



IGS Network Challenges the IC view: Stations, Network, Formats, Multi-GNSS

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“ The IC is a forum of experts that develops policies, standards, guidelines, recommendations, and other initiatives to maintain and improve the GNSS data and information systems upon which IGS product quality and responsiveness rely.”

IGS IC Charter, 2009

Members: Carine Bruyninx (OMA), Lou Estey (UNAVCO), Gary Johnston (GA), Ignacio (Nacho) Romero (ESA/ESOC), Mike Schmidt (NRCan), Georg Weber (BKG), Steve Fisher - CB, Jake Griffiths - ACC, Mark Caissy – RTWG Chair, Bruno Garayt - RF Coordinator, Carey Noll – DCWG Chair, Ken Senior - Clock Products Coordinator



Site Guidelines



- Guidelines have been under work for some time and reviewed at IC and NC extensively.
- Open for general IGS review in April (IGSMail 6573) here:
<http://igs.org/network/guidelines/proposed.html>
- Corrections have been received both general and specific to Real-Time section.
- Please review and provide input ...

IGS Stations



- Recovered and New Stations
- NGA stations ...
- Antennas and Radomes!

STATIONS

NETWORK

FORMATS

REAL-TIME

M-GEX



NGA stations



NGA added its stations for the **repro1** effort, they consist of 22 double stations at 11 sites – stations have been out since '09



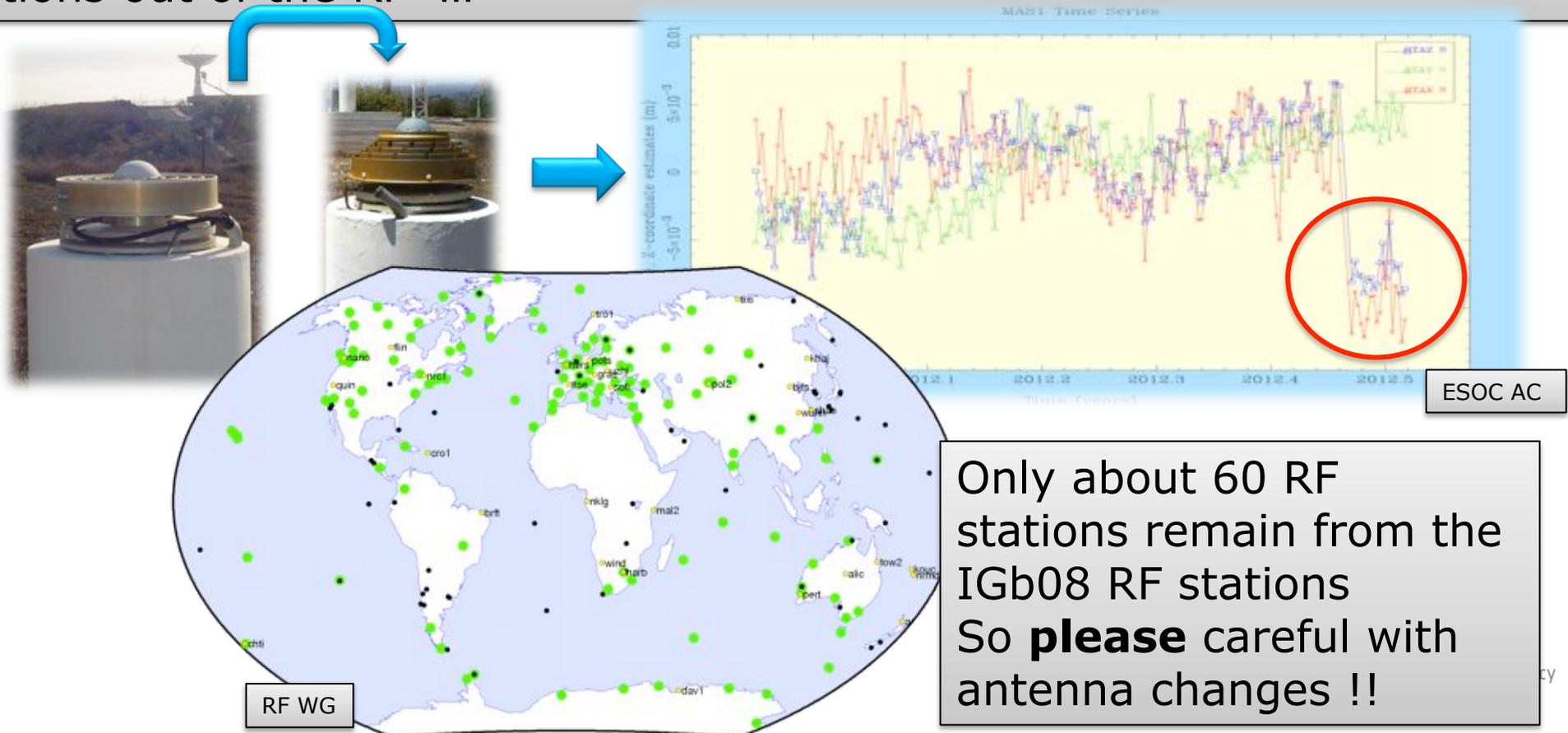
NGA upgraded equipment to unknown ITT receivers/antennas, we have identified the equipment into **rcvr_ant.tab**, added calibration from NGS to **antex** but data has $\frac{1}{2}$ phase cycle ambiguity, until a correction is found by NGA the data will continue to be out.



Antenna and Radomes



Antenna changes can cause stations to experience position jumps. The **new site guidelines recommend parallel installations for new equipment** to be tested. This is the main anthropogenic cause for stations out of the RF ...



Only about 60 RF stations remain from the IGb08 RF stations
So **please** careful with antenna changes !!



Antenna and Radomes



SMST - Addition of an uncalibrated Radome is a **disaster**. The station is collocated with SLR so its important and we will attempt to have radome removed or to add to Radome experiment.

12475410	TRM41249.00	TZGD	ANT # / TYPE
1.8660	0.0000	0.0000	ANTENNA: DELTA H/E/N
12475410	TRM41249.00	DOME	ANT # / TYPE
1.9550	0.0000	0.0000	ANTENNA: DELTA H/E/N

Change took place **in March**, header changed 10 May, 2012, no IGSStation mail, no new log! NC, IC, ACs, ACC all concerned ...



Calibrated



Uncalibrated



Antenna and Radomes



Uncalibrated radomes are a significant problem at SLR and VLBI sites, where their ITRF08 tie discrepancies can reach 99 mm!!

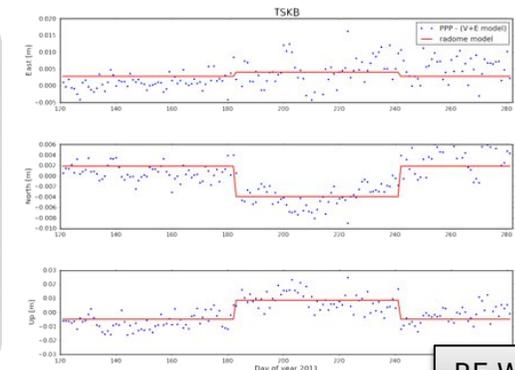
Radome-Off Test Candidate Stations



The station Operators remove the uncalibrated radome for 8+ weeks and then replace it so that the offset can be estimated before equipment is upgraded to calibrated!

Station Participation so far

	Radome Removal	Re-installation
CRO1	01-Apr-2011	24-Jun-2011
TSKB	01-Jul-2011	30-Aug-2011
TSK2	01-Jul-2011	30-Aug-2011
AREQ	19-Aug-2011	03-Feb-2012
FAIR	28-Apr-2012	Not yet
YAR2	28-Apr-2012	Not yet
GODE	06-Jul-2012	Not yet



RF WG

The IC, RFWG, ACC, AWG and CB have coordinated this effort and Station Operators have been open to participate

See poster P04-10 Tue 13:30-15:00

IGS Network

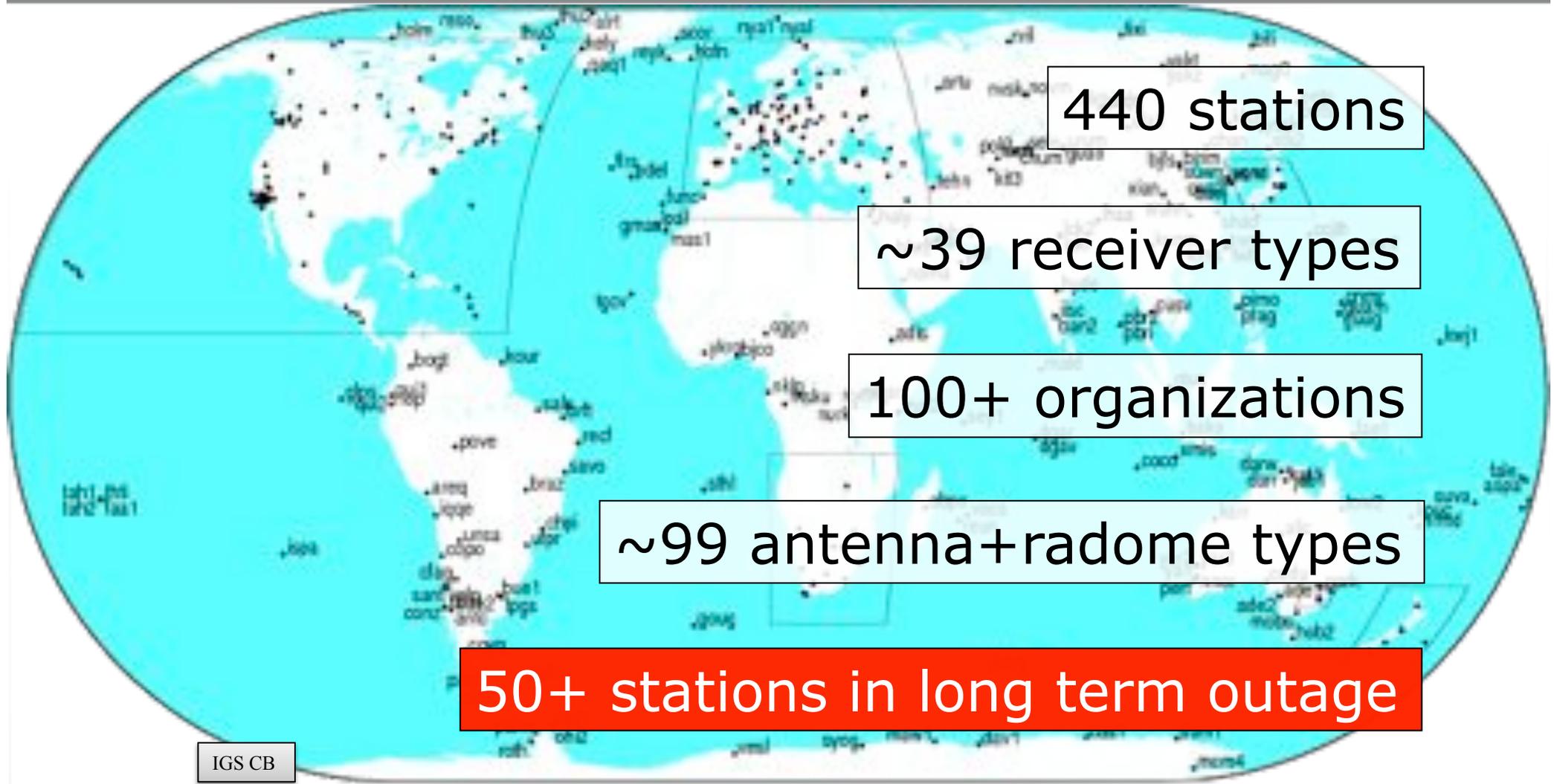


- IGS Network Status
- Network of Networks





IGS Network

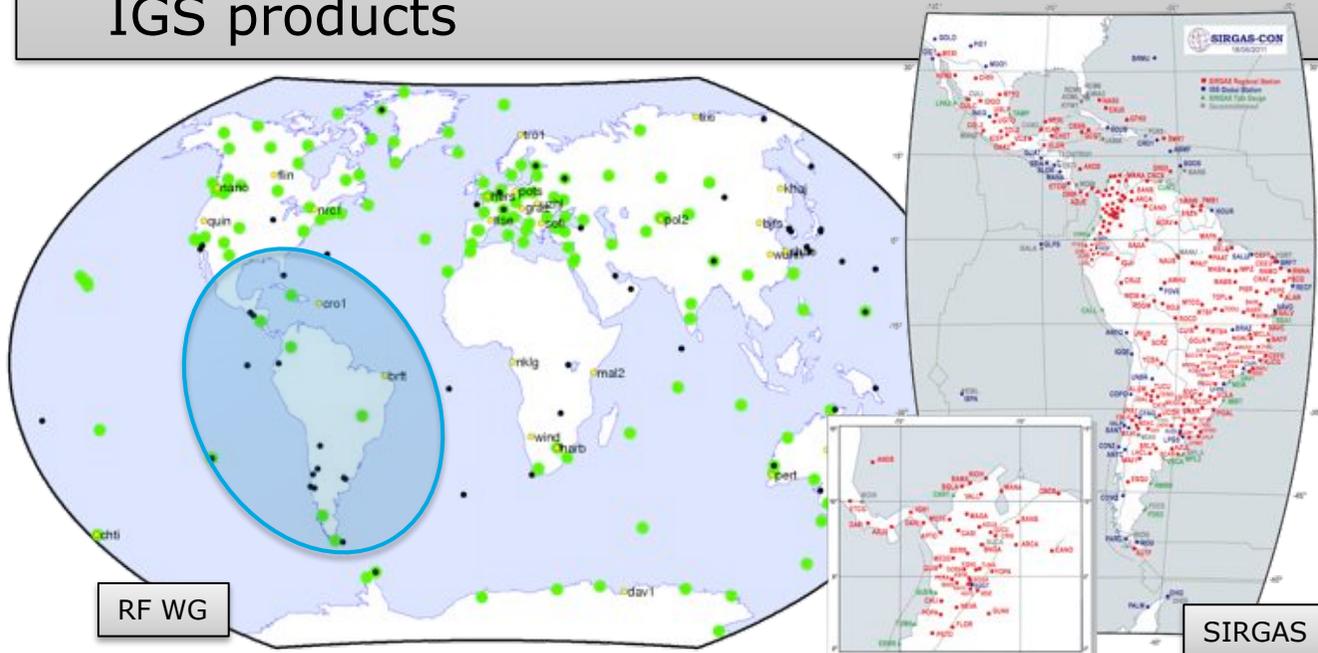




IGS Network of Networks



- In 2008 I proposed the push for the IGS to manage a **Network of Networks** as most stations can belong to a regional body
- The IGS would thus **promote adherence to the guidelines on the regional organizations** and all the stations could be used safely for IGS products



Mexico : 7+1 historic
Caribbean : 2
Colombia : 1
Venezuela : 1
Brazil : 1
Peru : 1
Bolivia : 1
Argentina : 5

37 new good stations

- The RFWG consulted with SIRGAS and proposed to ACs new stations to strengthen the RF in the long term



IGS Network of Networks



In 2012 The IC drafted a call for good regional stations in an FIG newsletter ahead of the Comm 5 meeting in Rome



International Fédération of Surveyors
Fédération Internationale des Géomètres
Internationale Vereinigung der Vermessungsingenieure

FIG Commission 5 Position and Measurement e Newsletter – March / April 2012

Dear Colleague,

Welcome to FIG Commission 5's first e-Newsletter for the year 2012. On behalf of Commission 5 we hope you all had a very festive season. In this edition you will read about the proposed technical program for our Commission at the Working Week in Rome, an "appeal" from IGS for GNSS CORS, and also a report on the working group's 2011 activities. Please feel free to distribute this newsletter to colleagues and friends.

Regards Mikael Lijé, (Mikael.Lije@in.se)
Chair of FIG Commission 5

FIG Working Week 2012 - Rome, Italy, 6-10 May 2012




IGS GNSS Reference Frame Station Appeal

Even though the IGS Network has increased over the last 10 yrs in reliability, capabilities, coverage and overall numbers, the reference frame definition using the GNSS stations continues to be a challenge. Due to earthquakes, antenna changes and monumentation or environmental problems many stations cannot be relied on for reference frame definition, and after each subsequent ITRF update there is significant decay rate of GNSS stations available for RF definition leaving large gaps in world coverage. Note in the map below in green are the current stations that we can rely on in the IGS for RF definition each week (we have to thank the IGS Reference Frame Working Group for the plot). The green stations continue to have coordinates stable enough from the reference epoch up to now, many others, in black, have dropped out for the reasons stated above.

From the IGS we are making this appeal for contributions of GNSS stations to help us shore up the reference frame definition into the future on a more solid basis by adding long running good GNSS stations from your national geodetic networks (3+ years of operations). The main geographical areas of interest for now are Africa and Central and Eastern Asia and Russia, but you can see the coverage gaps in other parts of the world, so all useful contributions are needed.

The Reference frame is the backbone of much of the modern global Earth research and it is in need of your help. The proposed station data and SINEX solutions, if available, will be analysed in the IGS for stability and then the regular station data will be invited into the IGS for processing with the aim of producing weekly coordinates as part of the IGS processing.

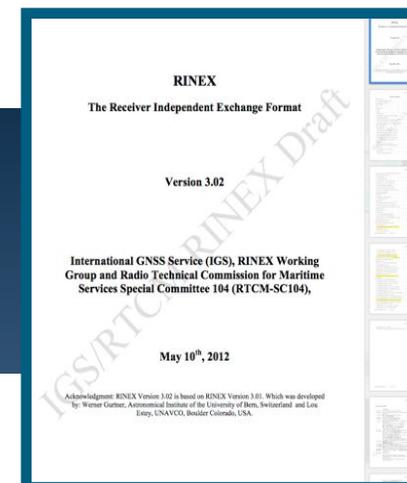
National Geodetic Agencies are asked to please contact the IGS Infrastructure Committee Chair (Ignacio.Romero@esa.int) and the IGS Reference Frame Working Group Chair (bruno.garayt@ign.fr). Thanks.

Ignacio (Nacho) Romero
IGS Infrastructure Committee



Unfortunately no feedback yet from FIG members with new station leads. Still worthwhile to be present in all forums.

Data Formats



- RINEX 2 / RINEX 3
- ~~RTCM 3 – MSM~~ (Covered by G. Weber)





RINEX 2/3



- Rinex 2.11 is the last official Rinex 2 version – just revised
- Rinex 3.0x has started to be distributed actively as part of MGEX (3.01 now, 3.02 to be approved soon), find data as part of mgex directories in CDDIS, IGN, BKG
- 3.02 will include QZSS, etc
- Rinex WG has been setup between IGS/RTCM to maintain the format
- The transition plan is under development to use Rinex 3 by 2015



RINEX 2/3



- Rinex 3.02 renaming of files !! Everybody is unhappy!
- What we cannot have is a name like now that 'assumes' many things:
mas11930.12o.Z mas11930.12n.Z mas1193a.12d.Z mas1193a15.12d.Z
- It is time to move to names that more fully describe and differentiate so we can easily store and communicate
- Have been proposed:
CAONALGONRCAN__ACSRNX_302_OBS030S0169203000001D00.hat
MAS1ES11_12001_0000_24H_30S_OBD.gz
ALGOCA00-NRC-R-20121601000-15M-RNXOG-01S.gz

Real - Time



- Streaming Stations
- RTPP stations way forward

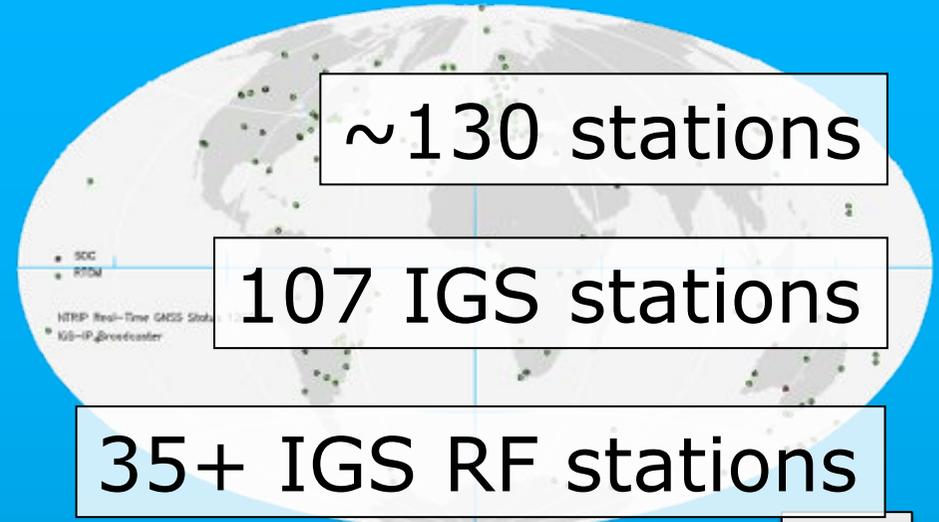




RT Stations



RTIGS



~130 stations

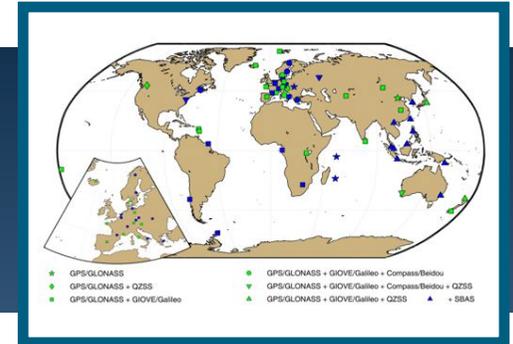
107 IGS stations

35+ IGS RF stations

BKG

- The IC is **concerned** that RT work proceeds with “good” stations that follow the guidelines either from IGS or regional.
- More **communication** is needed by RTPP to IC and NC to check/validate stations that they use.
- The IGS **RF stations are asked to move to RT** so that the RT products can access the RF, the IC/NC will promote this more.

MGEX



- MGEX Stations
- MGEX Stations way forward

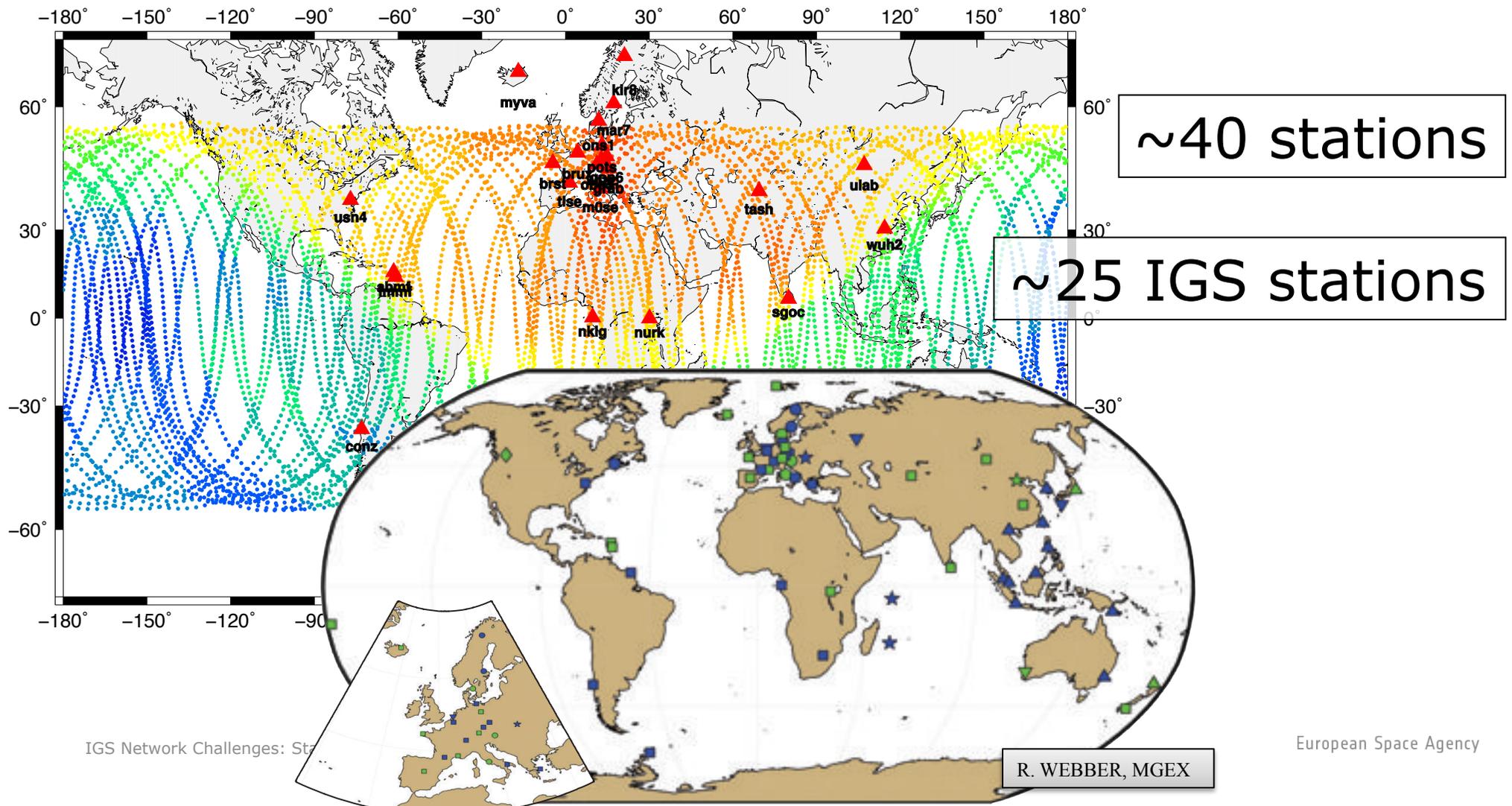




MGEX Stations



Satellite Coverage – Theory – 12120





Conclusions



IGS RT
Speed, RTCM, Global

IGS MGEX
New Signal Needs,
Global + Regional

IGS RF
Stable long term
Time Series, Global

In Conclusion

IGS Network

Need strong management
from new NC with IC help

IGS projects/experiments

Need better communication
with Ntwk

IGS Ntwk of Ntwks

NC/IC need to identify more
regional bodies with good
active stations to underpin
all IGS efforts



Thank You!

Please contact the IC with questions and concerns through one of its members or me:

Ignacio.Romero@esa.int

Also contact the NC at: cb@igs.org



IC Splinter Session –Rm 1- **Tue** 15:30 – 17:00