

Advanced Global Navigation Satellite Systems tropospheric products for monitoring severe weather events and climate (GNSS4SWEC)



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IGS Workshop 2014, 23-27/06/2014 Pasadena, CA, USA

GNSSMet

Europe

Why

ES1206

WG1

AGNSS

WG1 Y1

WG2

GNSS4SWE

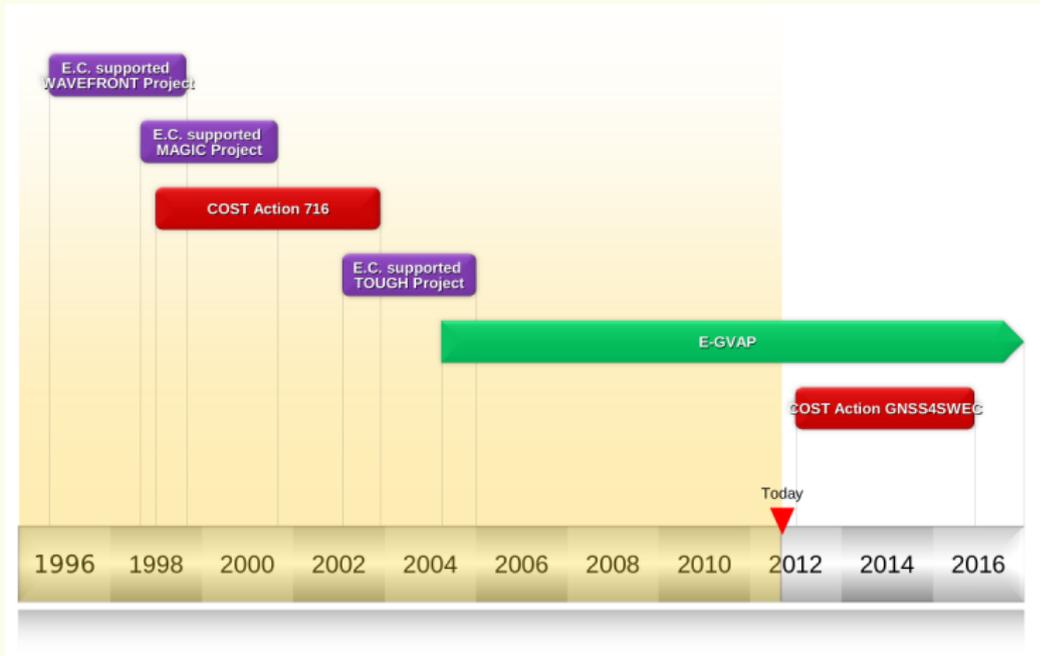
WG2 Y1

WG3

GNSS4C

WG3 Y1

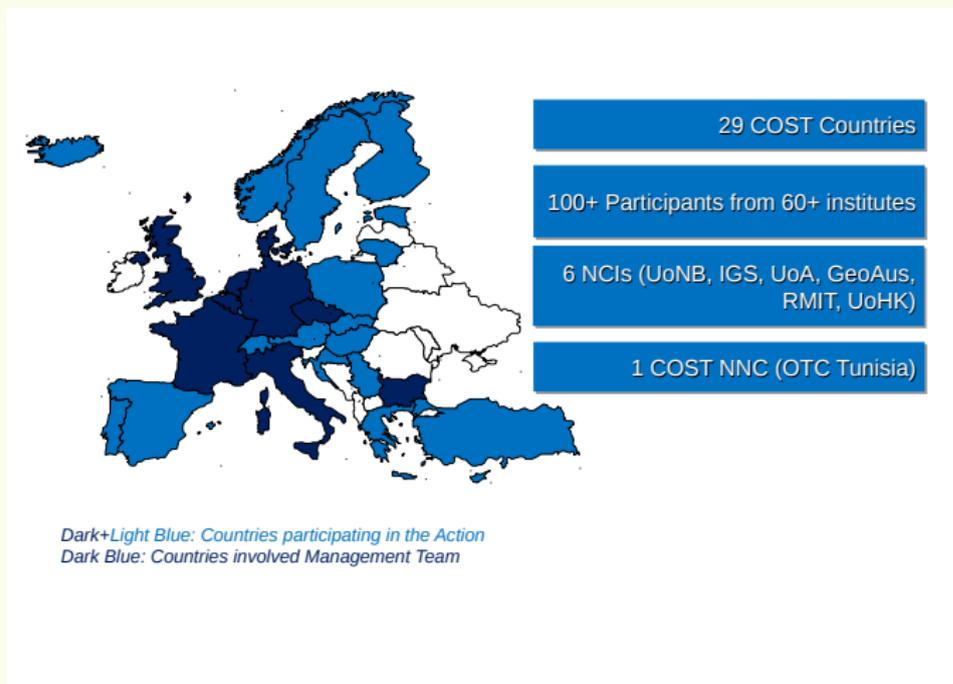
2014-2015



source: J. Jones, COST DC hearing, Brussels, September 2012

- GNSS tropospheric products
 - GNSS Meteorology processing is essentially **GPS processing only**
 - tropospheric gradients and/or slant delays produced; **not used in NWP**
 - network solution eliminating GNSS receiver and satellite clock errors in double difference
 - GNSS tropospheric product coverage - very good in West Europe; **poor in East and Southeast Europe**
 - NWP data used in Vienna Mapping Function concept
- GNSS and weather forecasting (E-GVAP-NOAA)
 - 18 national Met-offices and 17 AC members of E-GVAP;
 - GNSS data assimilated in NWP models in UK, Netherlands, France, ECMWF
 - over 1800 ground-based GNSS stations in Europe, over 2000 Europe and USA
 - GNSS tropospheric products mainly **ZTDs with hourly update**
 - impact on very short range forecasting (nowcasting) of precipitation/thunderstorms
- GNSS and climate
 - IGS and EUREF repro 1 tropospheric products available and repro 2 in the pipeline
 - validation of NCEP model - good seasonal and inter-annual variations of IWV
 - NCEP model - IWV underestimation with 40 % in tropics and 25 % in Antarctica
 - linear IWV trends
 - Global scale trend: -1.6 to $+2.3$ $\text{kg}/(\text{m}^2 \cdot \text{decade})$
 - **trend uncertainty: 0.2 to $+1.5$ $\text{kg}/(\text{m}^2 \cdot \text{decade})$**

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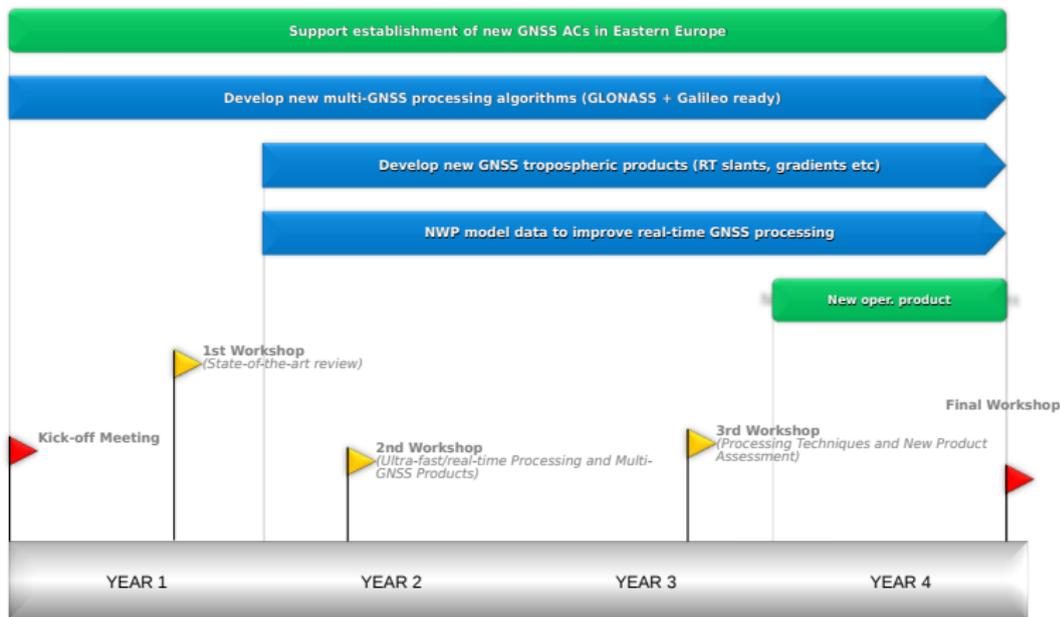
WG2 Y1

WG3

GNSS4C

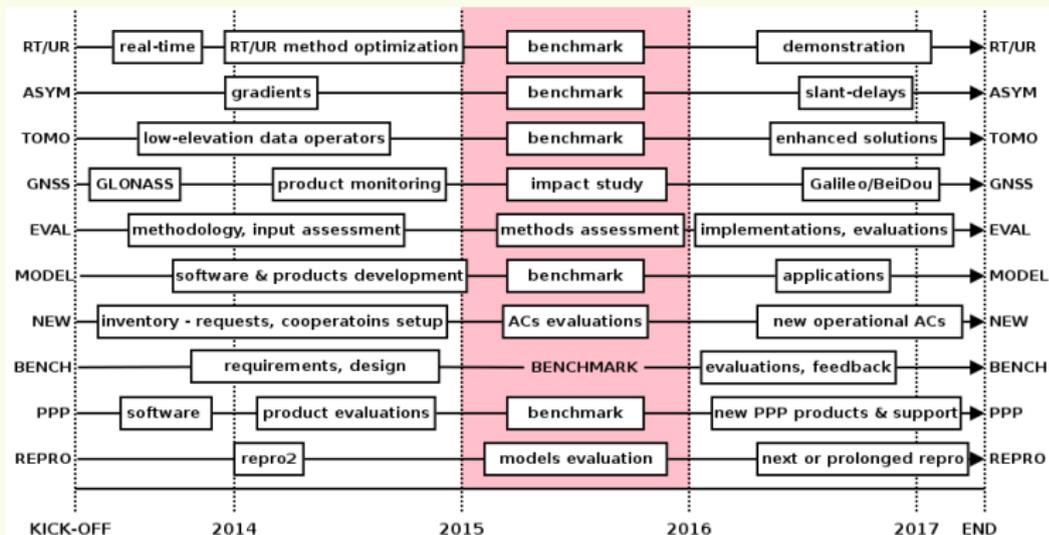
WG3 Y1

2014-2015



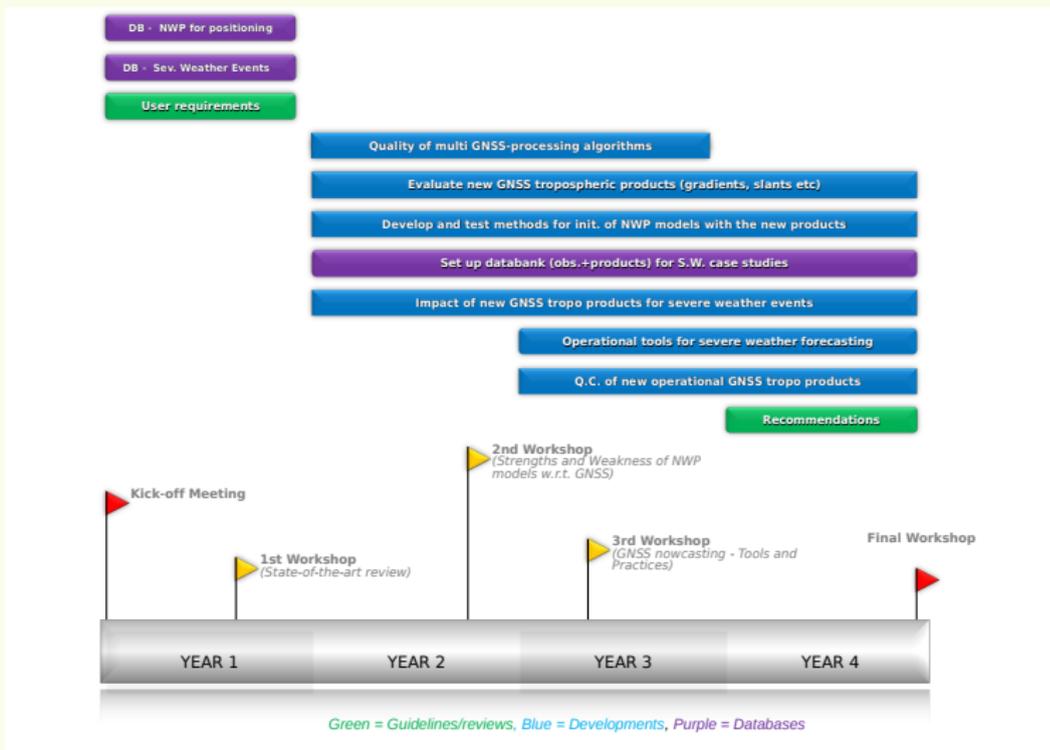
Green = Guidelines/reviews, Blue = Developments, Purple = Databases

- 4 AC implemented Ultra Rapid/Real Time processing strategies
- 3 AC implemented first level multi GNSS processing (GPS+GLONASS)
- 7 new AC from 7 EU countries established
- added over 130+ new stations to the operational European GNSS network
- strong correlation between GNSS and NWP

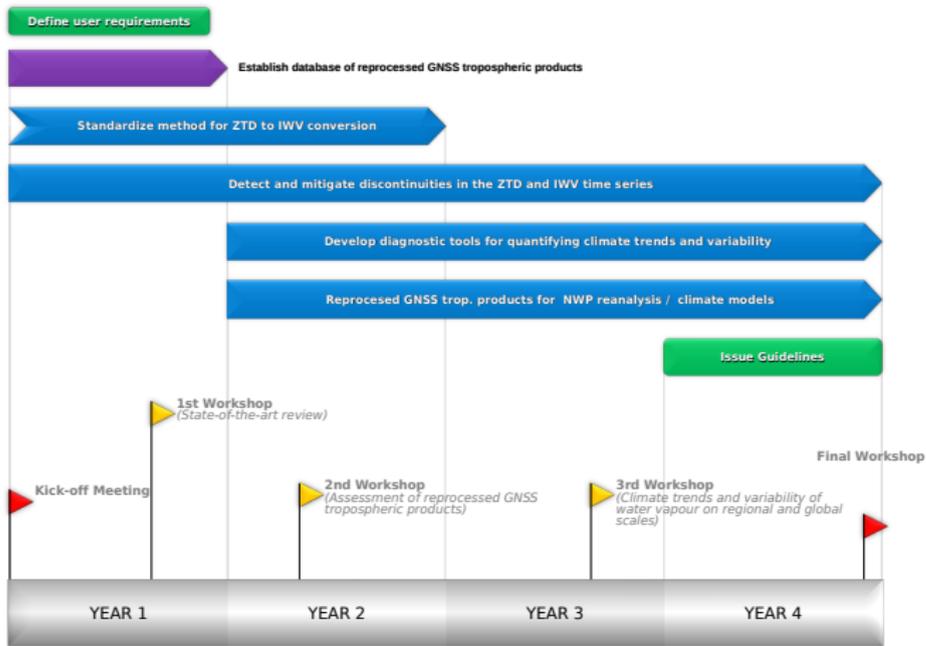


Working Group 2: GNSS for high resolution NWP and severe weather forecasting

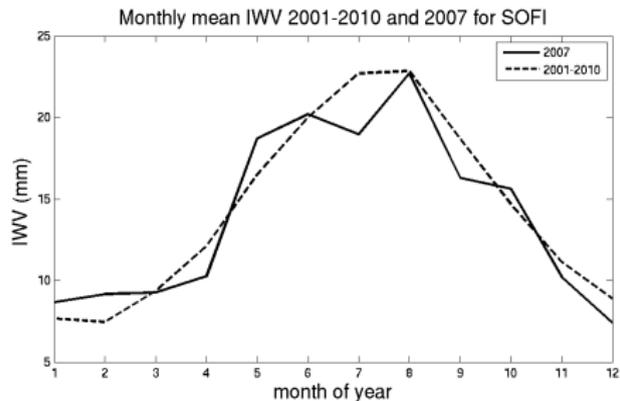
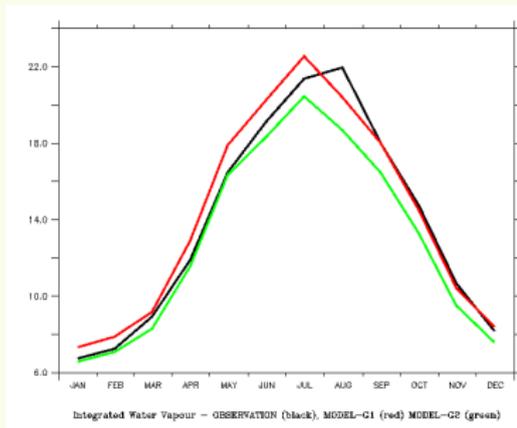
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- inventory reprocessed GNSS products
- review of ZTD to IWV conversion
- global database for GNSS+RS comparison with climate data (GOP)
- first studies with climate models
- ongoing GNSS data homogenisation with the TIGA data-set (GFZ)



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2014-2015

- First COST ES1206 Workshop - 26-28 February, Munich, Germany & International Symposium on Data Assimilation
- First COST ES1206 Summer school and Working Group meeting - 8-13 September 2014, Bulgaria
- Second GNSS4SWEC workshop, May 2015, Greece
- <http://gnss4swec.knmi.nl/>



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