

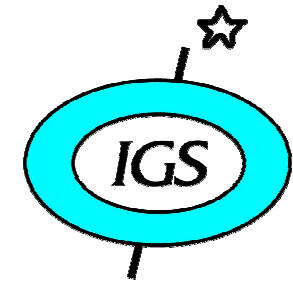
# The International GNSS Service IGS and the ICG: Status Update

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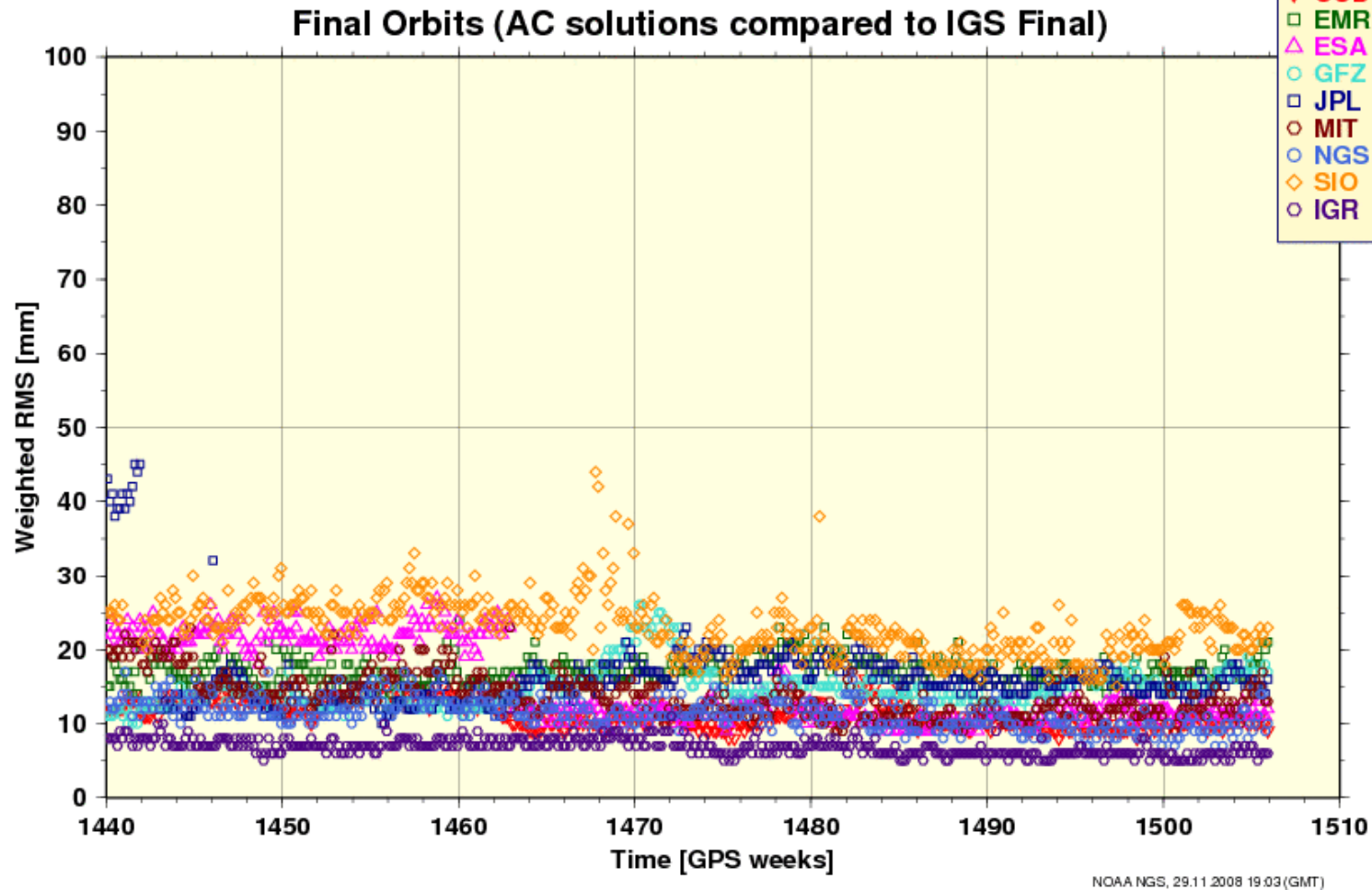
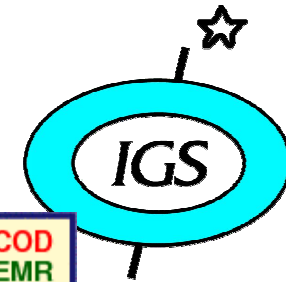
# IGS Core Products



- Data from a global network of tracking stations
- Precise orbits (few cm), predictions (<10 cm)
- Clock corrections (satellite, ground: <1 ns)
- Ground positioning (<1 cm)
  - Consolidated input of GNSS to the International Terrestrial Reference Frame (ITRF)
- Ionosphere maps
- Troposphere corrections (water vapour)

**IGS products in constant development**

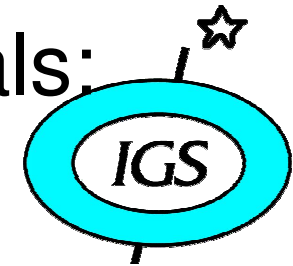
# IGS Quality Control



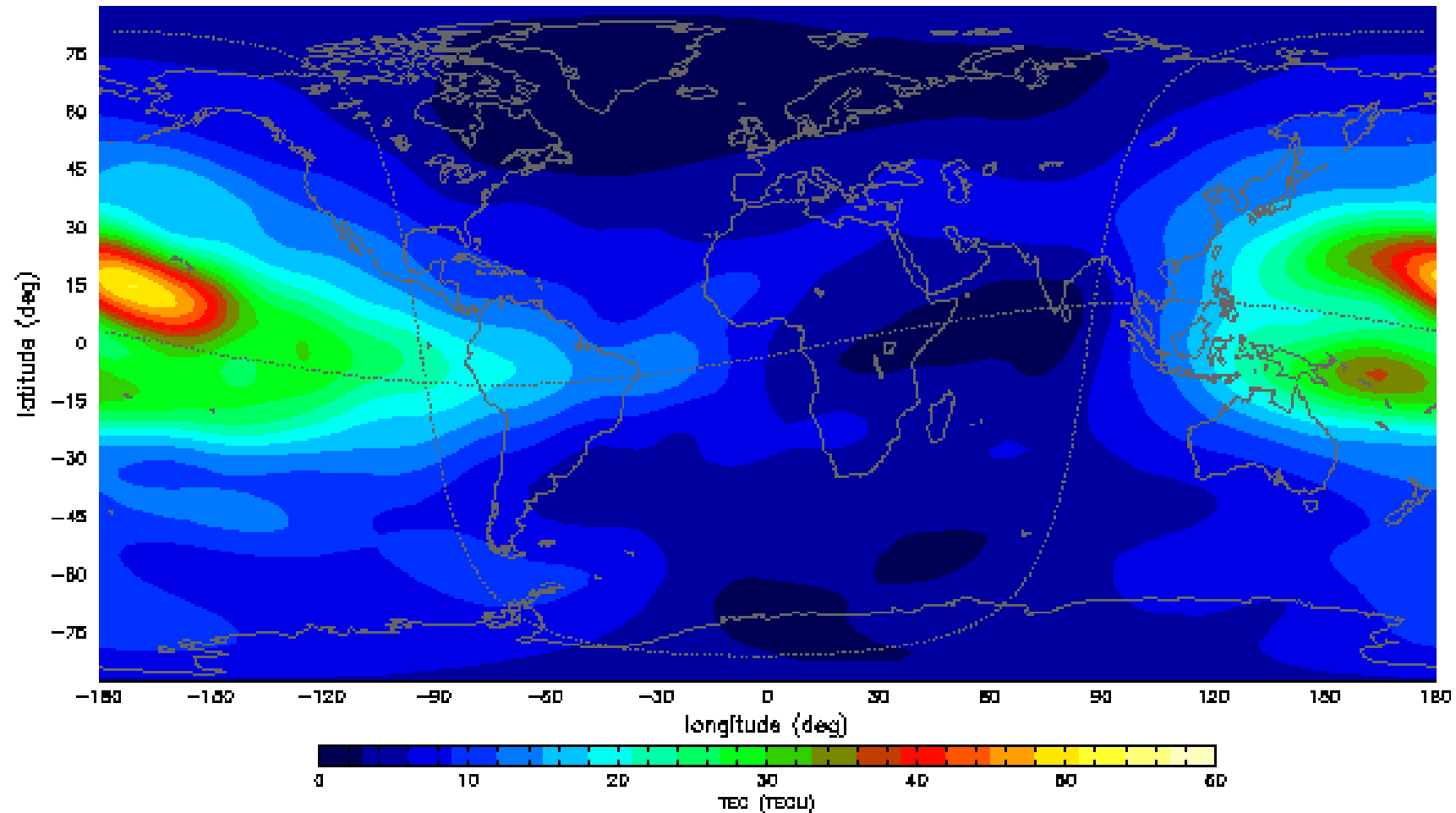
**Quality Control is a key driver for IGS product improvement**

ICG-3, Pasadena, USA, 8-12 December 2008

# Full Exploitation of the GNSS Signals: Ionosphere

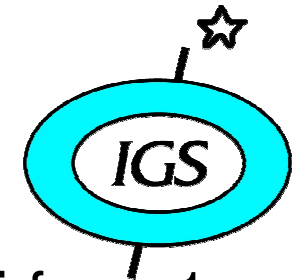


TEC MAP (height= 450.0 km) at 2008/10/16,00:00:00  
esa/eesc SH: spherical harmonic model from 173 stats; n = 15, m = 15



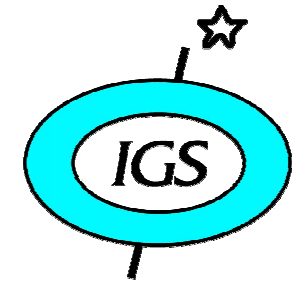
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# IGS Analysis Centre Workshop 2008



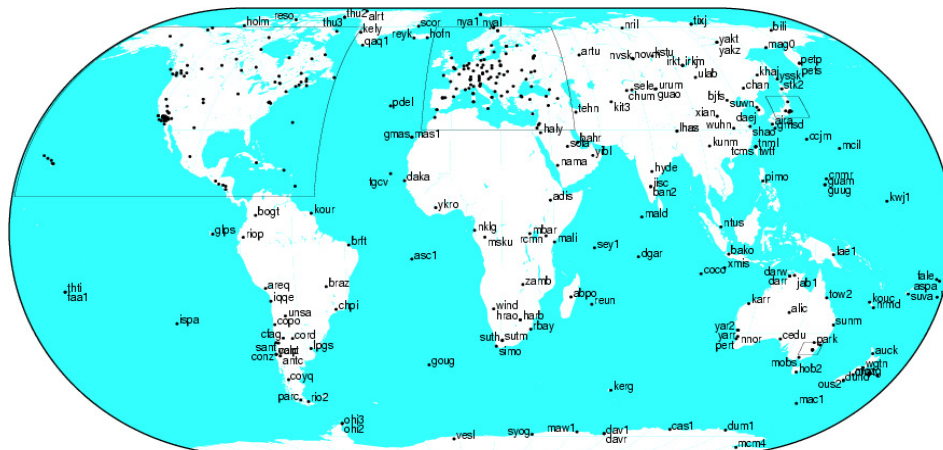
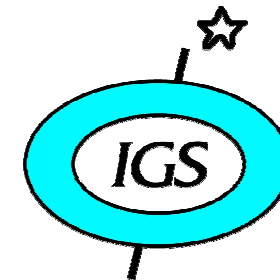
- IGS Analysis Centre workshop was held at Miami from 1 to 5 June 2008
- Organised by NOAA/NGS, who have taken over the AC Coordination function from GFZ Potsdam for a 4 year term
- Topics included:
  - Real-time
  - Re-processing data 1994-
  - Antenna phase centre calibrations
  - Site standards (antenna monuments, receivers for new signals)
  - Analysis standards
  - Multi-GNSS solutions
- Governing Board decided to set up new Infrastructure Committee

# IGS as a multi-GNSS Service



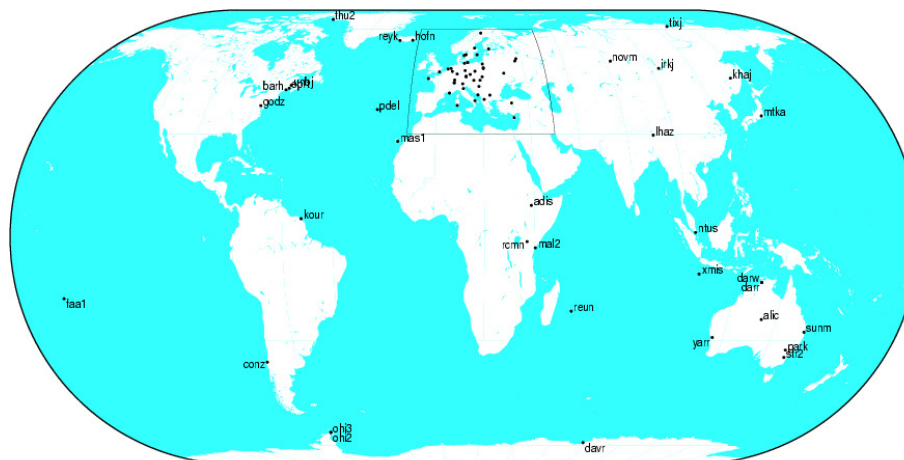
- Galileo: IGS/IAG centres are involved in
  - 13 station global Galileo Experimental Sensor Station network, now tracking GIOVE-A & -B
  - Galileo Geodetic Reference Provider Prototype
- Continuing independent monitoring of operational GNSS's (currently GPS, GLONASS) and their spatial and time references
  - Glonass orbit solutions from 4 IGS centres consistent to 5 cm
- Multi-system GNSS solutions
  - Two AC's are providing fully compatible GNSS solutions: GPS + GLONASS
  - Multi-system IGS GNSS product is feasible but GLONASS tracking network still lacks good global distribution

# IGS Tracking Networks



GPS

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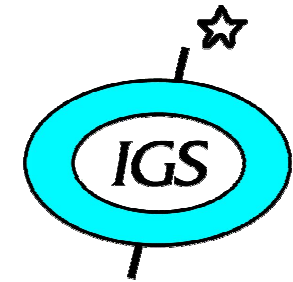


Glonass

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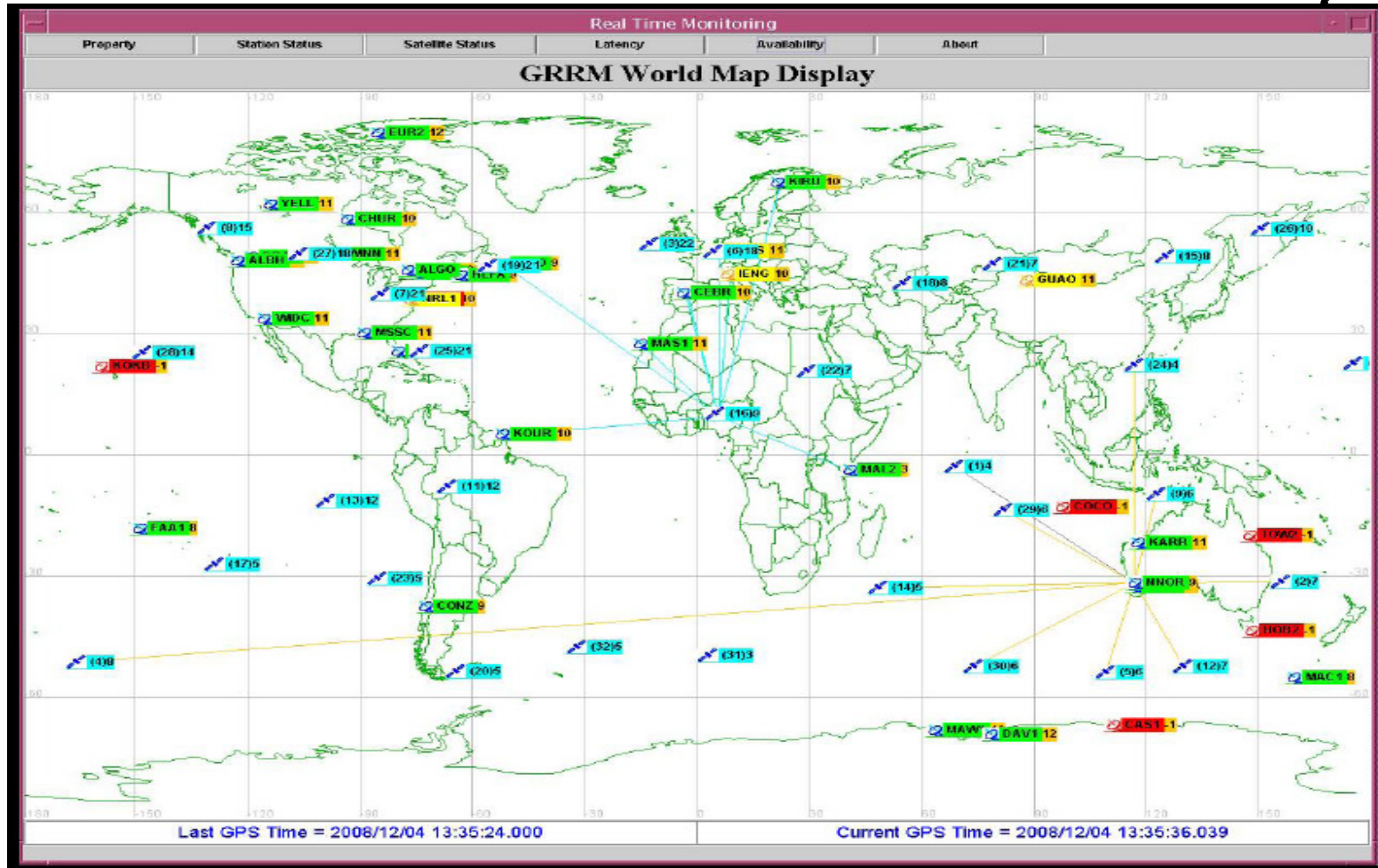
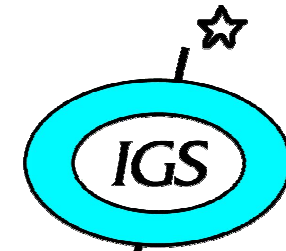
# IGS Real-time Pilot Project



- Maintain a global IGS RT receiver network, generate RT products (orbits, clocks), and investigate standards for RT data and products
- Official start in April 2008 with up to 50 RT stations, 33 participating organisations
- Currently 5 active ACs (NRCan, ESOC, BKG, DLR, GMV)
- ESOC provides Analysis Centre Coordinator for Pilot Project
  - Typical real-time clock rms: 0.2-0.3 ns (vs 4ns for Broadcast)

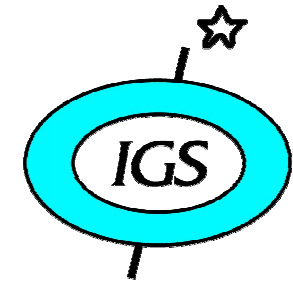


# IGS Real-Time Monitoring

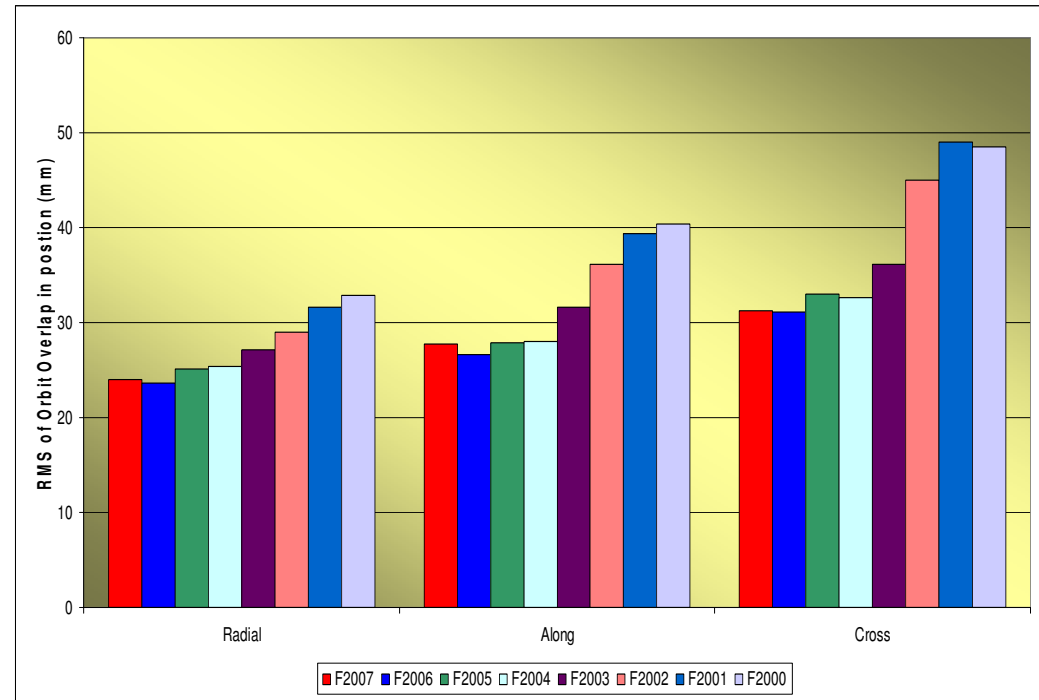


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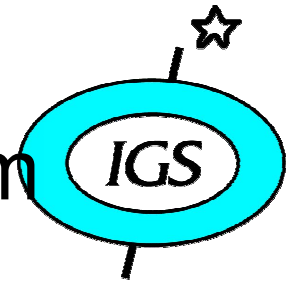
# IGS Re-processing



- Re-process all IGS data since 1994
- Generate homogenous time series of IGS products
- 8 Analysis Centres, 4 Combination Centres
- Contribute to the ITRF2008 realisation
- Relevant for Global Geodetic Observing System (GGOS)

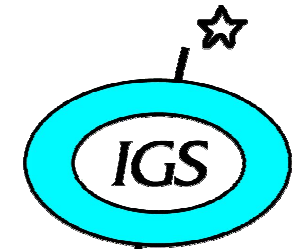


# Global Geodetic Observing System



- GGOS is the contribution of space geodesy to GEOSS
  - GEOSS = Global Earth Observing System of Systems
- GGOS is the prime project of the International Association of Geodesy (IAG)
  - IGS is a key player in GGOS together with all other space geodetic techniques (ILRS, IVS, IDS) and the IERS
- The GEOSS/GGOS framework will require homogeneous and uniform sets of products:
  - Following the latest international standards and models
  - Available in real time and in post processing
    - Re-processing and real time monitoring likely to become **core** IGS activities

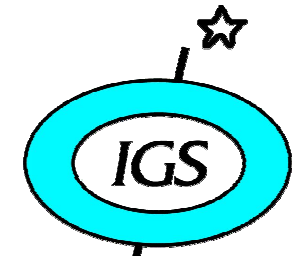
# Conclusions



- The IGS provides a reference for many GNSS applications
  - Reliable, rapidly available, highest accuracy products for a large user community
- Quality Control is a key driver for the IGS
  - Continuous product comparisons and feedback motivate improvements
- Even after 15 years of “routine operations” there is still very much innovation and development within the IGS
  - New developments in 2008
    - More multi-system GNSS solutions
    - Real Time Pilot Project
    - Re-processing
- More at <http://www.igs.org>
- Interoperability between the systems extremely important
  - Key role for International Committee on GNSS



# Galileo Science Conference: Padova



- Follows successful 1<sup>st</sup> Colloquium on Scientific Uses of Galileo in Toulouse, October 2007
- Organised by Galileo Science Committee, which is now developing a “Science Opportunities Document”
- 2<sup>nd</sup> conference in Padova, 14-16 October 2009
- Topics related to (e.g.):
  - Earth sciences
  - Metrology and reference frames
  - Fundamental physics and relativity
  - Processing of Giove data