ES1206: Advanced GNSS Tropospheric Products for monitoring Severe Weather Events and Climate

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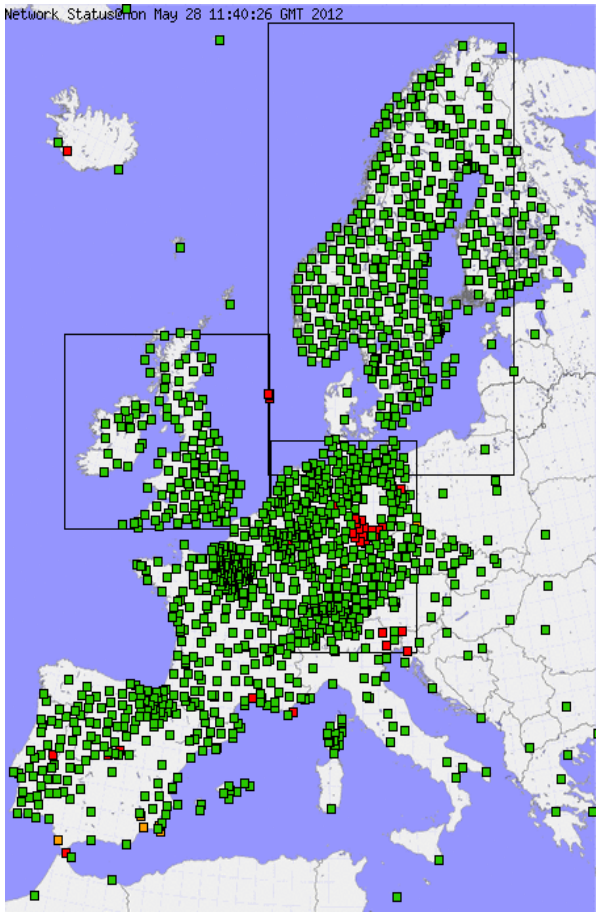
Contents

This presentation covers the following areas:

- Current GNSS meteorology in Europe
- Recent meteorological and GNSS Developments
- COST Action ES1206
  - Work Programme
  - Organization and structure
  - Objectives and Milestones

Current Status (E-GVAP)

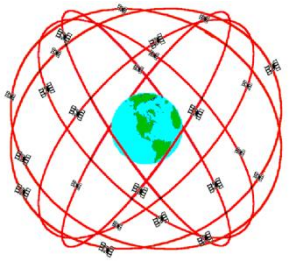


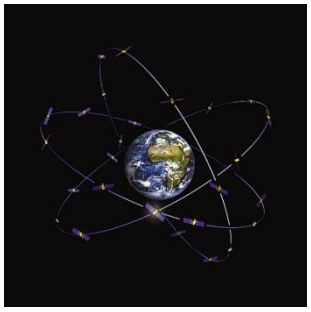
- Project focusing on GPS-only *hourly processing*, delivering only Zenith Total Delay (*ZTD*) *in 90mins*
- *Operational assimilation* at Euro National Met Services. ZTD has a positive impact on NWP forecast skill scores
- *2000+ European sites*' delivering ~15M ZTDs per month
- Surface T and P used for *conversion* to Integrated Water Vapour (*IWV*)
- GPS IWV has been used in research experiments for more than 10 years
- Data monitoring and Quality Checking in place (+improving)

Recent Met. Requirements

- New hi-res NWP models require ZTD with improved timeliness and greater spatial and temporal resolutions (e.g. Met Office UKV 1.5km)
- Advanced GNSS products are desired for obtaining more information about troposphere (vertical resolution of water vapour, azimuthal anisotropy etc.)
- Sub-hourly processing would greatly increase usefulness of GNSS products for nowcasting and IWV displays
- Climate community only now starting to use GNSS tropospheric products (e.g. Hadley Centre)

Recent GNSS Developments





- More GNSS constellations (GPS + GLONASS, Galileo etc…) = new geometries, increased number of observations etc
- Real-time NTRIP raw data streaming
- Real time PPP processing schemes
- Continued R&D working towards more advanced tropospheric products (slants, gradients, tomography)
- Single frequency processing
- Long-term, homogenised GPS products available (EPN/IGS/CODE/others), valuable for climate analysis?

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- 4 year COST Action May 2013 – May 2017
- 25 COST countries participating (+5 non-COST)
- 80+ participants from 50+ institutes
- COST supports:
  - Management Committee and Working Group meetings
  - Scientific workshops
  - Short Term Scientific Missions
  - Training Schools
  - Publications, website, public outreach

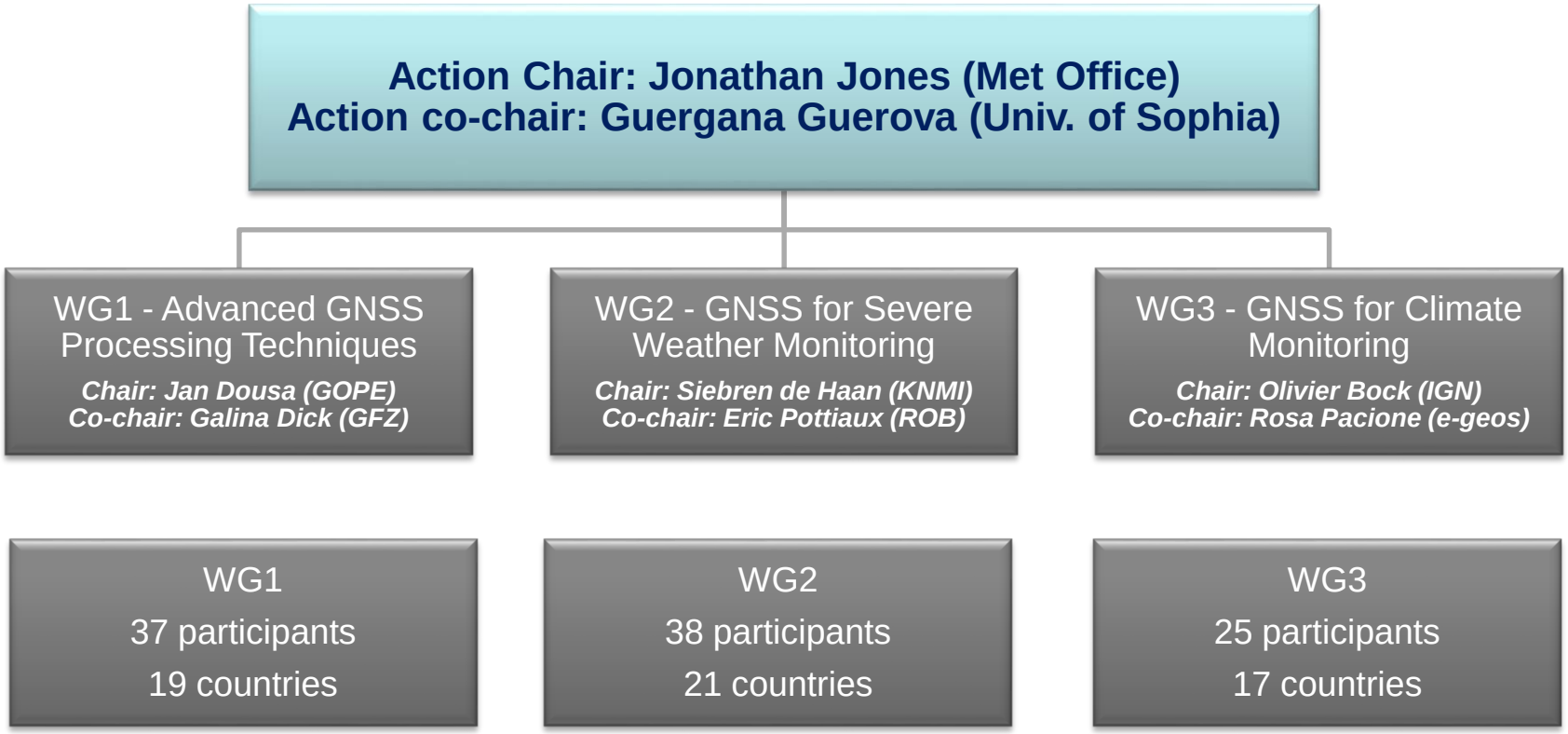
ES1206: Timetable

	Year 1	Year 2	Year 3	Year 4
MC Meeting	2	2	2	2
WG Meetings	1	1	1	1
WG Report	1	1	1	1
Reports to DC	1	1	1	1
Final Report				1
Workshop	1	1	1	
Final Workshop				1
Training School		1		1
STSM	8	8	8	8
Website	1	1	1	1
Dissemination of products	1	1	1	1

ES1206: High-Level Objectives

- 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: Management



Working with EUREF

- Validation of EPN-REPRO products against other GNSS and remote sensing instrumentation
- Validation of real-time orbit and clock corrections estimated by the IGS and its real-time ACs in the IGS-Real Time Pilot Project
- 10+ EUREF LAC's involved
- Help define future GNSS-met requirements (timeliness, mutli-GNSS, slants etc) and help define future data formats (COST716 to COST1206)

ES1206: Summary

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.*

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Questions

http://www.cost.eu/domains_actions/essem/Actions/ES1206

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http://gnss4swec.knmi.nl/