

COST Action ES1206: Advanced Global Navigation Satellite Systems tropospheric products for monitoring severe weather events and climate (GNSS4SWEC)

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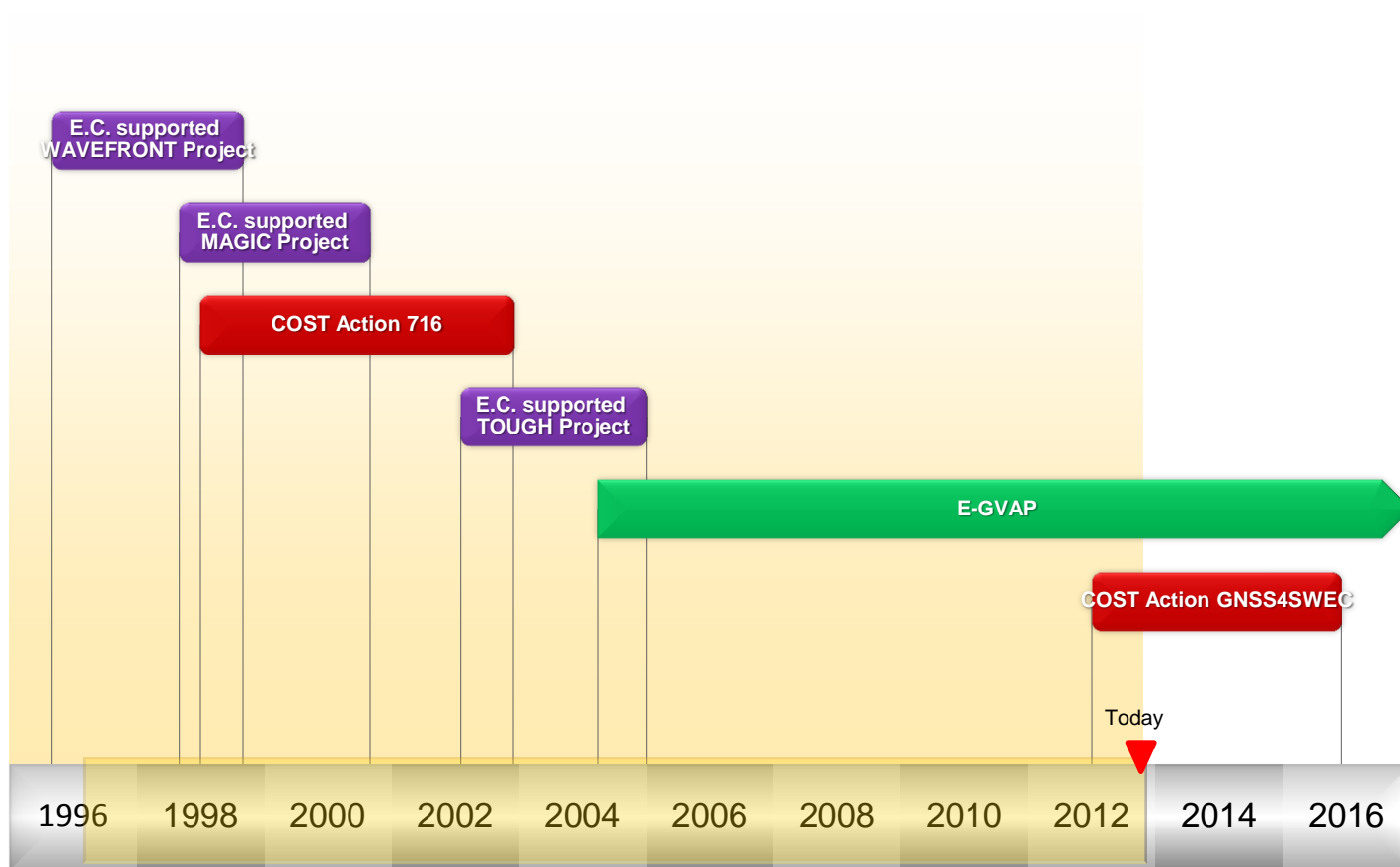


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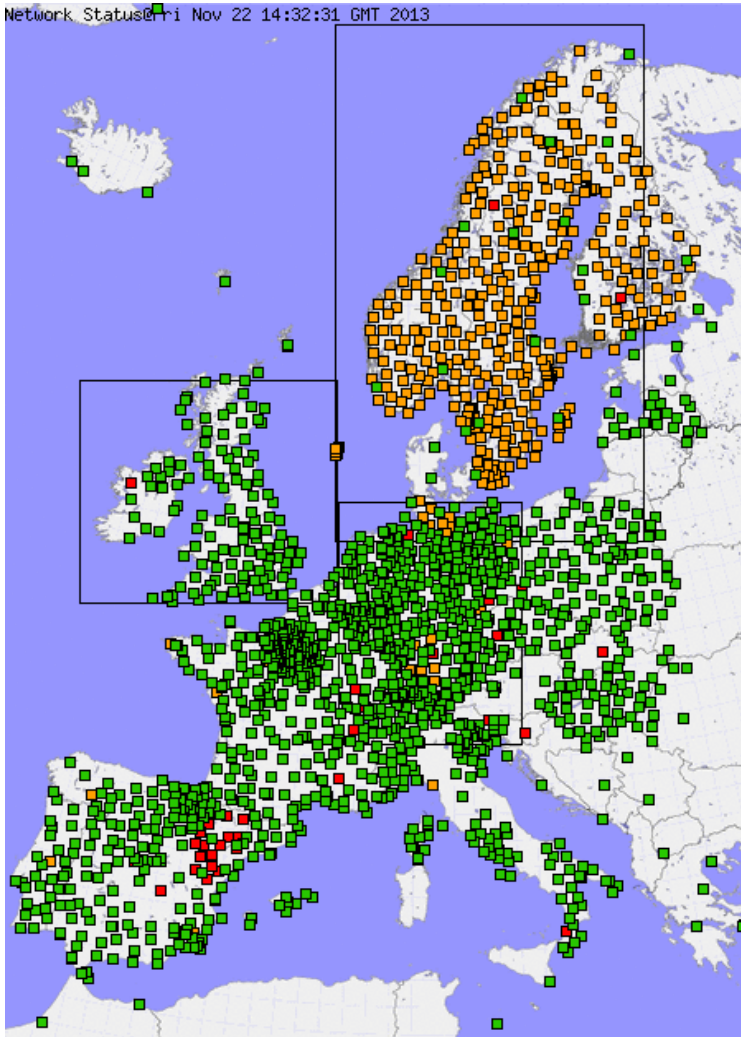
This presentation covers the following areas

- History of GNSS meteorology in Europe
- Current Status
- Reasons for a new COST Action
- COST Action ES1206: GNSS4SWEC
 - Organization and Structure
 - Time schedule, Deliverables and Milestones

European GNSS-Met Projects



Current Status (E-GVAP)



- *EIG EUMETNET Project coordinating the **near real-time** delivery of data from ~2000 European sites delivering > **12M ZTDs pcm***
- E-GVAP focus in on GPS-only **hourly processing**, delivering only ZTD **in 90mins**
- **Operational assimilation** at a few European National Met Services, many others under testing.
- Use of E-GVAP ZTDs has proven positive impact on NWP forecast skill
- Surface T and P used for conversion to integrated Precipitable Water Vapour (**PWV**)
- Active Quality Control (**AQC**) in place
- **MoUs** in place with EUREF and EUPOS

Positive Impact in NWP

HIRLAM (U11) Precipitation Forecast
(without GPS)

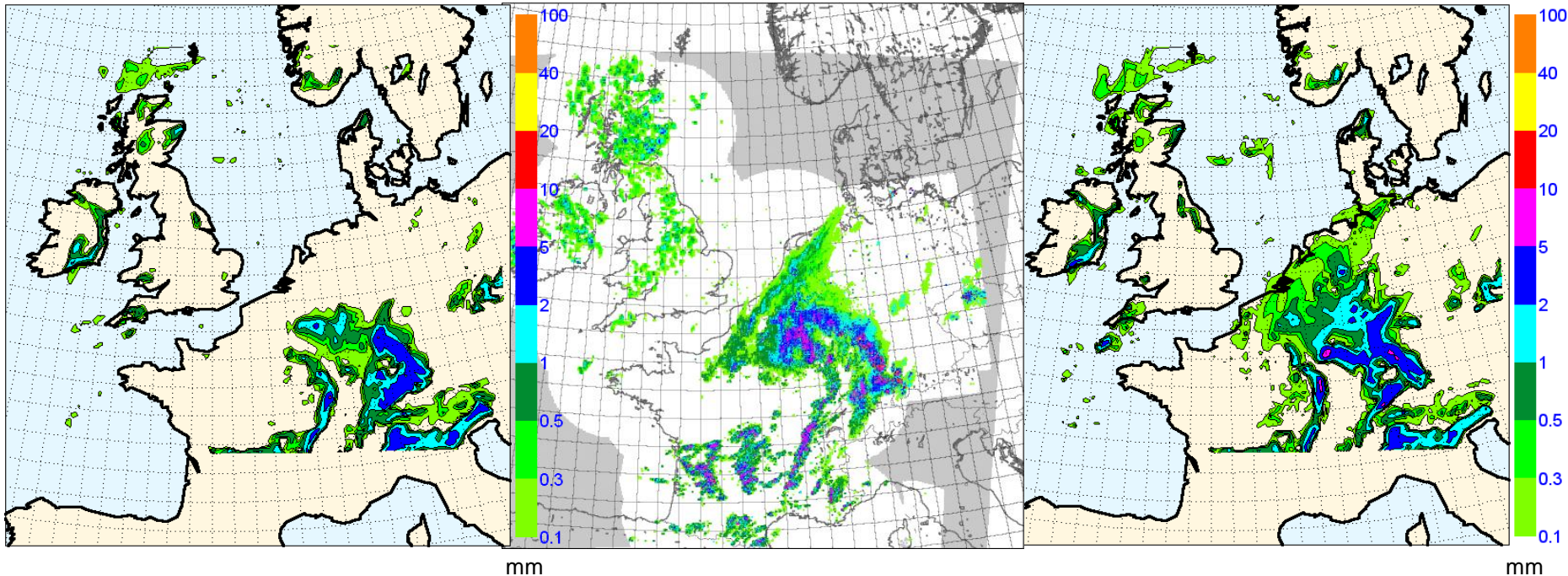
16 to 17 UTC on 11 May 2010

Radar Hourly Precipitation
Observations

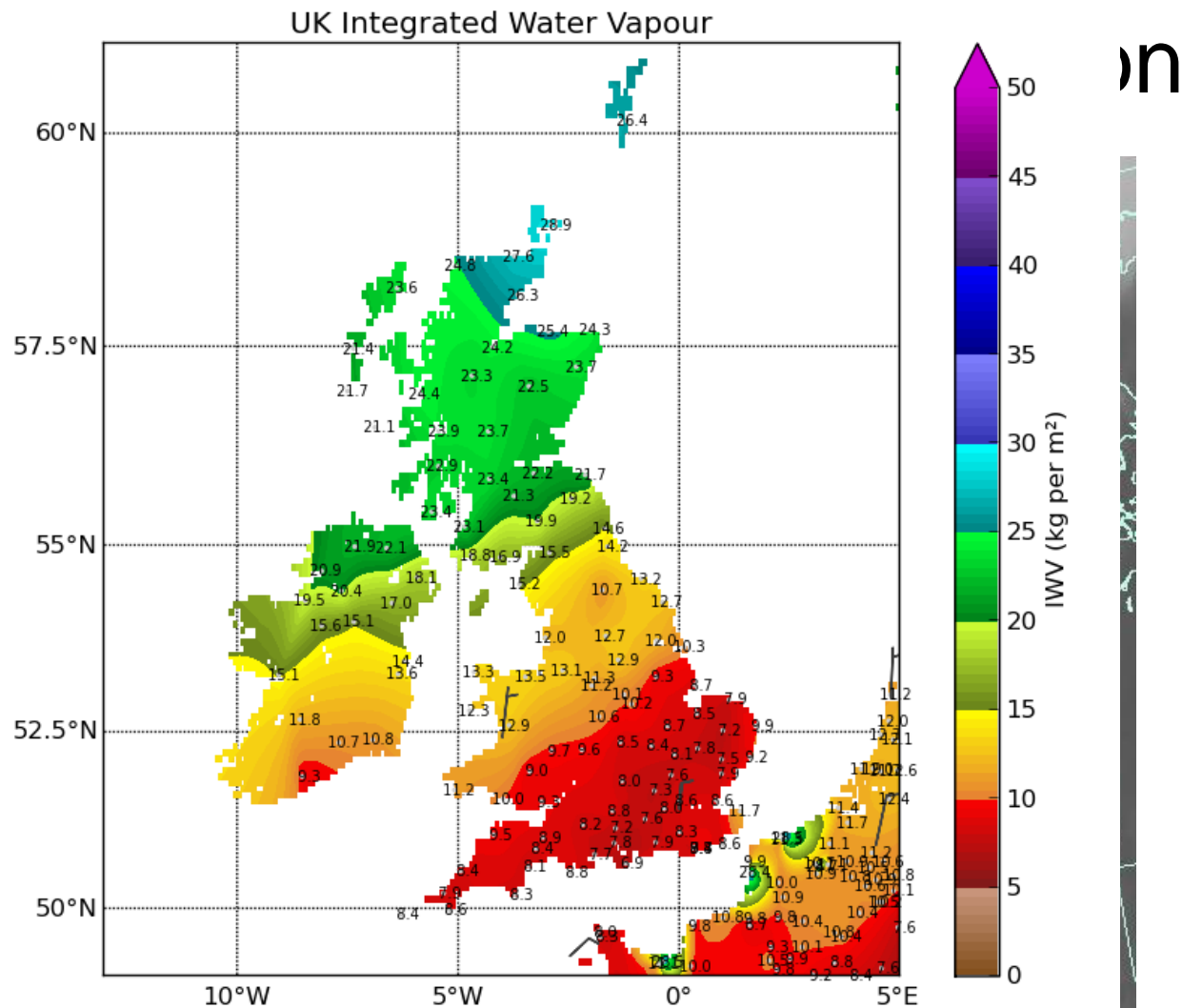
16 to 17 UTC on 11 May 2010

HIRLAM (U11) Precipitation Forecast
(with GPS)

16 to 17 UTC on 11 May 2010



Example of positive impact observed in NWP for precipitation forecast
(ZTD also has positive impact on other model parameters)



Dots = GPS sites Crosses = ATDnet fixes Barbs = Wind profiler (large barbs) and AMDAR (small barbs) data (between 1-2km)

IWV at 1100Z, 26/11/2013

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Met requirements vs. GNSS Data

- New hi-res NWP models require ZTD with improved timeliness and greater resolution (e.g. UKV 1.5km model)
- New GNSS products (slants, gradients, tomography etc) may be able to deliver good quality vertical resolution of water vapour
- More real-time processing greatly increases the usefulness of GNSS tropospheric products
- Climate community becoming aware of long-term, homogenised GNSS tropospheric products
- More GNSS constellations with raw data available in real-time
- Single frequency processing



Why a COST Action?

- EU funded body for European Cooperation in Science and Technology (COST)
- Existing European collaborative projects, such as E-GVAP, only focus on bringing current state to operations
- The Action will:
 - Facilitate networking between two distinct R&D communities
 - Coordinate and expand pan-European collaboration (incl. data/knowledge transfer W to E&S) and with the wider (global) community
 - Coordinate European R&D projects for potential EU funding
 - Use STSMs to address specific scientific problems
 - Provide training schools to prepare the next generation



What does a COST Action fund?

- No direct funding for R&D, only for supporting R&D
- Meetings
 - Management Committee
 - Working Group
- Short Term Scientific Missions
 - Allow researchers to work on specific topics for <3months in COST countries or Non-COST Institutes
- Training Schools
 - To develop next generation of scientists
- Publications, Dissemination, Outreach
 - Papers, website, attending conferences



GNSS4SWECC

Three working groups, with a *strong* working *relationship* between each group:

WG1

Advanced GNSS processing techniques (AGNSS)

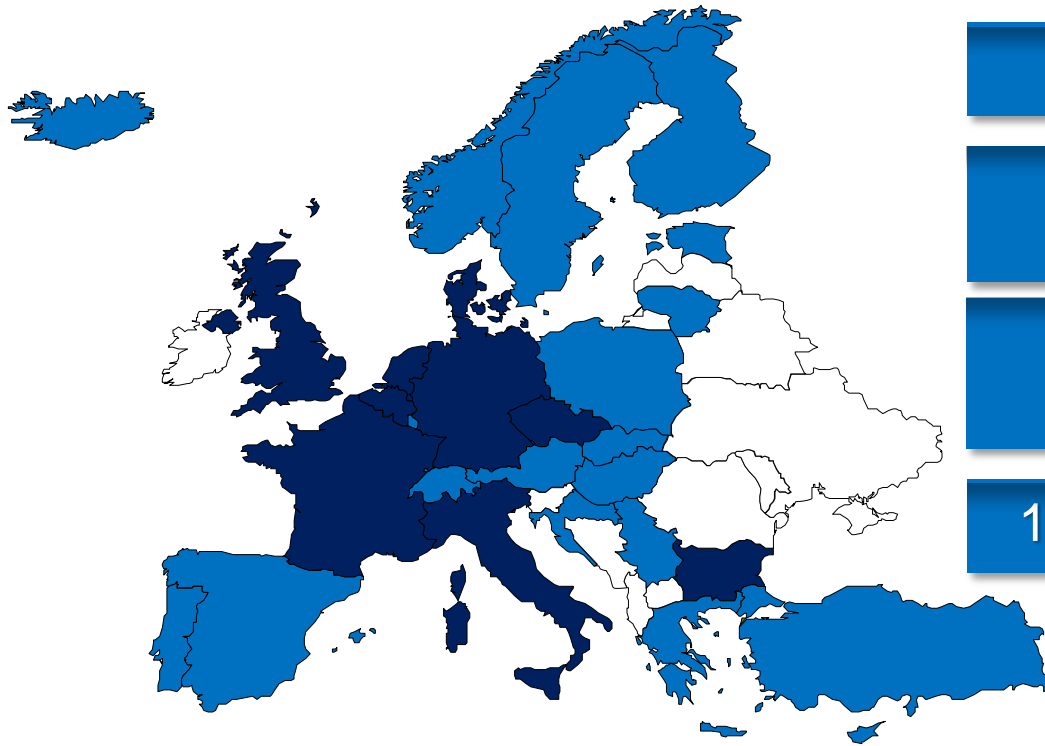
WG2

GNSS for severe weather monitoring (GNSS4SW)

WG3

GNSS for climate monitoring (GNSS4C)

Participation



29 COST Countries

100+ Participants from 60+ institutes

6 NCIs (UoNB, IGS, UoA, GeoAus, RMIT, UoHK)

1 COST NNC (OTC Tunisia)

Dark+Light Blue: Countries participating in the Action
Dark Blue: Countries involved Management Team

Main Objectives of GNSS4SWEC

- Coordinate the development of **new multi-GNSS** solutions and assess the benefit to meteorology and climate analysis
- Assess the potential of **new GNSS products** for use in nowcasting and rapid cycle NWP
- Determine the added value of the re-processed GNSS tropospheric data to the current state-of-the-art **climate** research
- Establish a database of reference tropospheric solutions to validate reprocessed GNSS ZTD/IWV against **climate** quality data from a range of other instrumentation
- Stimulate the exploitation of atmospheric data as an input to improve **Real-Time GNSS** positioning and navigation
- Standardize the conversion of ZTD to IWV
- Stimulate exchange of data and expertise in the field of GNSS Meteorology

ES1206 Schedule

	Year 1	Year 2	Year 3	Year 4
MC Meeting	00	00	00	00
WG Meeting	0	0	0	0
WG Report	0	0	0	0
Reports to DC	0	0	0	0
Final Report				0
Workshop	0	0	0	
Final Workshop				0
Training School		0		0
STSM	000	00000	00000	000
Website	0	0	0	0
Dissemination of products	0	0	0	0



Summary of Action Instruments so far 2013-14

- Kick off MC meeting, Brussels, 17th May 2013
- Core Team meeting, Potsdam, 4th Sept 2013
- WG meetings, Valencia 16th and 17th Oct 2013
- MC meeting, Valencia, 17th Oct 2013



Summary of Action Achievements so far 2013-14

- Warsaw University now processing GNSS in NRT
- Sofia University soon to be processing GNSS in NRT (with help of STSM)
- WG3 database for climate at GOP (reprocessed GNSS + some radiosonde)
- Dissemination
 - Establishment of ES1206 website:
<http://gnss4swec.knmi.nl/mc>
 - Paper defining 'State-of-the-art in Europe' in progress, using extended abstract for Galileo Colloquium as basis. Will submit before Christmas probably to Atm. Chem. Phys.
- ~4 STSMs approved



Met Office

ES1206 Future Activities

- 2013-2014 Workshop
 - 26th – 28th Feb, LMU, Munich (in conjunction with International Symposium on DA and Inverse Problems)
- 2014-15 WG Meetings
 - Sept 2014, Sofia University, Bulgaria
- 2014-15 Training School (need to discuss topics for sessions, names for keynote speakers etc)
 - Early Sept 2014, Black Sea resort, Bulgaria (exact location TBD), ~1.5days per WG. Preliminary agenda available
- 2014-15 MC Meetings
 - 1 alongside WG meeting
 - 1 stand-alone

Action Achievements

- 1 *Coordinate the development of new, multi-GNSS techniques and products.*
- 2 *Improve the understanding of short-term atmospheric processes.*
- 3 *Promote the use of, and determine the impact of, re-processed long-term GNSS tropospheric datasets for climate.*
- 4 *Link its activities to the IGS and EUREF, and work in support of E-GVAP.*
- 5 *Coordinate the exploitation of GNSS and meteorological data for mutual benefit.*
- 6 *Lead to a consolidation of collaborating groups.*



GNSS4SWEC - Advanced GNSS Tropospheric Products for monitoring Severe Weather Events and Climate

WG1 - Advanced GNSS Processing Techniques – wg1.gnss4swec@knmi.nl

WG2 - GNSS for Severe Weather Monitoring – wg2.gnss4swec@knmi.nl

WG3 - GNSS for Climate Monitoring - wg3.gnss4swec@knmi.nl

Questions

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<http://gnss4swec.knmi.nl/>