Federal Agency for Cartography and Geodesy

GNSS Futures

IGS real time service – status, future tasks and limitations

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IGS Workshop, 8–12 February 2016, Sydney, NSW, Australia

Outline

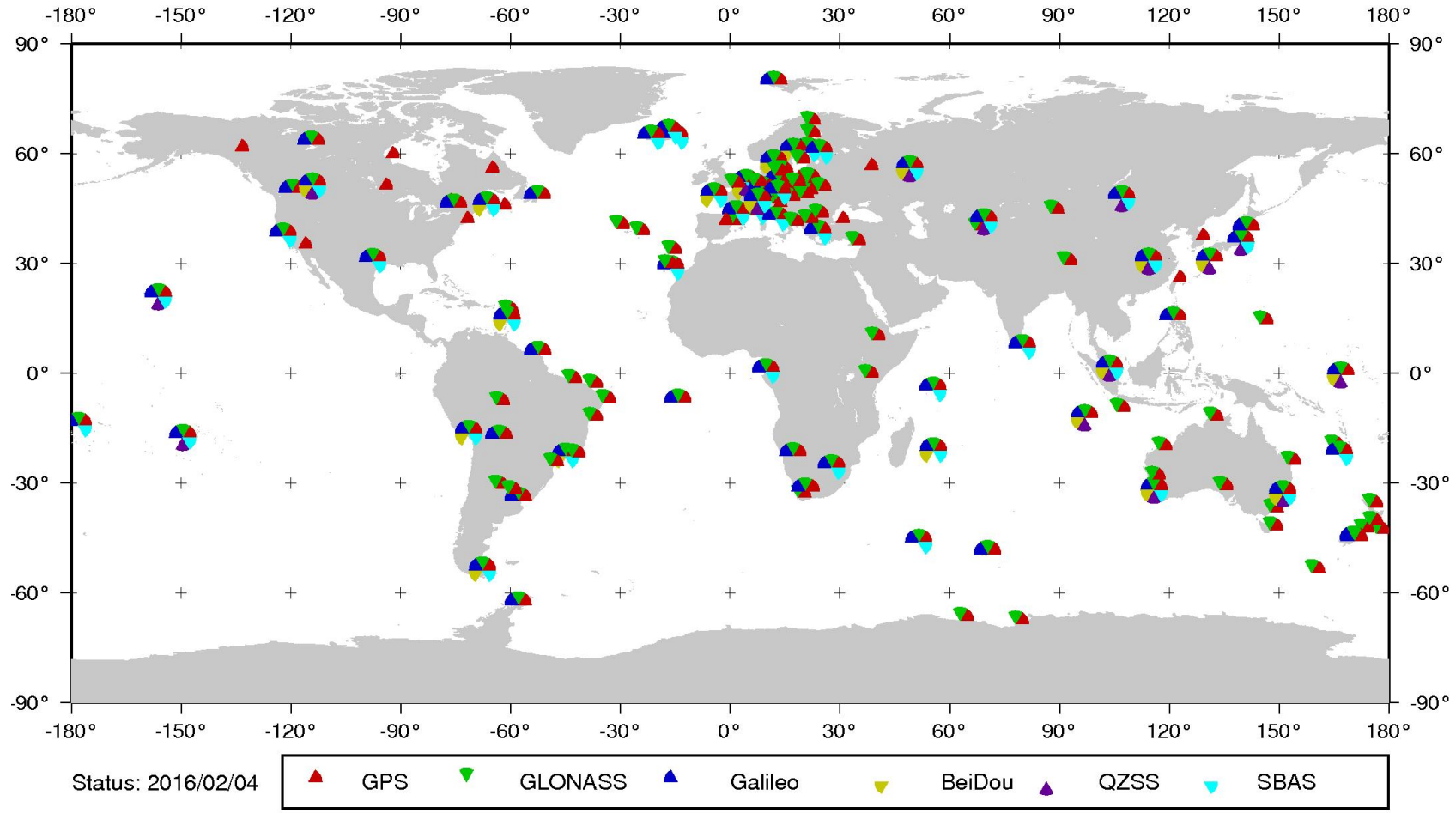
IGS RT observations

IGS RT products

IGS RT Service Limitations

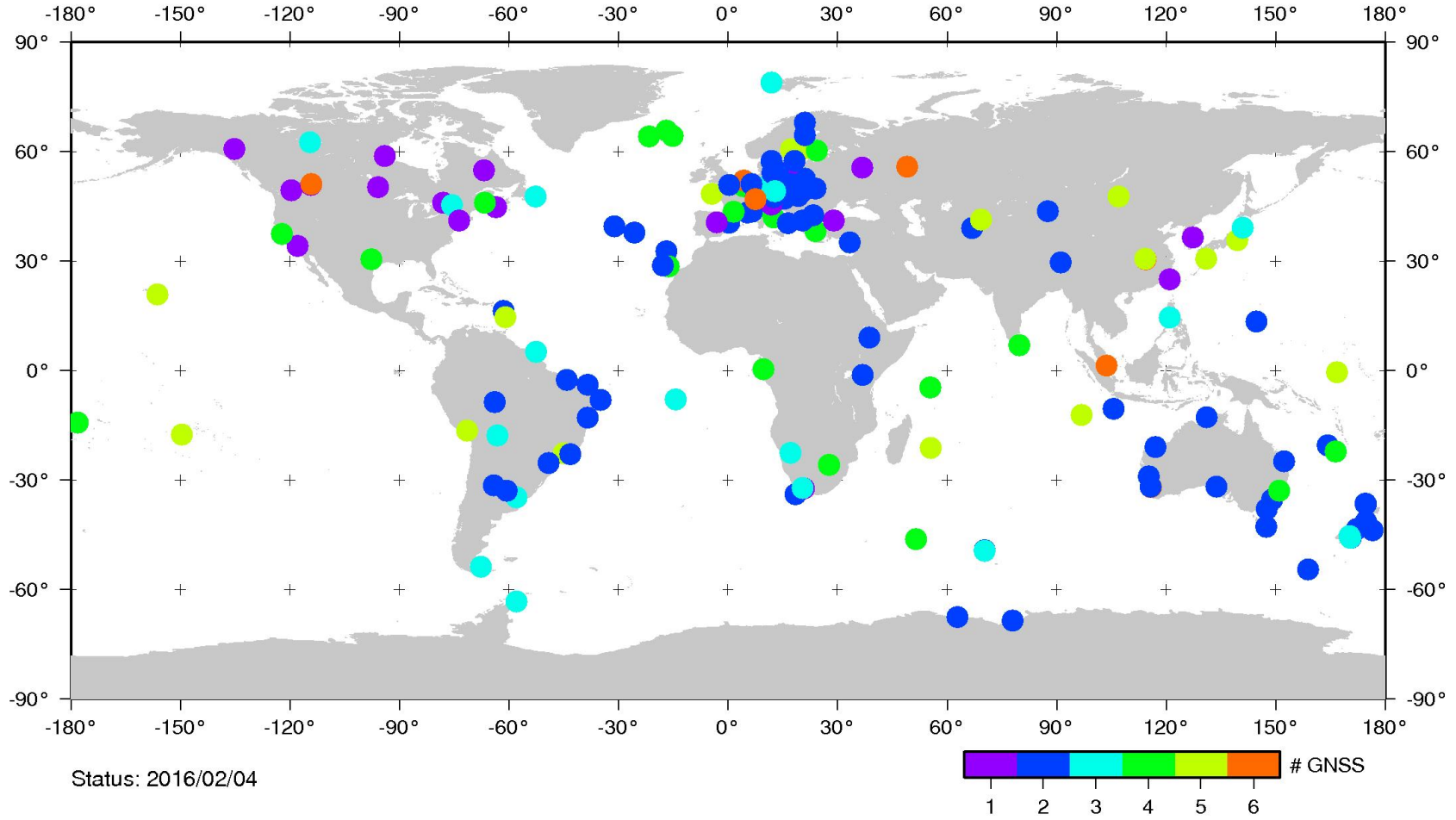
RT-Station Network

igs-ip.net
mgex.igs-ip.net

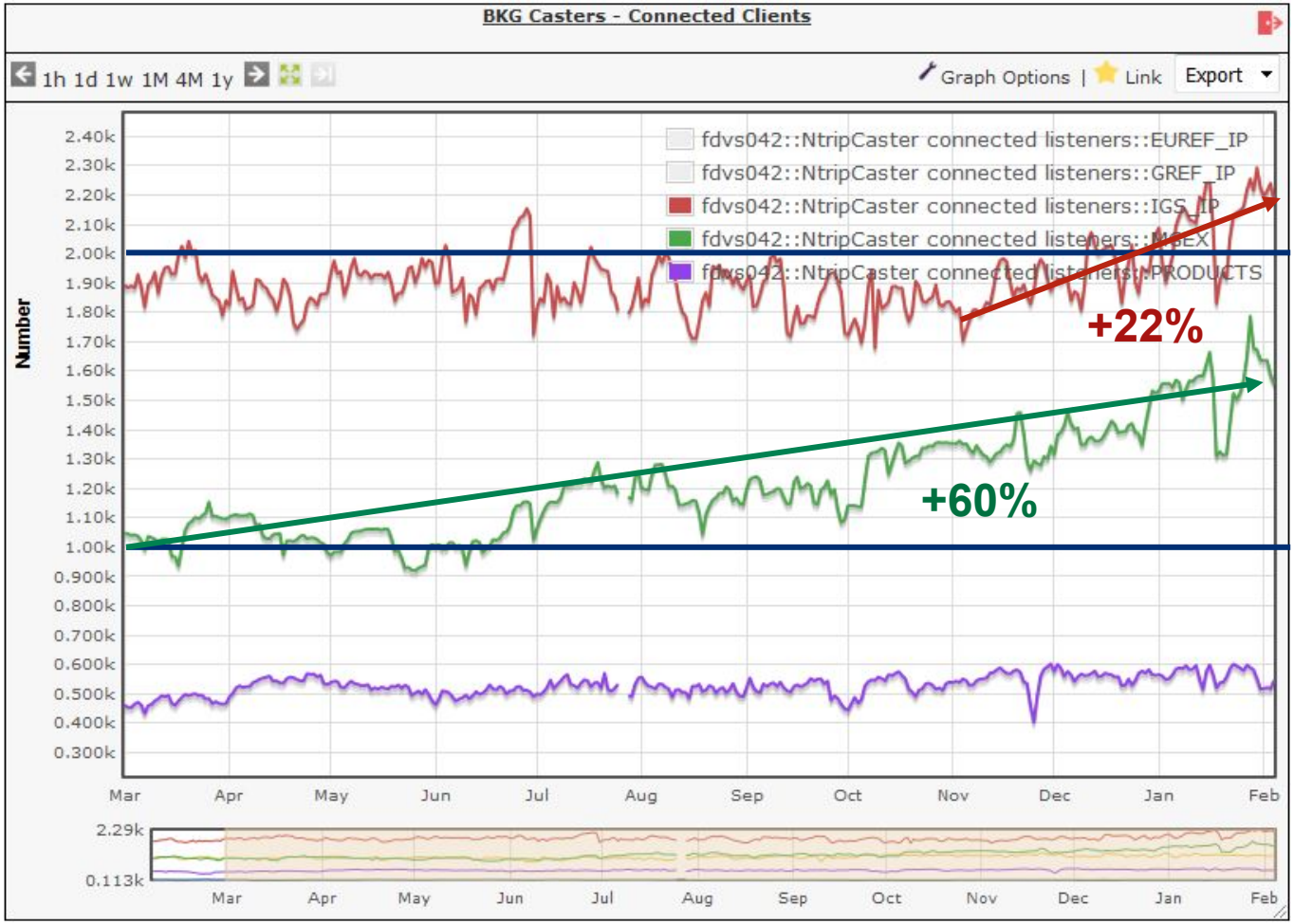


RT-Station Network

igs-ip.net
mgex.igs-ip.net



Connected clients at BKG casters



Optimization of RT infrastructure

- Increasing number of users on primary casters igs-ip.net, mgex.igs-ip.net
- If all registered users would pull the datastreams they are allowed to, the BKG casters would colapse.
- Re-organization of IGS RTS caster network is needed:
  - flat hierarchy in order to keep latency small
  - scalable
  - globally well distributed access points
  - High redundancy
- Encourage station providers to send 2 independent data streams directly to intependent casters
- Encourage station providers to send RTCM-MSM data streams, as soon as possible, preferable in addition to raw data streams (for experimental use only)

Standardization, SSR RTCM-SC104

System / RTCM SSR Message (* proposed)	GPS	GLONASS	Galileo	SBAS	QZSS	BDS
Orbits	1057	1063	1240*	1246*	1252*	1258*
Clocks	1058	1064	1241*	1247*	1253*	1259*
Code Biases	1059	1065	1242*	1248*	1254*	1260*
Combined Orbits and Clocks	1060	1066	1243*	1249*	1255*	1261*
VTEC	1264*					
Phase Biases	1265*	1266*	1267*	1268*	1269*	1270*

IGS-RTS: Products

AC	Mountpoints with Message Types and Update Rates
BKG	CLK00/10 (CoM/APC): **1057(60),1058(5)** CLK01/11 (CoM/APC): **1057(60),1058(5)**,1063(60),1064(5)
CNES	CLK90/91 (CoM/APC): 1059(5),**1060(5)**,1065(5),1066(5),1264(56),1265(10) CLK92/93 (CoM/APC): 1059(5),**1060(5)**,1065(5),1066(5),1242(5),1243(5),1261(5), 1264(60),1265(15)
DLR	CLK20 (APC): 1059(5),**1060(5)** CLK21 (APC): 1059(10),**1060(10)**,1066(10)
ESA	CLK52/53 (CoM/APC): **1059**(1815),1060(5)
GFZ	CLK70/71 (CoM/APC): **G Orbits/Clocks**
GMV	CLK80/81 (CoM/APC): **1059(5)**,1060(5),1066(5)
NR Can	CLK22 (APC): **1059(5)**,1060(5)
Wuhan	CLK15/16 (CoM/APC): **1059(5)**,1060(5)

GPS Orbits and Clocks

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GPS Orbits and Clocks

GLONASS Orbits and Clocks

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GPS Orbits and Clocks

GLONASS Orbits and Clocks

Galileo Orbits and Clocks

BDS Orbits and Clocks

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GPS Orbits and Clocks

GLONASS Orbits and Clocks

Galileo Orbits and Clocks

BDS Orbits and Clocks

CODE Biases

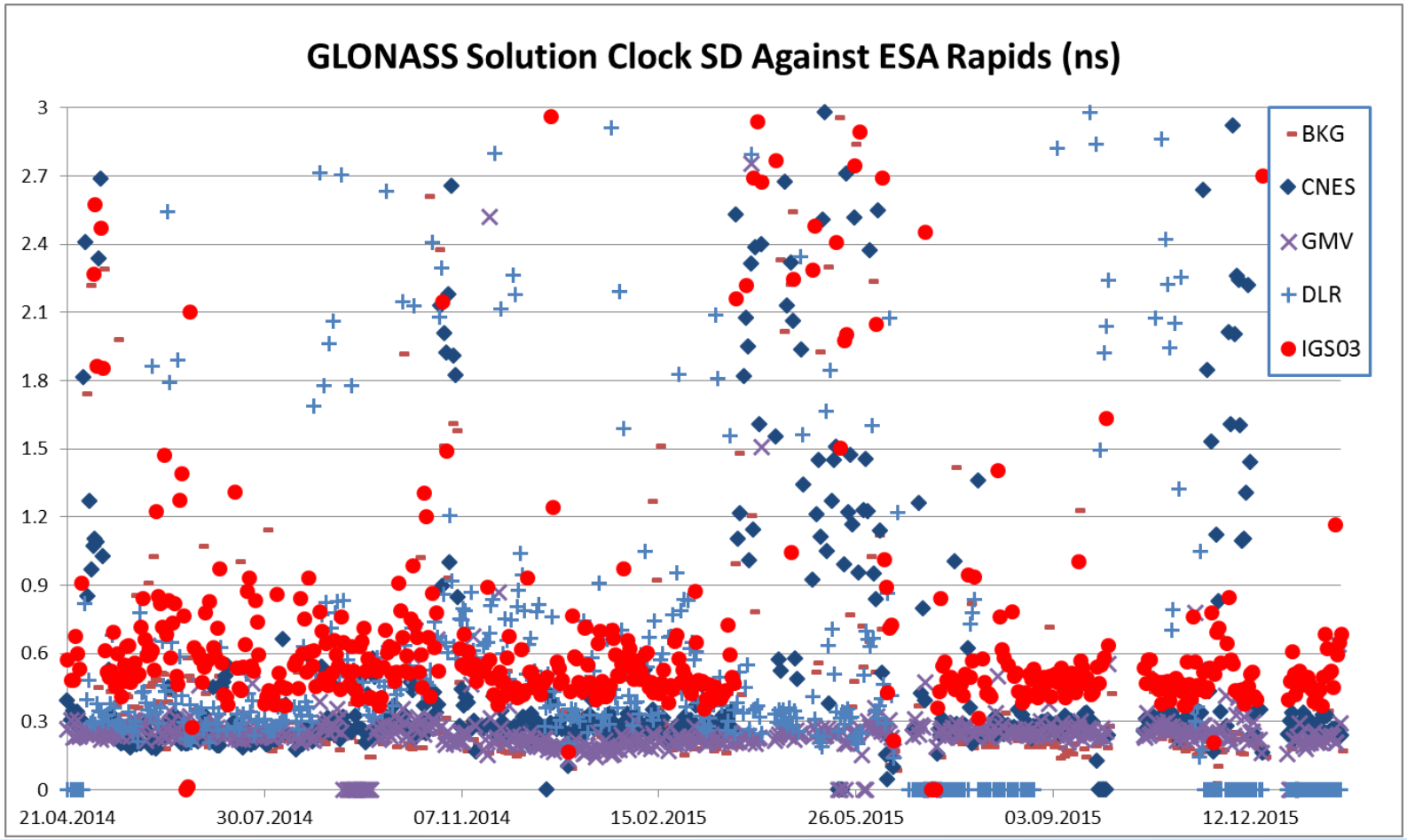
Phase Biases

VTEC

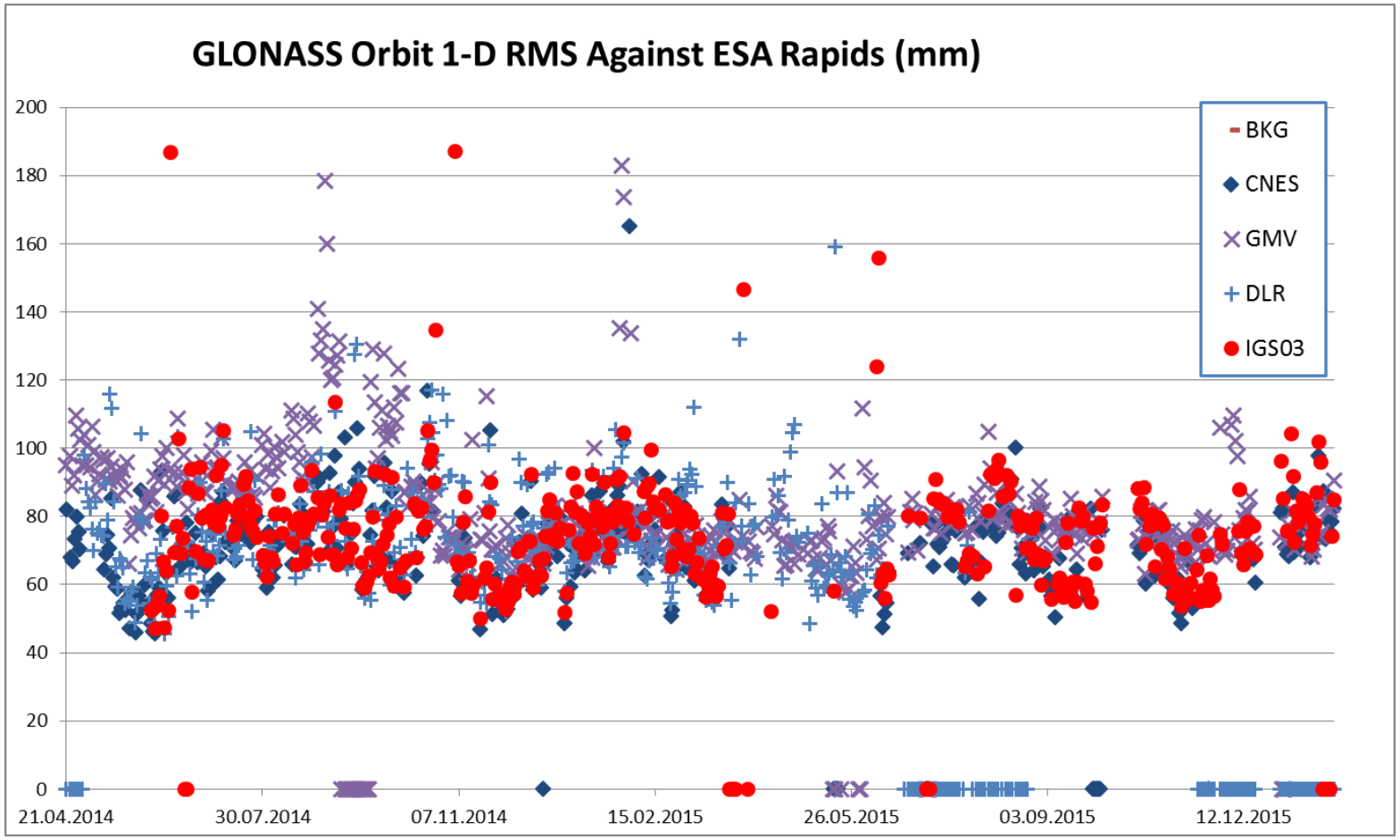
IGS RT Products

Stream	Description	RTCM-Messages	RP	CC/Soft-ware
IGS01 IGC01	GPS only orbit / clock correction, orbit: average value from all contributions clock: weighted average	1059(5),1060(5)	APC CoM	ESOC/ RETINA
IGS02 IGC02	GPS only orbit / clock correction, Kalman filter combination orbit: extracted from one specific AC clock: estimated using clocks from individual ACs as pseudo observations	1057(60), 1058(10), 1059(10)	APC CoM	BKG / BNC
IGS03 IGC03	GPS + GLONASS same procedure as for IGS02/ IGC02	1057(60), 1058(10), 1059(10), 1063(60), 1064(10), 1065(10)	APC CoM	BKG / BNC

GLONASS - Clocks

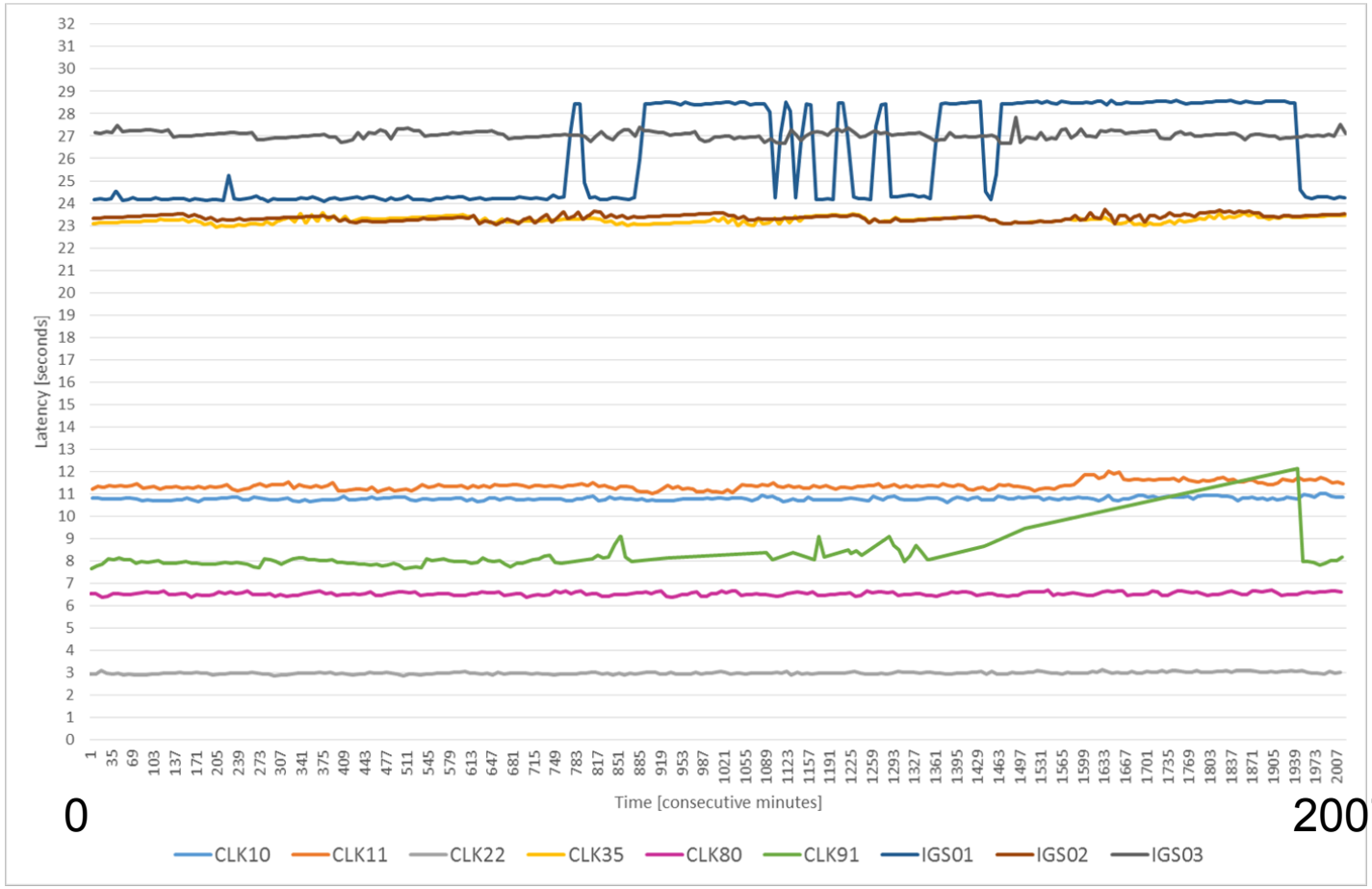


GLONASS - Orbits



Latency of product data streams

products.igs-ip.net



Future Tasks

- Improvement of latency of IGS RTS products
  - Latency optimized network
  - Optimization of syncronisation times
- Enhancement of RTS monitoring
  - Monitoring of broadcast ephemeris
  - Developement of a notification system
- Implementation of other constellations
- Estimation of additional SSR modelling parameters
- Encouragement of development of open standards within RTCM SC104
  - Encouragement of participation in interoperability testing → Software development

Limitations of the IGS RTS?

- At least for some commerical players the IGS RTS is noticed as a competitor.
- This fact might be one reason for deleceration of the acceptance of open standard developements (especially SSR corrections).
- The IGS should work out a clear product policy for IGS RTS products which is inline with the IGS mission:

The International GNSS Service provides the highest quality GNSS data, products, and services in support of the terrestrial reference frame; Earth observations and research; positioning, navigation, and timing (PNT); and other applications that benefit the scientific community and society.

Thank you for your kind attention!

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