

Galileo Terrestrial Reference Frame and beyond: the GGSP project

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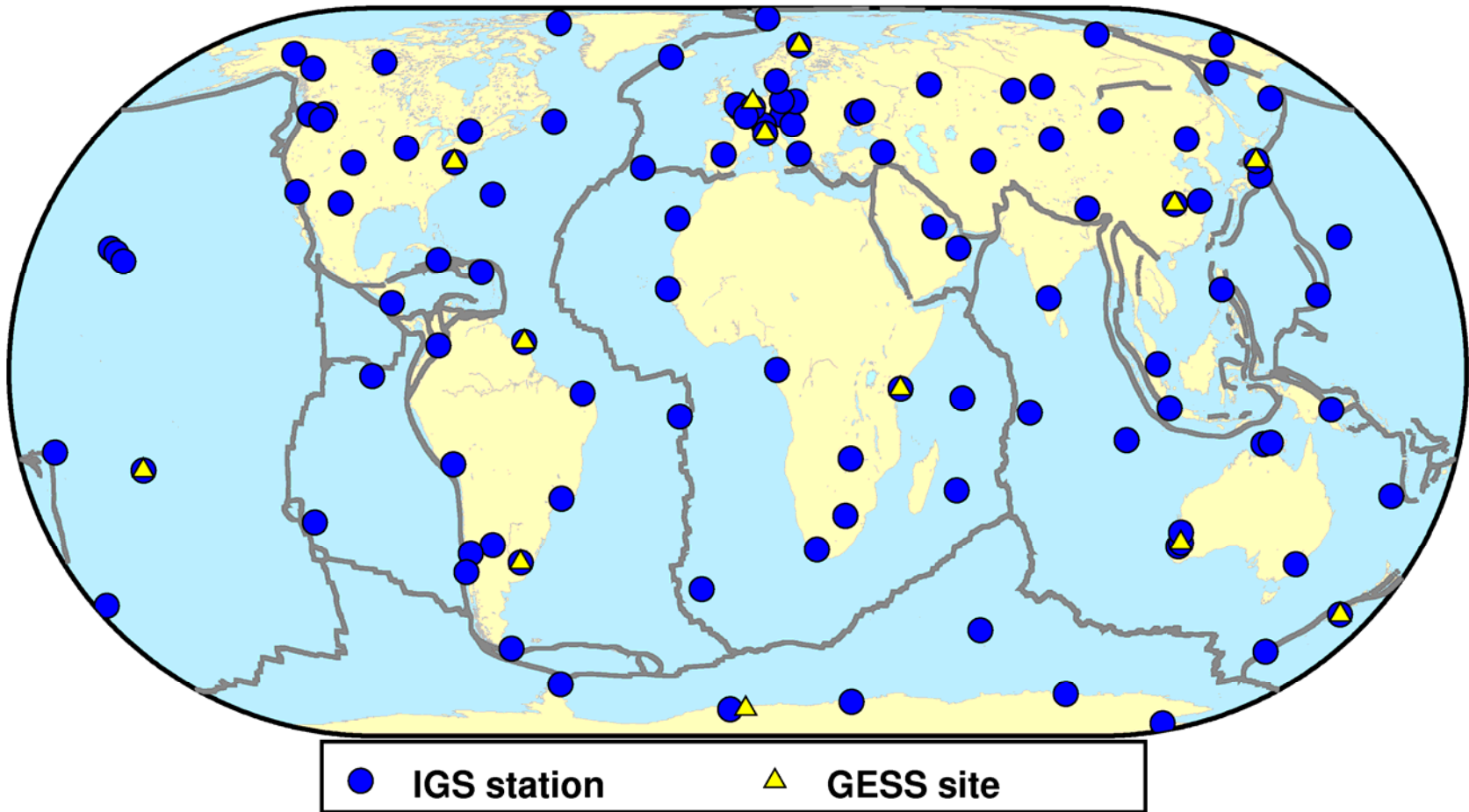
GGSP Prototype Team

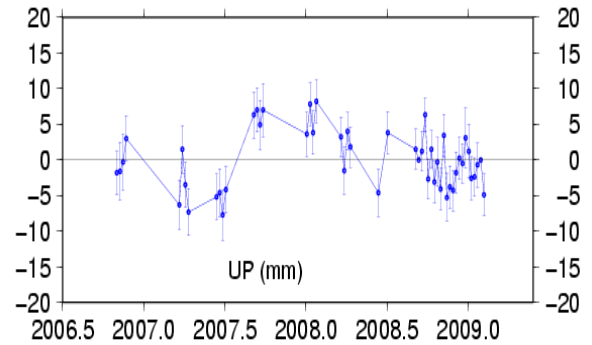
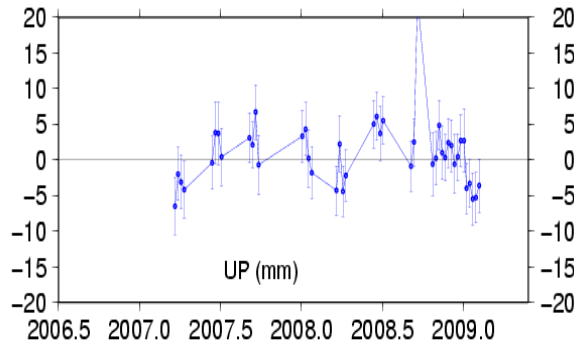
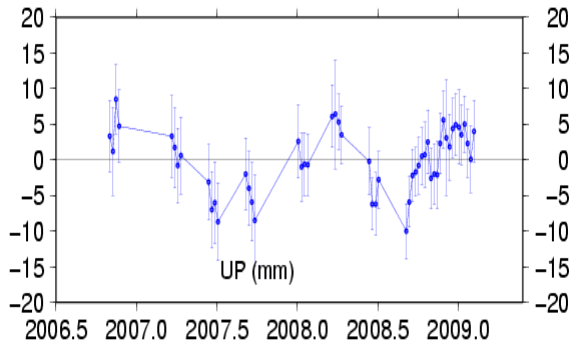
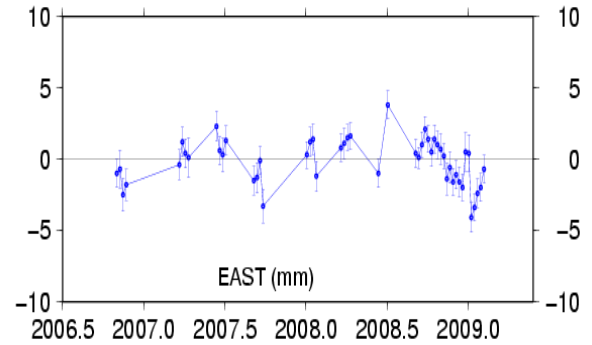
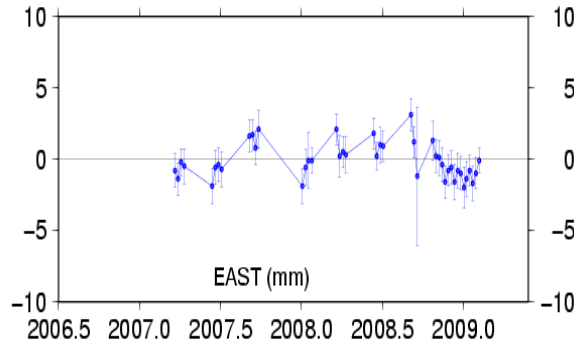
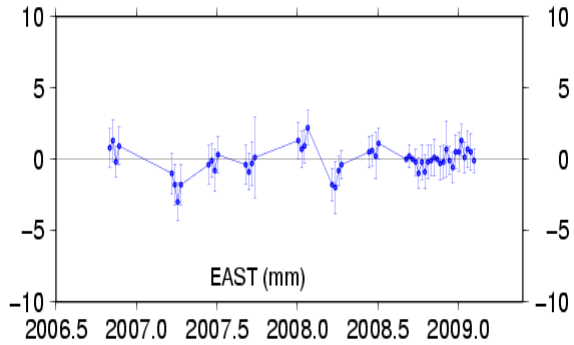
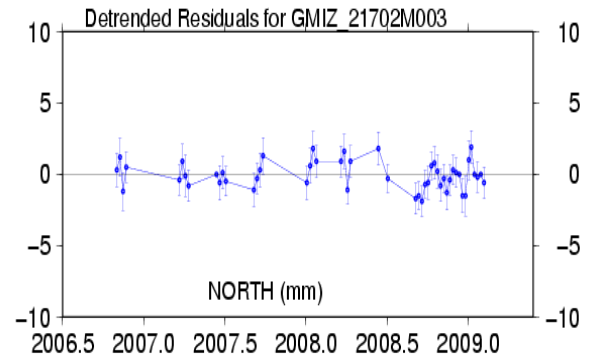
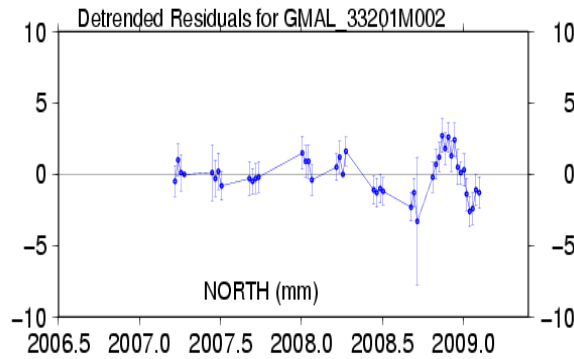
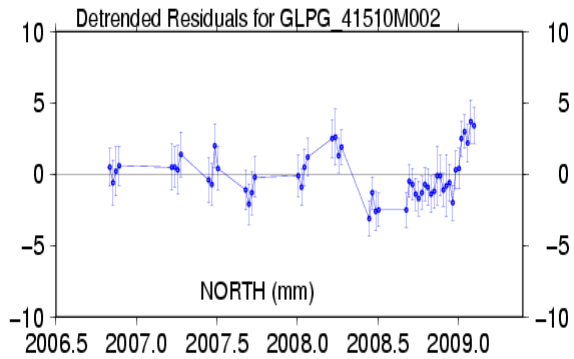
- **GGSP Prototype**
- **Galileo Terrestrial Reference Frame**
- **Processing of GIOVE data**
- **Outreach**
- **Summary and Outlook**

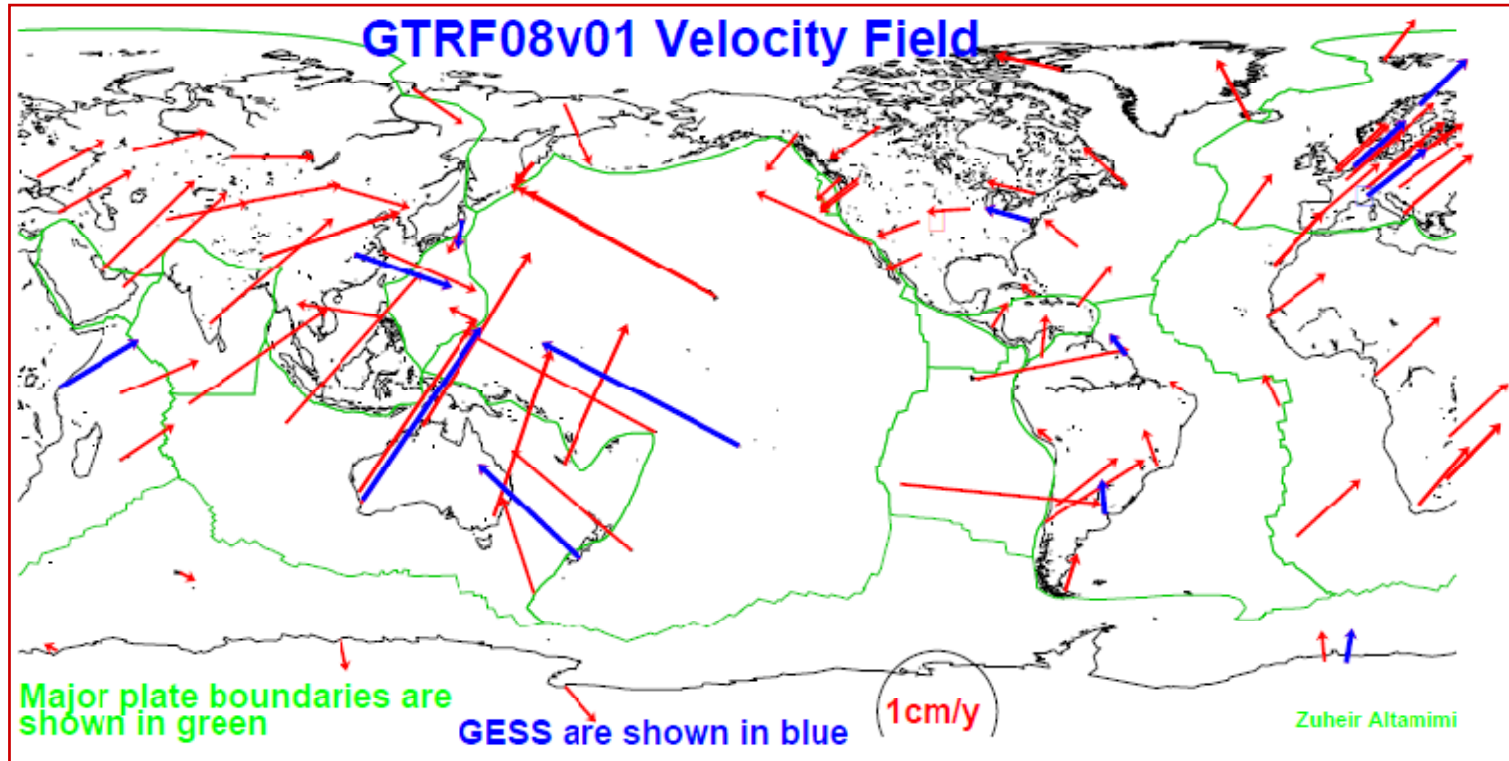
- **Galileo Geodetic Service Provider (GGSP) Prototype started in July 2005 as project of the 6th FP of the EU**
- **Prolongation until May 2009**
- **Main tasks:**
 - ◆ **Realization of a GTRF aligned to the ITRF**
 - ◆ **Implementation of a prototype for a permanent service**
 - ◆ **Inclusion of GSS when installed**
 - ◆ **Recommendations for the permanent service**
 - ◆ **Software extension for Galileo:**
 - ◆ **Bernese, NAPEOS and EPOS “Galileo ready”**

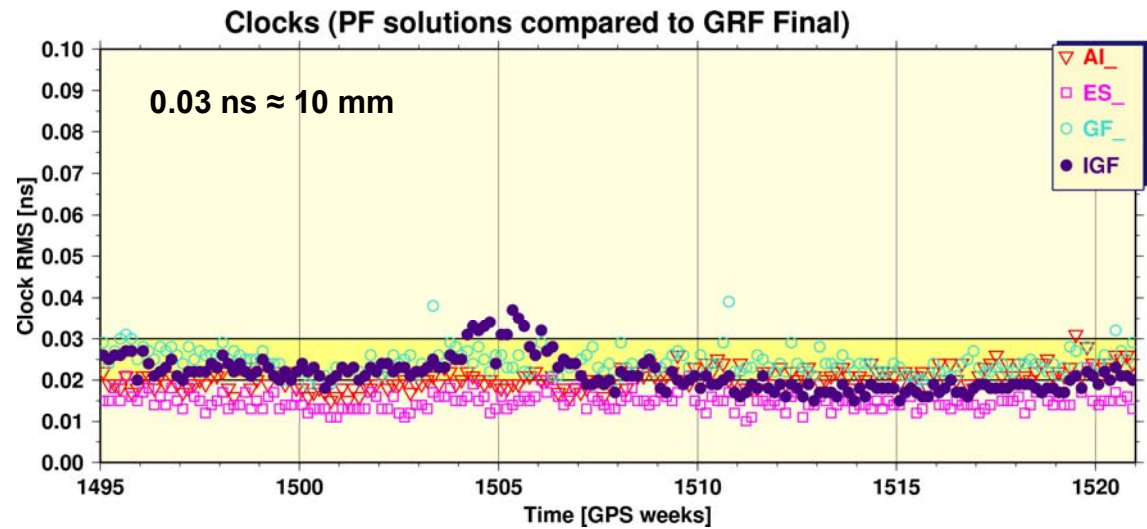
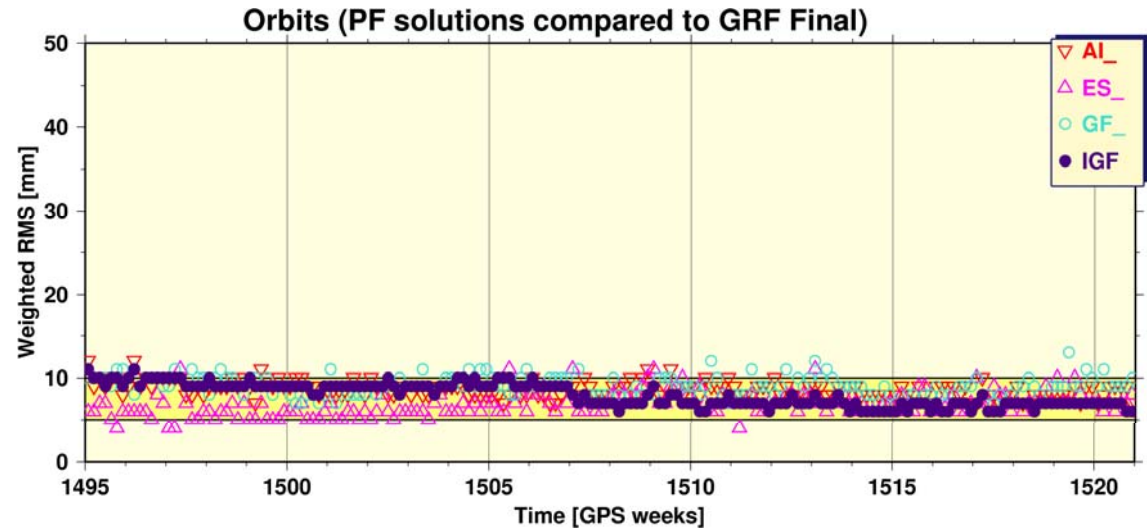
- **Initial realization in November 2007**
- **About 100 IGS sites and 13 GESS**
- **Campaign-like analysis (4 weeks each three months)**
- **Since September 2008 continuous operation**
- **RINEX 3.0 as standard data format within GGSP for GPS+Galileo (GIOVE) data**
- **Software tests and validation**
- **Combined solution aligned to ITRF2005**
- **Semi-annual releases**

Initial realization including 13 GESS







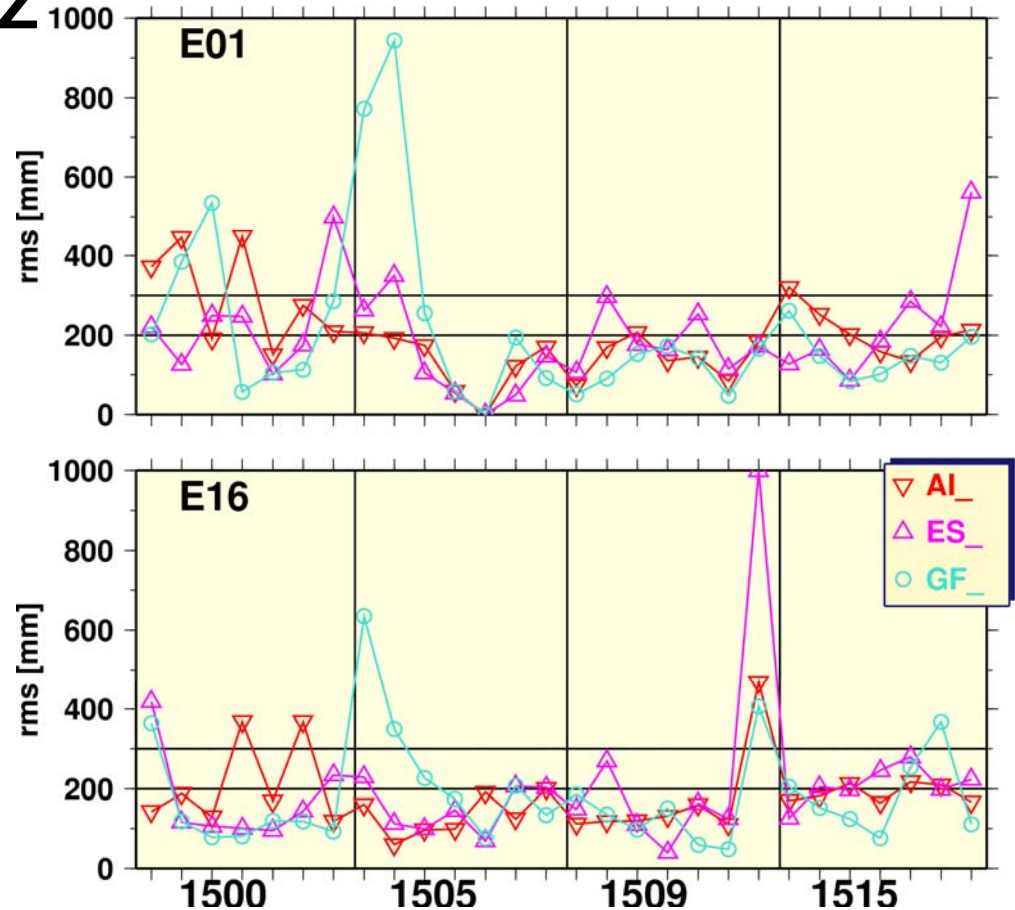


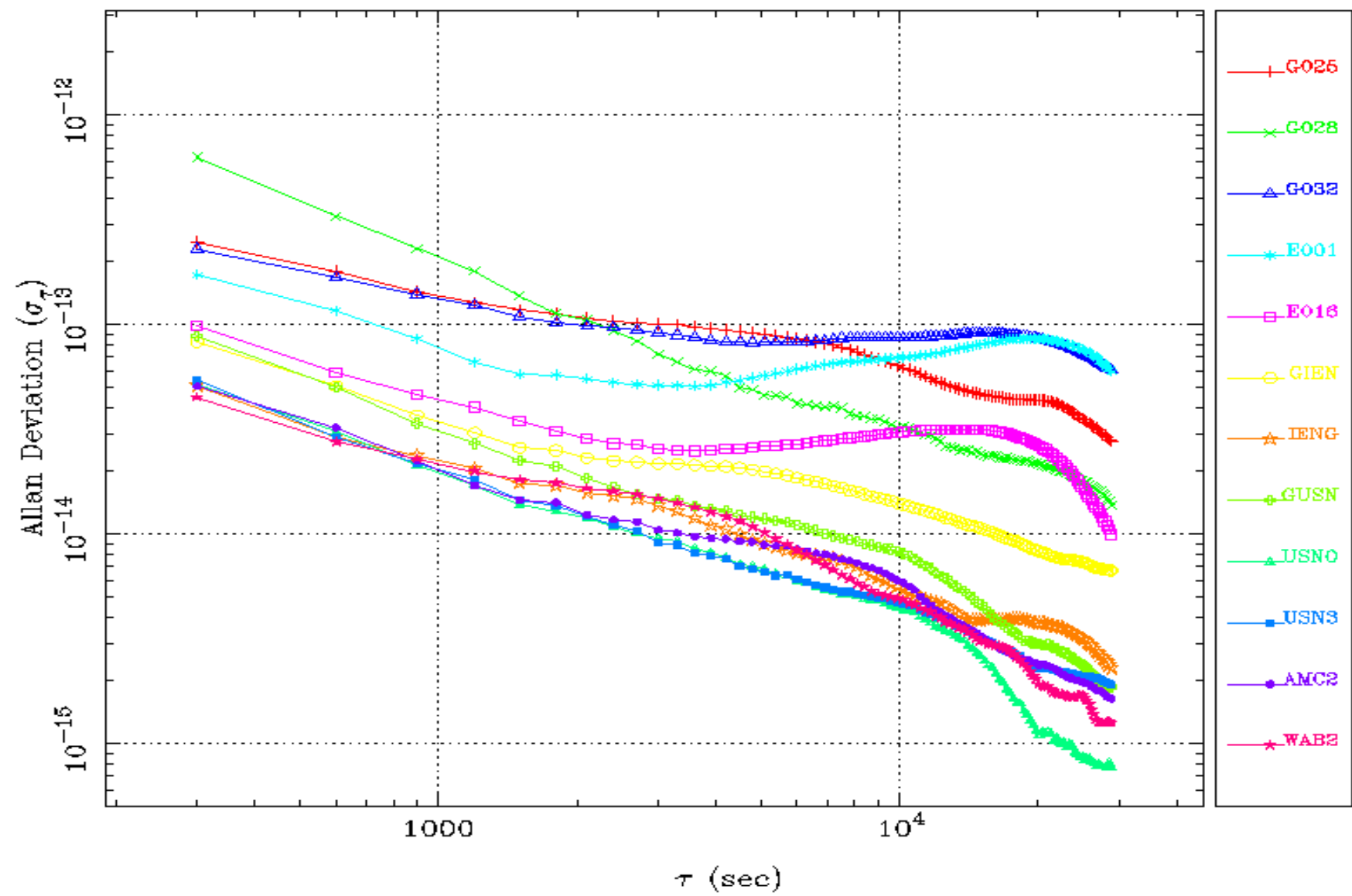
- **Galileo In-Orbit Validation Experiment (formerly GSTB-V2A/B)**
- **GIOVE-A**
 - ◆ **Launch Dec, 28, 2005 (aka E01)**
 - ◆ **Two Rubidium Atomic Frequency Standards (RAFS)**
- **GIOVE-B**
 - ◆ **Launch Apr, 27, 2008 (aka E16)**
 - ◆ **Two RAFS and Passive Hydrogen Maser (PHM)**
- **Galileo: Two RAFS and 2 PHM**
- **More: www.giove.esa.int**

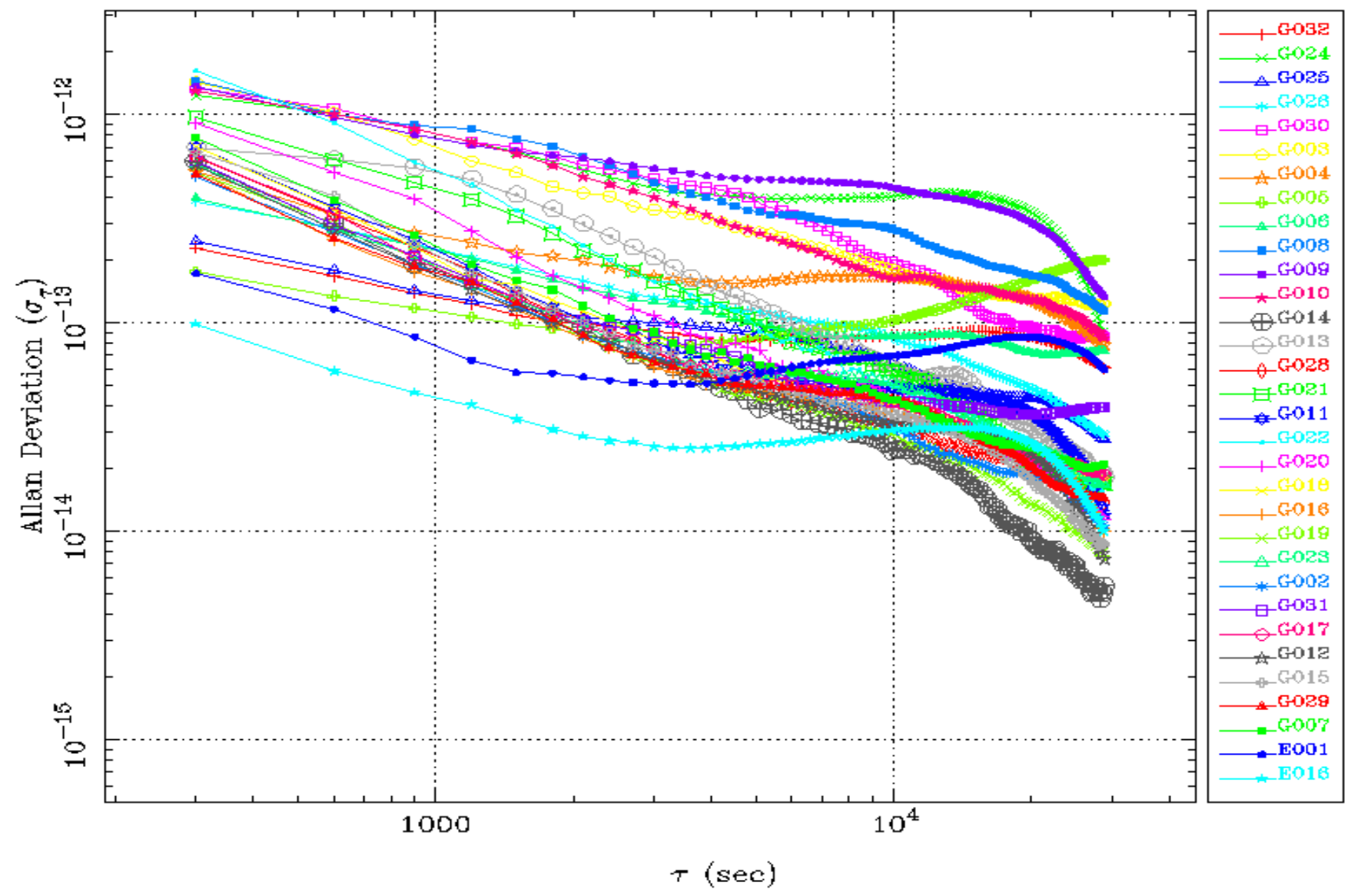
● GGSP consortium members activities on GIOVE data

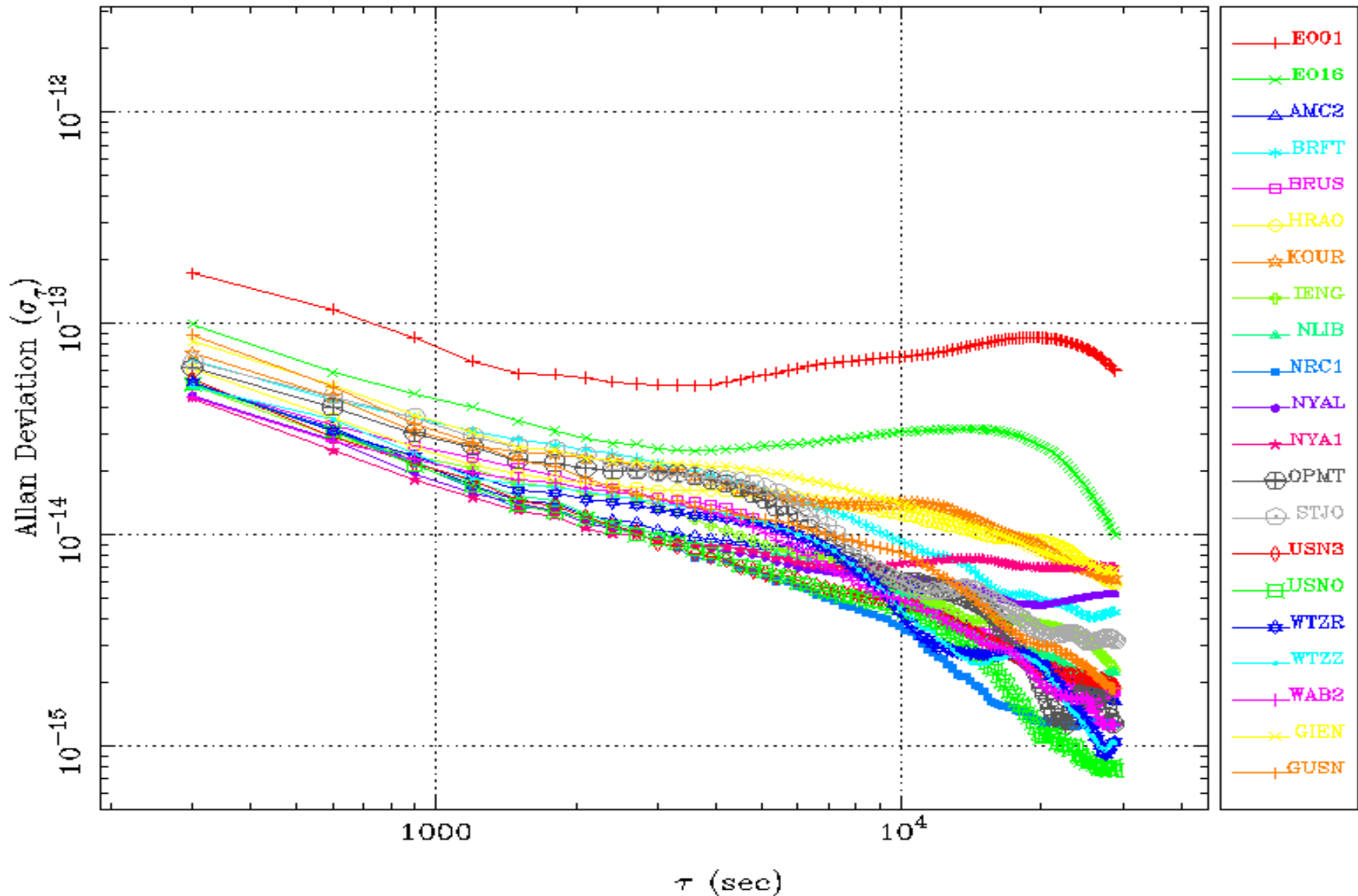
- ◆ Orbit & clock processing & combination
- ◆ Long term and short term frequency stability
- ◆ Combination/comparison with SLR → Thaller et al., Tue, 21, A49

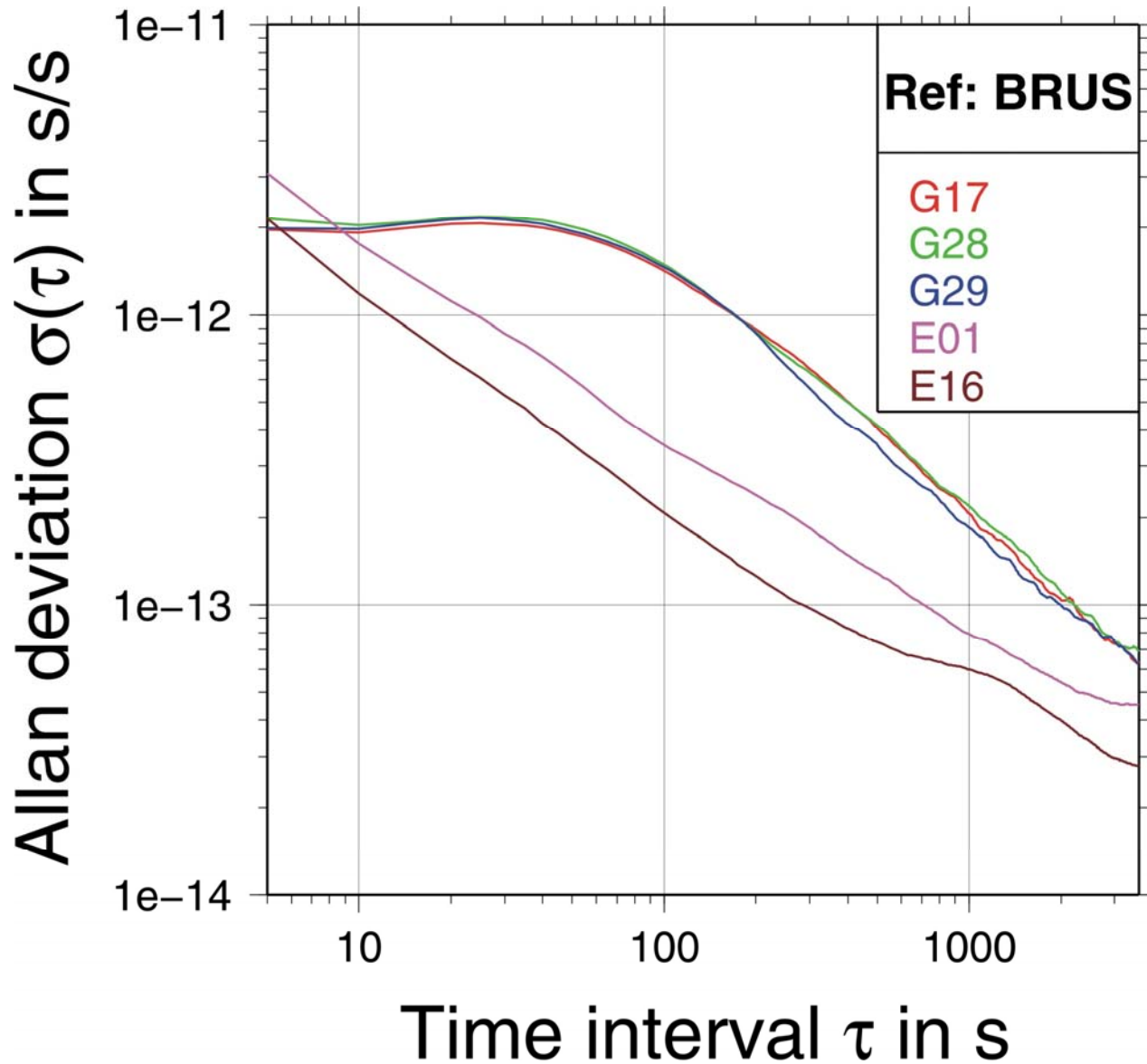
- GPS weeks 1500, 1505, 1509, and 1515
- Orbits and clocks from Processing Facilities (PF) AIUB, ESOC, and GFZ
- Orbit differences PFs to combination: 10 – 30 cm

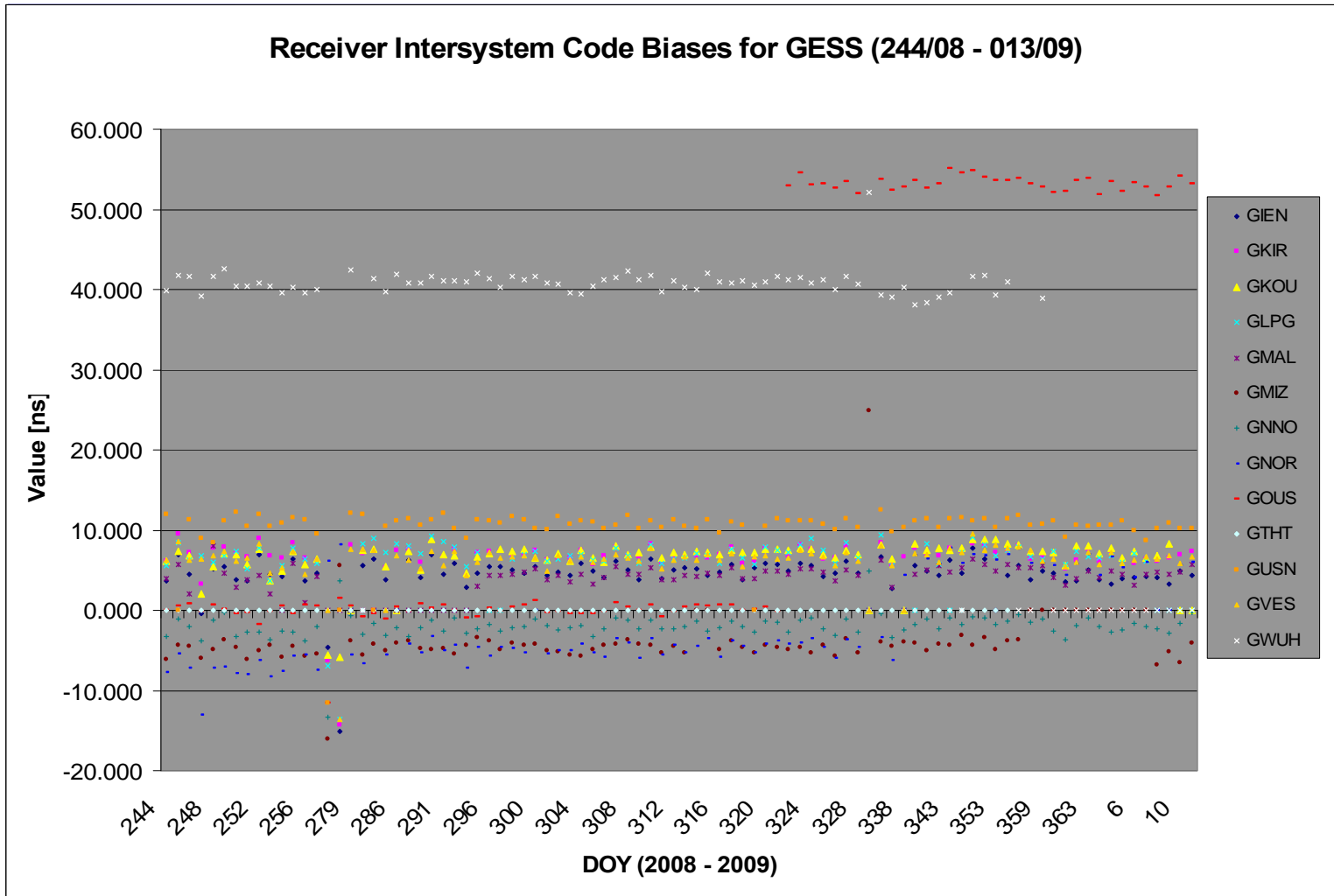




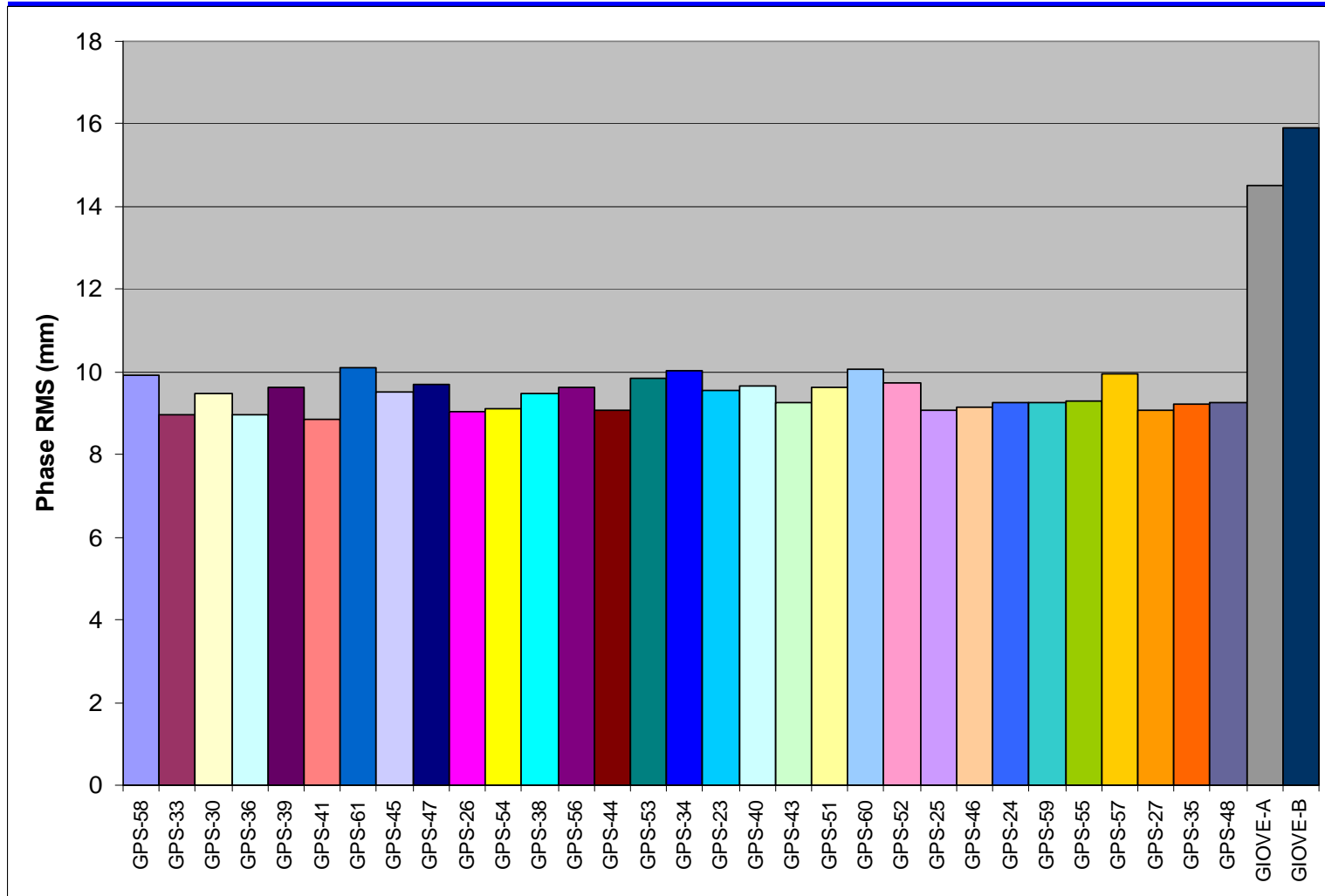








● **GESS equipped with experimental receiver / antenna combination!**

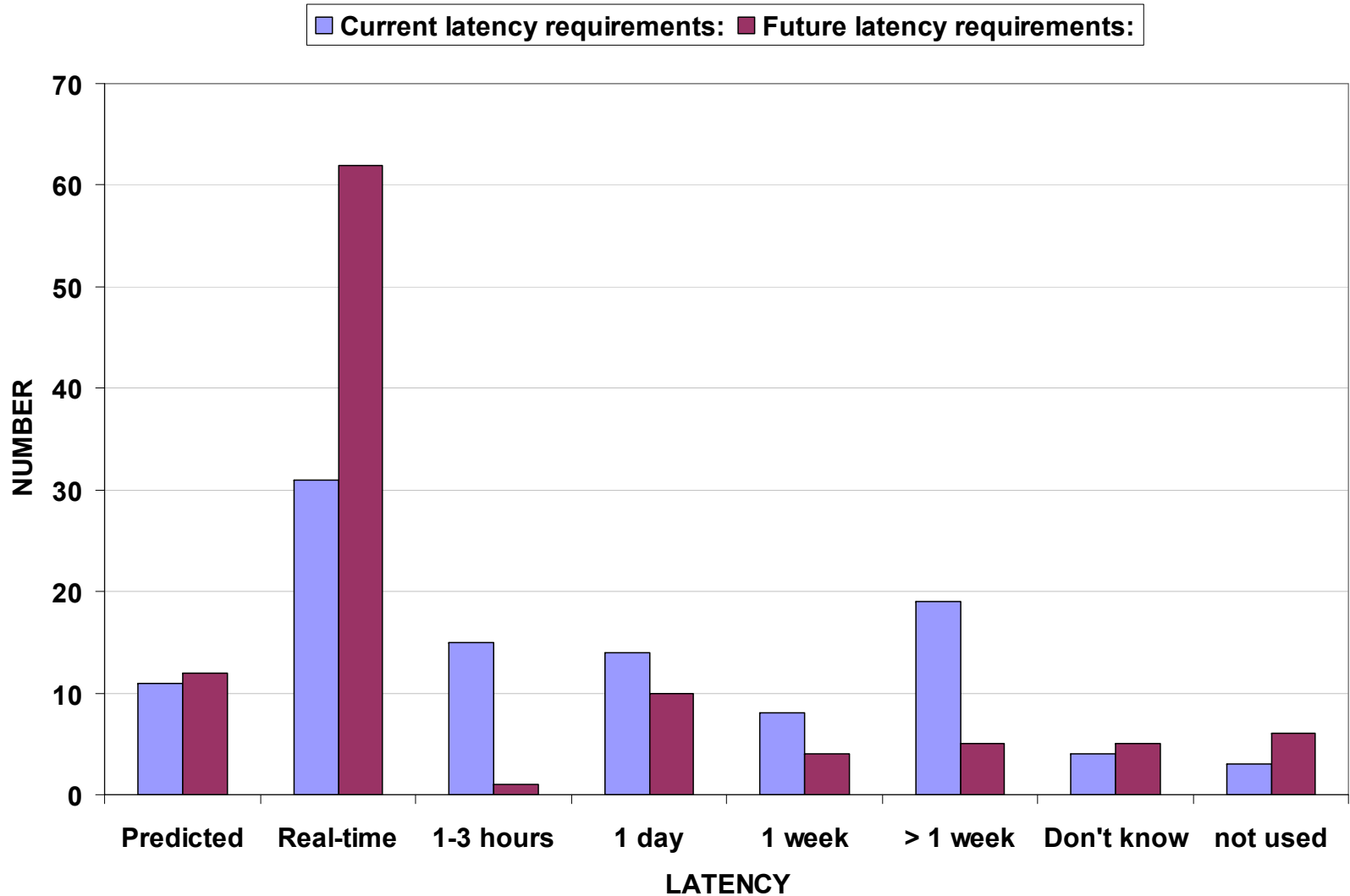


● GPS: IGS+GESS -> no difference visible

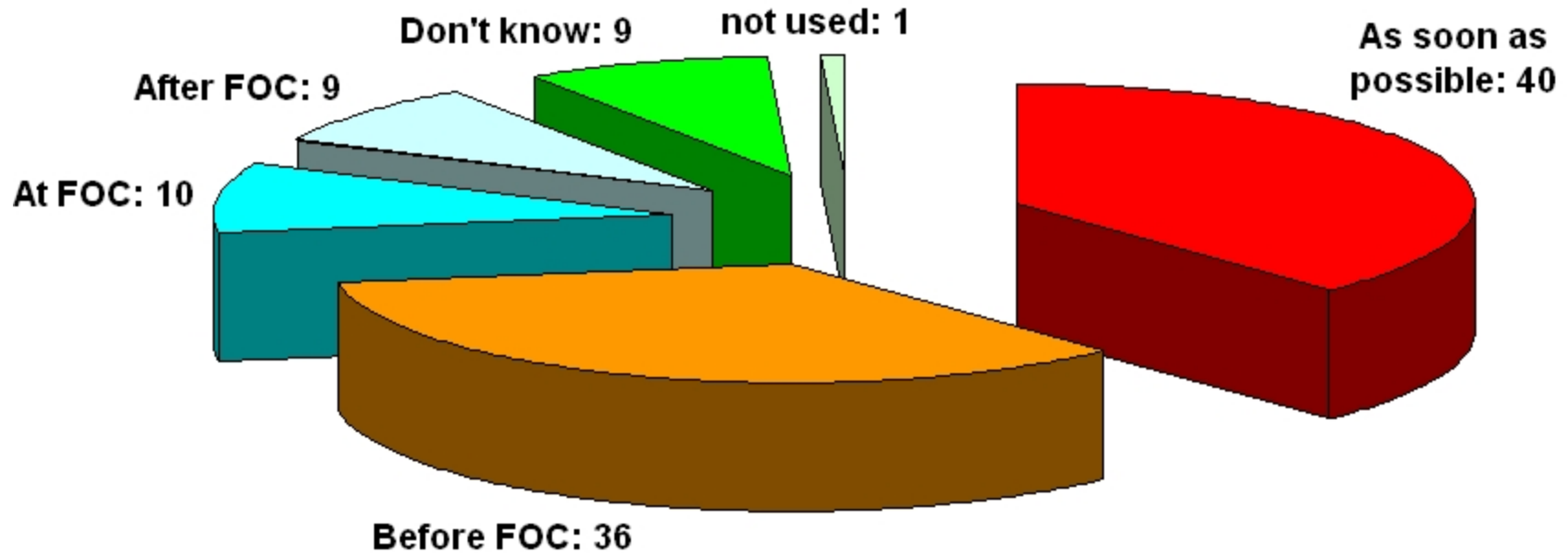
● GIOVE experimental satellites vs. GPS operational sats.

- **Survey about GGSP, GTRF, and Galileo**
- **Geodesy-related questions about knowledge, acceptance, and user needs**
- **Questionnaire available as webpage**
- **Several hundred recipients invited by Email**
- **> 100 submission from > 50 countries from all continents between Sep '08 and Jan '09**
- **Majority of submissions by governmental organisations and research institutes but also industry, SME, service provider, etc.**

What are your current and future latency requirements?



When do you intend to start with Galileo?



- **FP6 project covering Galileo Reference Service Provider to be finalized next month**
- **Necessity of a high-precise Galileo Terrestrial Reference Frame for routine Galileo operation identified**
- **3G (GPS + GLONASS + Galileo (GIOVE)) processing on an advanced level at all PFs**
- **Expected behaviour of GIOVE-B onboard PHM confirmed**
- **Waiting for Galileo IOV ...**

Thank you for your attention!

<http://www.ggsp.eu>