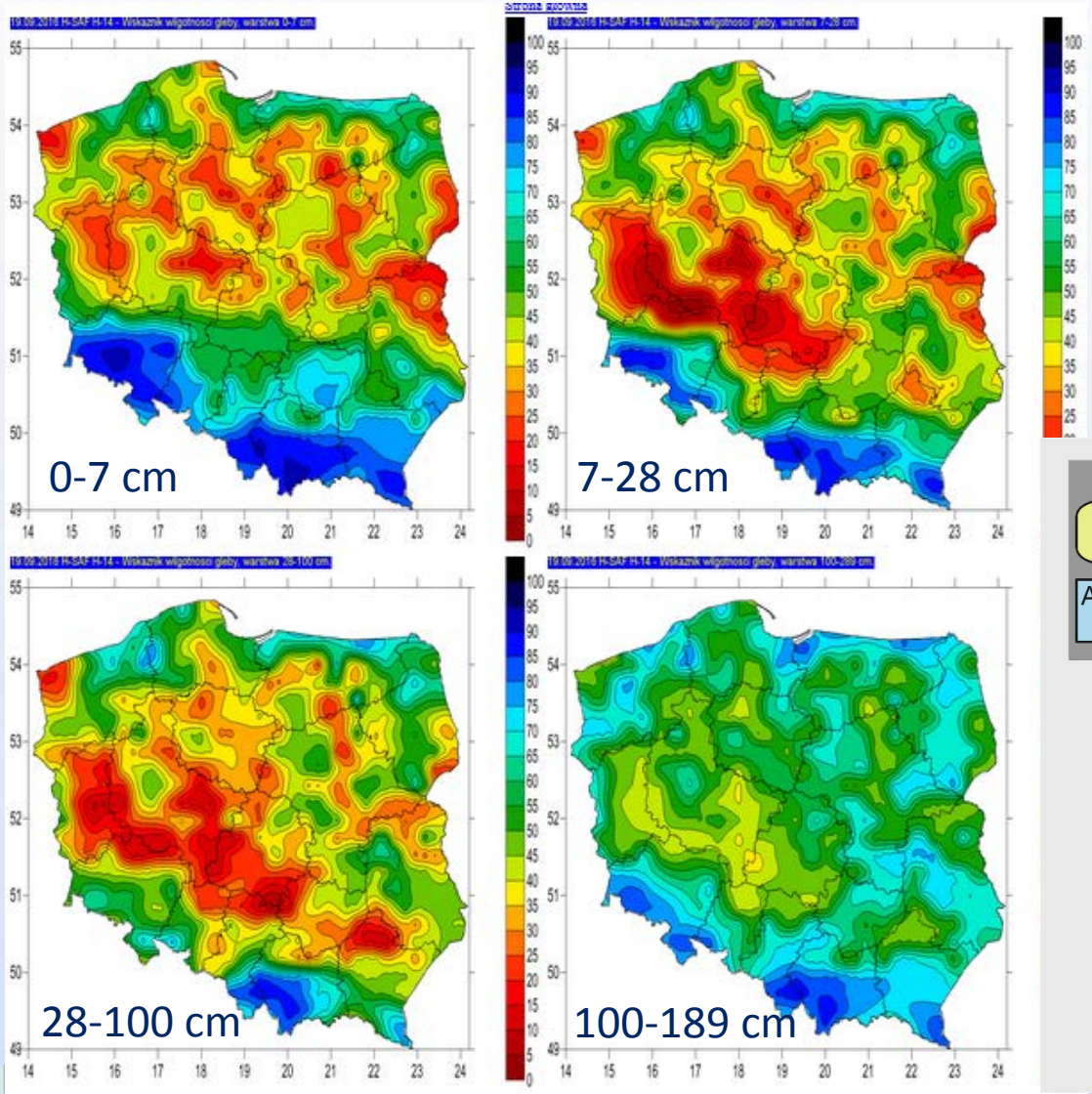
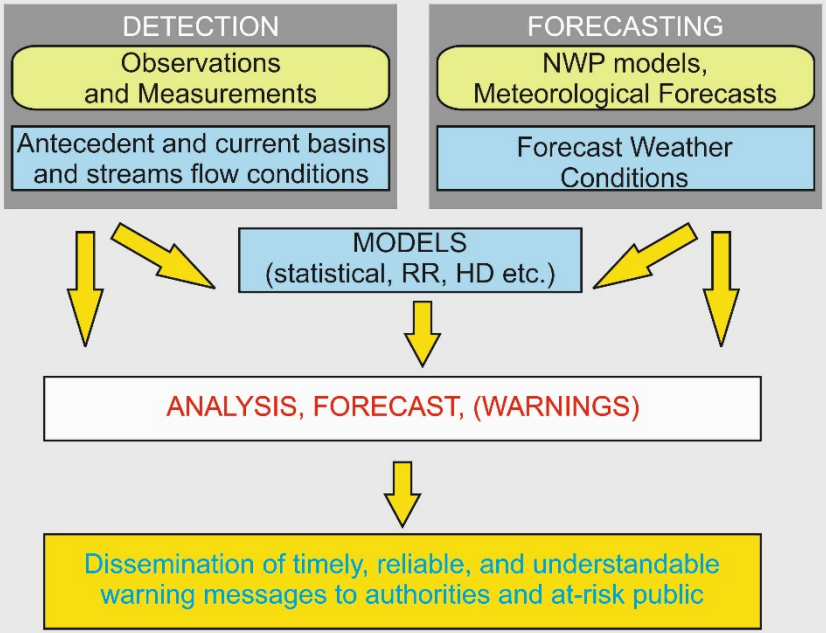


H08
Small scale surface soil moisture by radar scatterometer

H14
Profile Index in the roots region by scatterometer data assimilation



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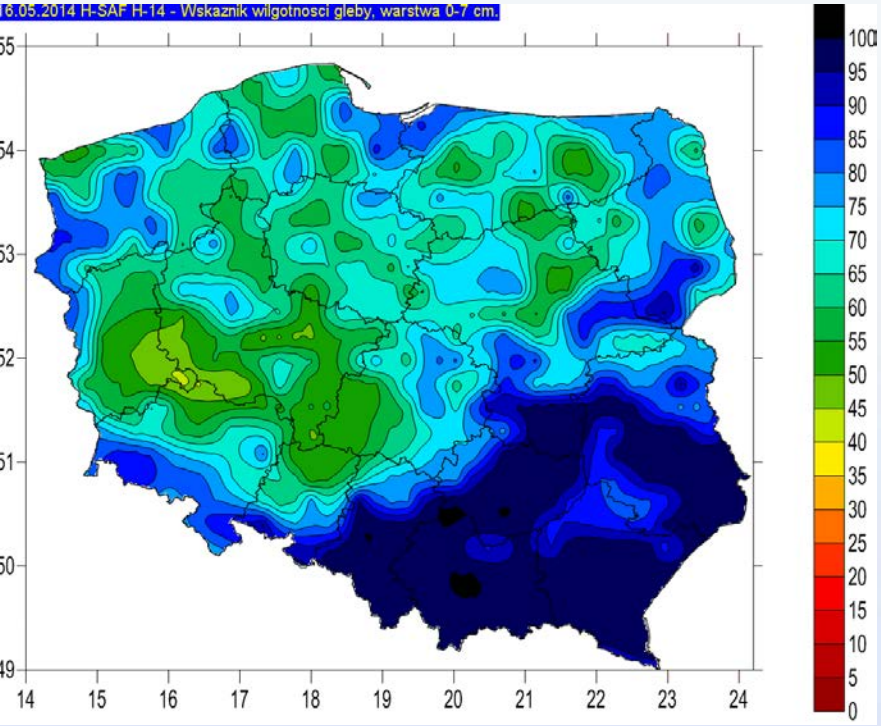
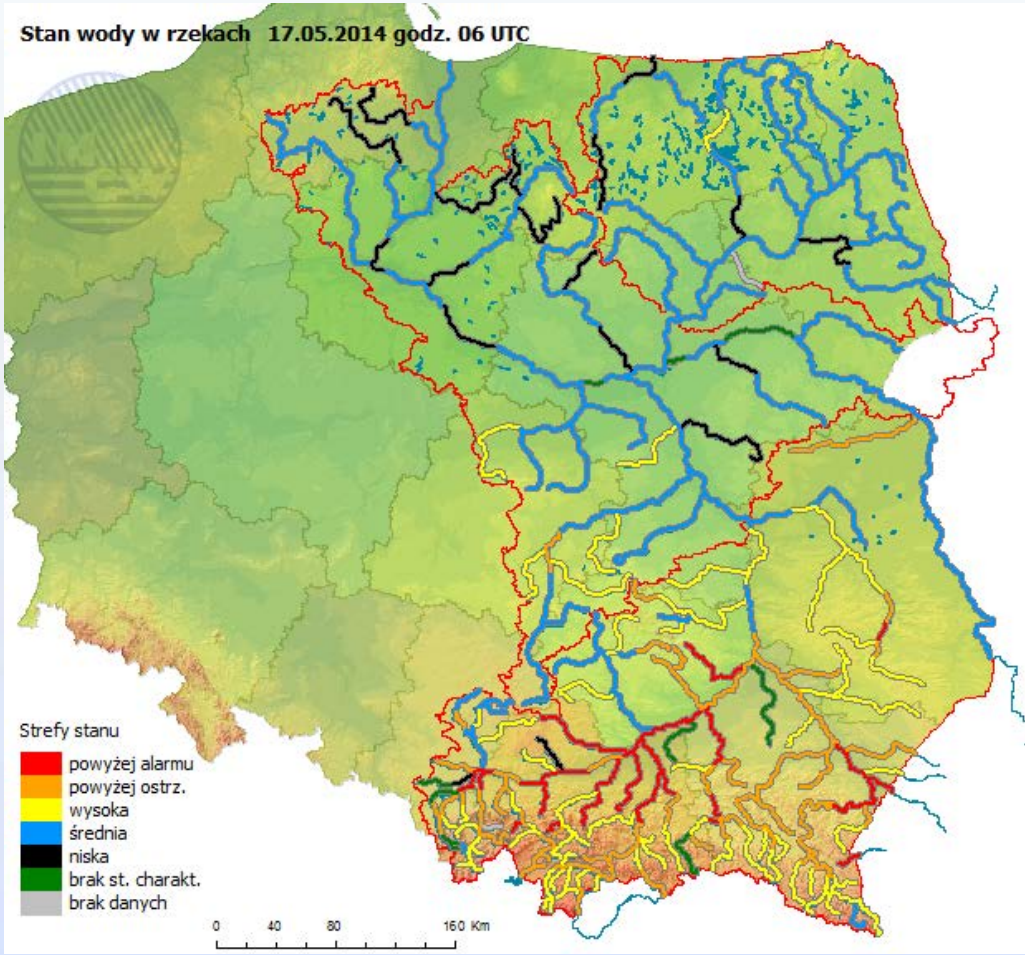
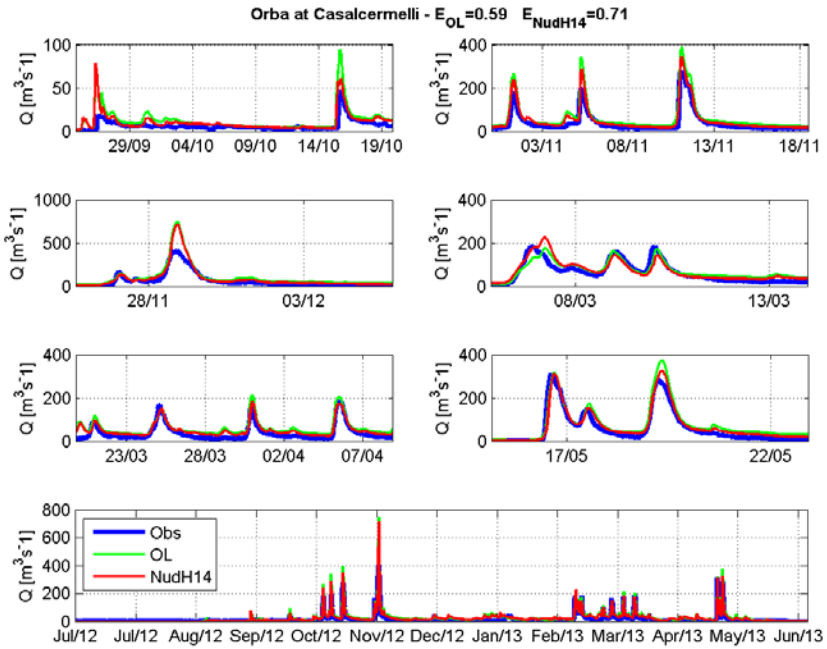
Soil Moisture Products





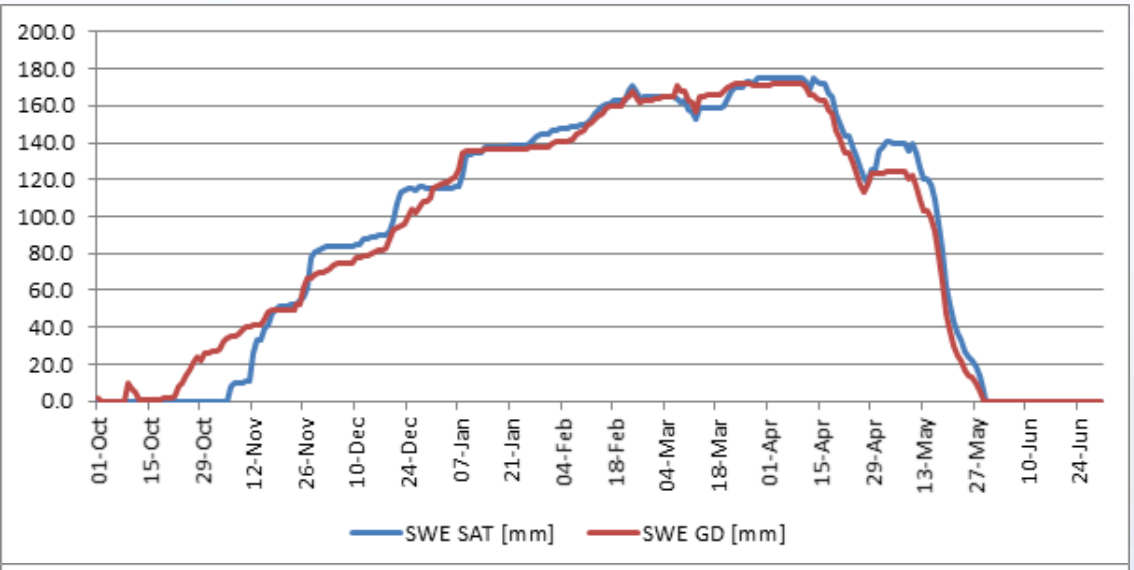
Soil Moisture Products

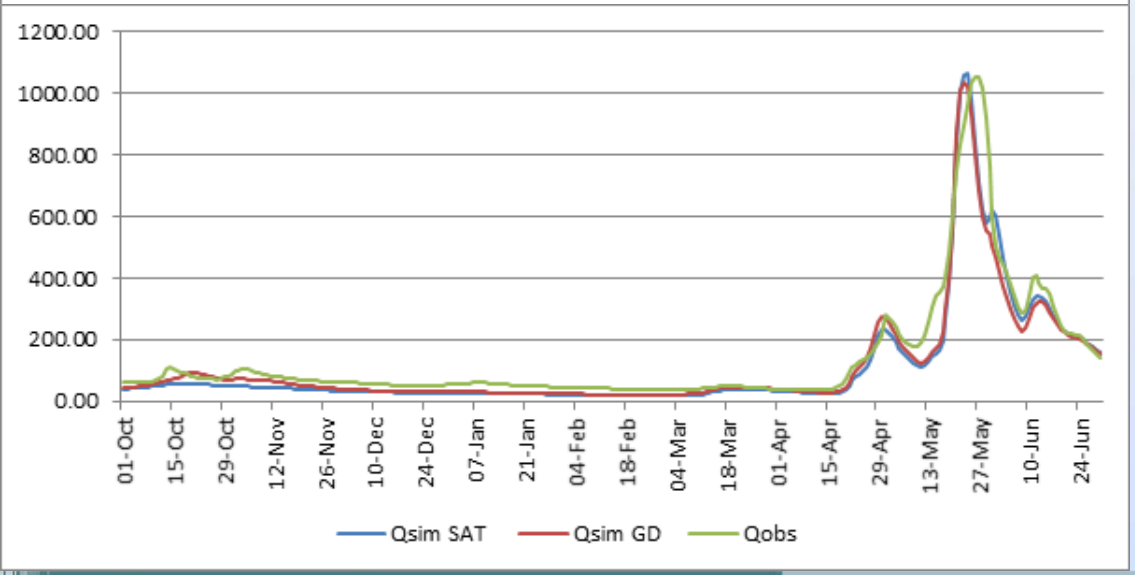
- resamping at the model resolution
- calculating a mean of layers SM
- time series rescaling in order to correctly perform DA
- Assimilation scheme (Orba > nudging scheme; CIMA)



RMSE	2012 / 2013												
	7	8	9	10	11	12	1	2	3	4	5	6	Year
QsimGD - Qobs [m^3/s]	0.49	1.76	6.92	9.89	44.07	19.91	24.53	11.57	24.91	17.03	21.56	5.85	19.95
QsimSAT - Qobs [m^3/s]	0.49	1.76	6.22	6.59	35.21	14.62	24.25	14.22	22.61	13.21	17.36	3.69	16.70
	2013 / 2014												
QsimGD - Qobs [m^3/s]	0.33	2.40	6.50	23.46	21.43	45.40	29.86	34.89	22.93	3.47	6.80	0.95	20.55
QsimSAT - Qobs [m^3/s]	0.29	1.95	5.32	23.52	23.77	44.19	20.61	33.17	19.41	3.92	8.80	0.85	21.96

Key points from hydrological validation of snow product H13

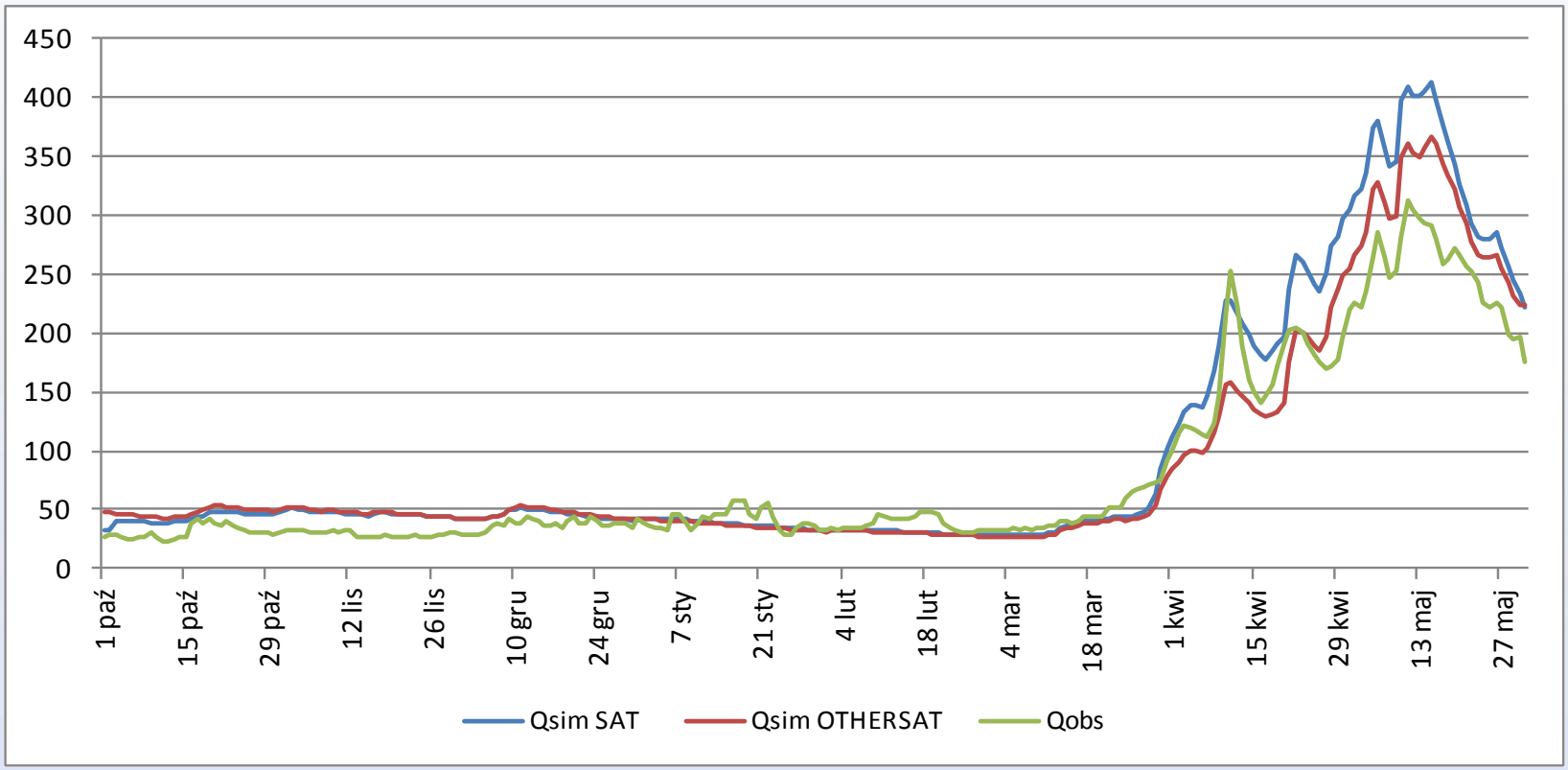




Ounasjoki

Key points from hydrological validation of snow mask H10 product - SRM

2014/2015



Key points from hydrological validation of snow mask H10 product – HBV DA, Karasu, AU

- Lead time accuracy is improved by data assimilation (MHE) with H10 snow cover data.
- State updates with Upper Zone also improves the lead time accuracy, but improvement in the further lead times is better with H10 DA
- DA with all states and H10 product, greatly improves the earlier lead time

Run	RMSE			R2			NS		
	Lead time			Lead time			Lead time		
	1d	2d	3d	1d	2d	3d	1d	2d	3d
Without DA	19.12	19.16	19.19	0.972	0.972	0.972	0.942	0.942	0.942
With DA - SCA	15.91	18.19	19.26	0.983	0.977	0.974	0.960	0.948	0.942
With DA – Upper Zone etc.	14.24	17.64	19.48	0.986	0.977	0.971	0.968	0.951	0.940
With DA (ALL)	11.14	16.77	18.91	0.990	0.978	0.972	0.980	0.956	0.944

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Thank you

- We kindly invite you to collaborate with us!