GSI's Vision for the AOV

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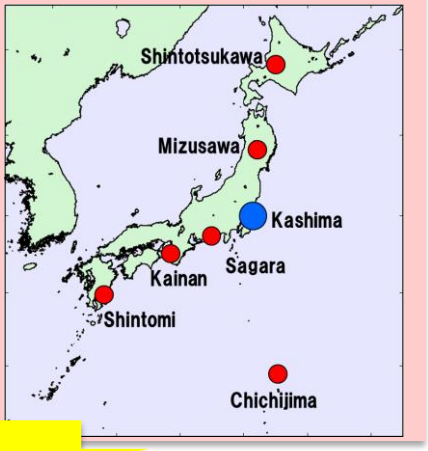
Outline

- Current Situation of GSI VLBI
  - Operation VLBI Stations
  - Correlation and Analysis
  - AOV Sessions
- Future Vision for AOV
  - Collaboration for VGOS and GGOS

Current Situation of GSI VLBI

VLBI Antennas of GSI

Transportable VLBI（1986-1993）



International VLBI（1992-2002）

Four stationary VLBI antennas (1998-)

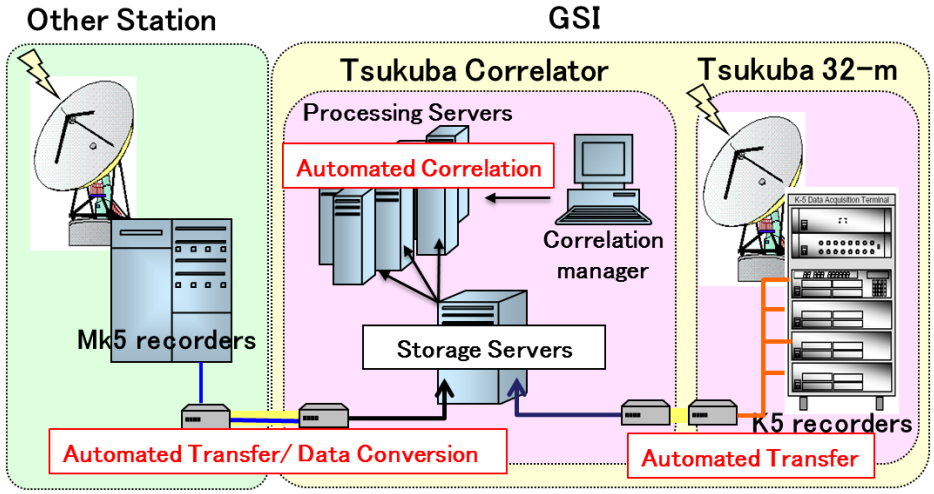
Aira 10-m　Chichijima 10-m　Shintotsukawa 3.8-m

Tsukuba Correlator/Analysis Center

Tsukuba Correlator (1998~) and Analysis Center (2009~)

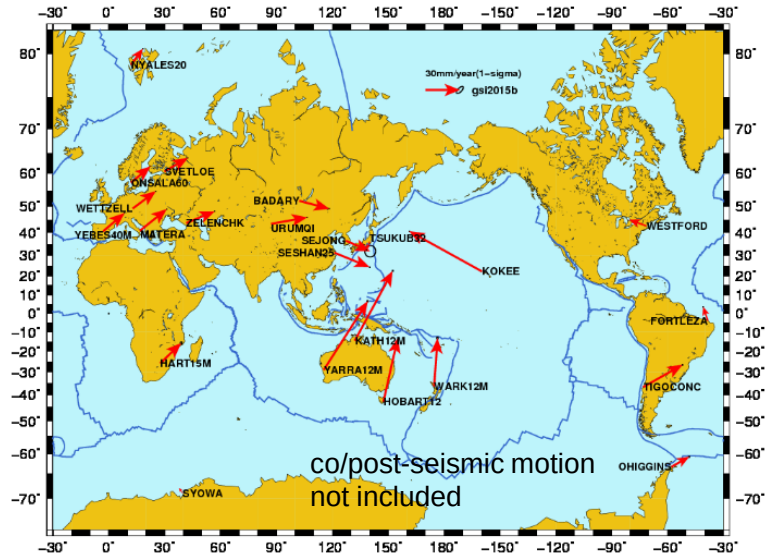
- Using
- 66 servers, >500 TB storage
- 10 Gbps network (Maximum)
- K5 software Correlator (NICT)
- Well Automated System
- C5++ for automation analysis
- Calc/Solve for final products

- Processing
- INT2s in every weekend
- JADE (Japanese domestic sessions)
- Some AOV sessions

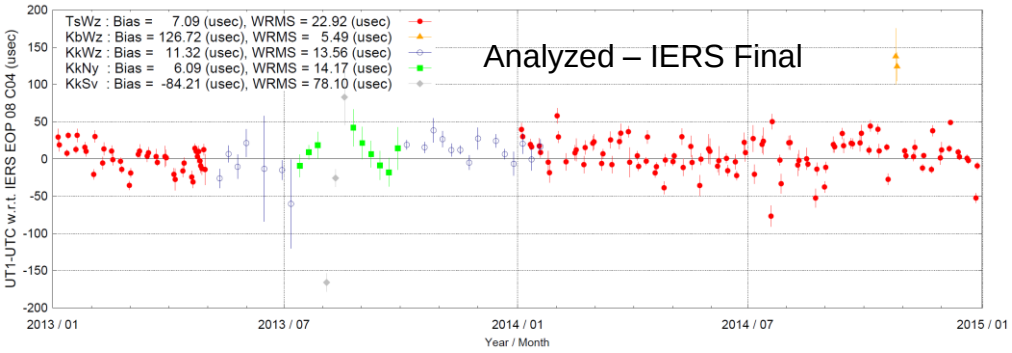


Analysis Results

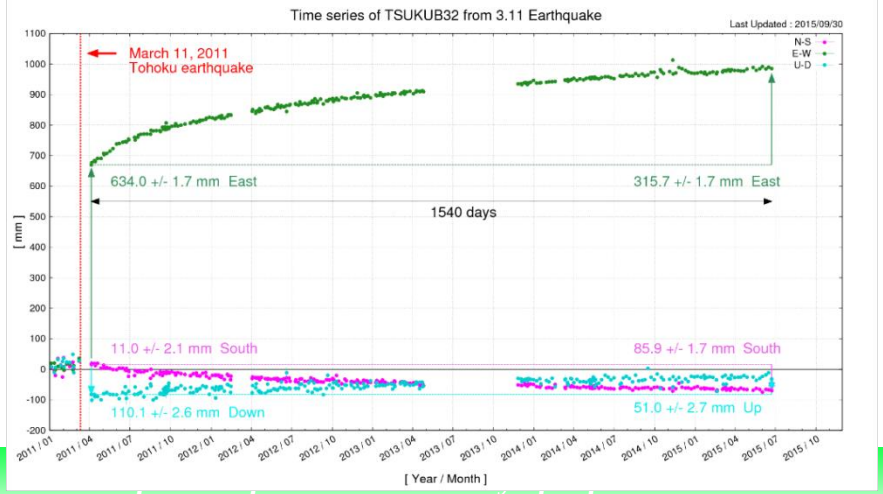
Station Velocities



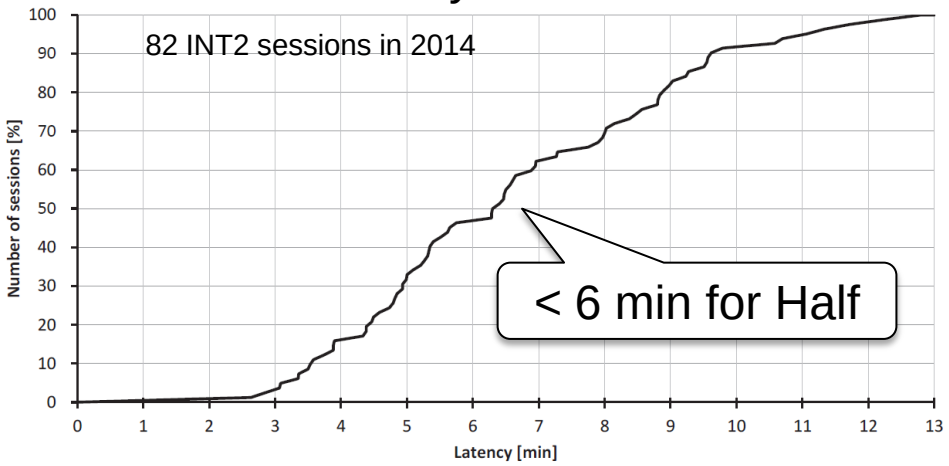
dUT1



Station Positions



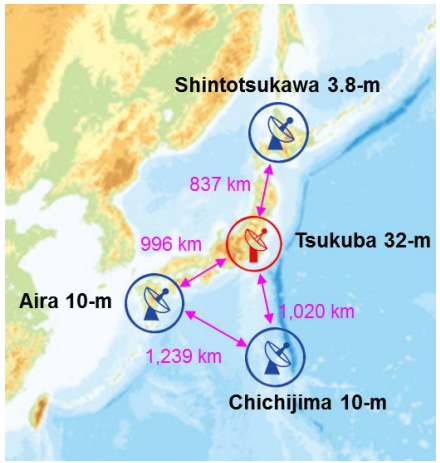
Latency Distribution



Recent Situation of GSI

- Construction of Ishioka VGOS antenna (2014)
  - Ishioka will take over the role of Tsukuba
- Operation of Regional Antennas Stopped
  - Shintotsukawa (Dec. 2013), Aira and Chichijima (Mar. 2015)
- No regular JADE
  - Japanese Domestic session scheduled, observed, and correlated by GSI
  - Some for Tsukuba-Ishioka Tie (17 km)
  - Loosing opportunities of scheduling and correlation

⇒ AOV



GSI within AOV

AOV sessions in 2015

SESSION NAME	SESSION CODE	DATE mondd	DOY ddd	TIME hh:mm	DUR hr	STATIONS	SKED	CORR
AOV001	AOV001	MAR21	80	00:00	24	AiHbIsK1KeKmShTsUrWwYg	UTAS	SHAO
AOV002	AOV002	APR30	120	19:00	24	HbIsKeKvSyTsVmWwYg	GSI	GSI
AOV003	AOV003	MAY17	137	00:00	24	HbHoIsK1KeKgKmPaT6TsWwYg -Vm	UTAS	GSI
AOV004	AOV004	AUG26	238	18:00	24	HbIsKbKeKvShTsWwYg	SHAO	NGII
AOV005	AOV005	SEP26	269	00:00	24	IsK1KbKeKgKmTsVmWwYg -HoUr	GSI	NGII
AOV006	AOV006	DEC16	350	18:00	24	HbIsKbKeKmKvTsUrWwYg -Sh	SHAO	SHAO

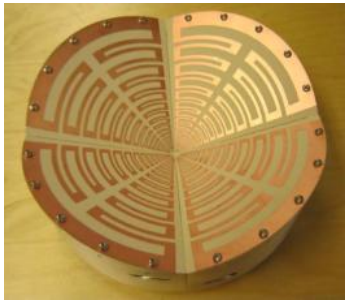
- Observation
  - 6 sessions by Tsukuba and Ishioka
- Scheduling
  - 2 sessions
- Correlation
  - 2 sessions including SYOWA in Antarctic

GSI could still accomplish VLBI by our selves

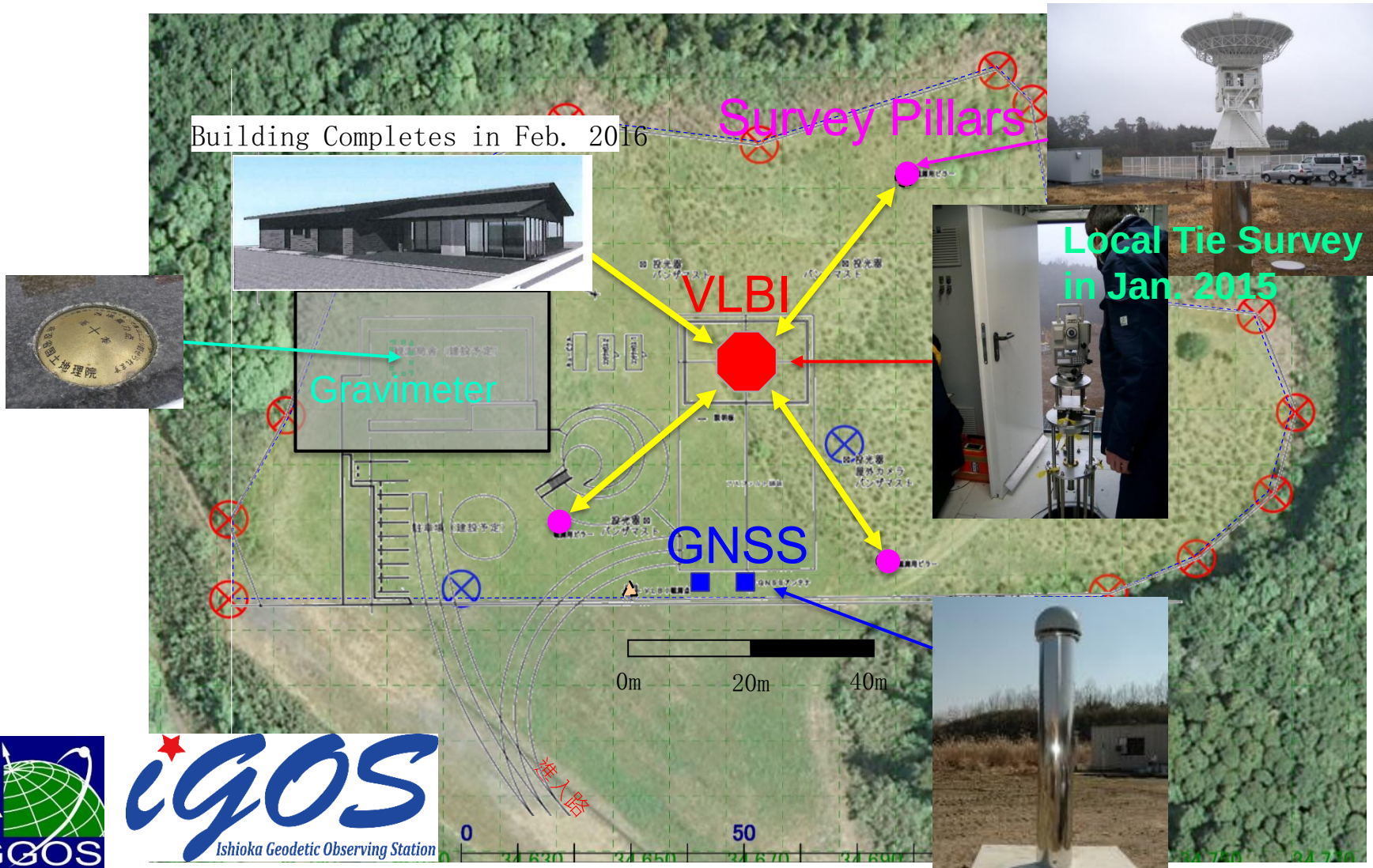
Ishioka VGOS Antenna

Diameter	13.2 m
Frequency Range	2–14 GHz
Optics	Ring Focus
Surface Accuracy	≦0.08mm (RMS)
Aperture Efficiency (S/X)	59% / 77%
Slew Rate (Az/El)	12 / 6 deg/s
SEFD (S/X)	1700 Jy / 1300 Jy

- Front-end (Broadband and S/X/Ka)
- K6 Samplers
- Recording Servers
- Two Hydrogen Masers



Co-location in Ishioka



iGOS Ishioka Geodetic Observing Station

国土地理院


Oct. 5, 2015

Operation of Ishioka

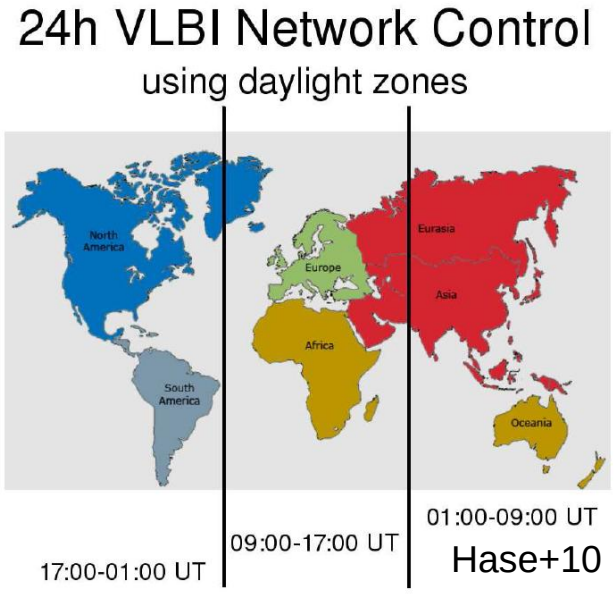
- 2015
  - AOV, JADE, R1(tag-along) in 2015
  - Broadband Experiments with NICT (Jan. and Jul.)
- 2016
  - Building Complete in Feb.
  - Antenna Not Available during Jan.-Mar.
  - AOV, APSG, R1, T2, JADE (if necessary) from Apr.
  - 3 Broadband Sessions (VGOS-p) during Aug.-Sep.

Future Vision for AOV

Collaboration in VGOS

- Technology
  - Information Sharing on Broadband Receiver and High-Speed Sampler
  - Experimental VGOS (Broadband) sessions in AOV

  (e.g. in next summer for Ishioka)
- Operation (in future)
  - Operation Center for AOV
  - Mutual Backup of weak network in this region

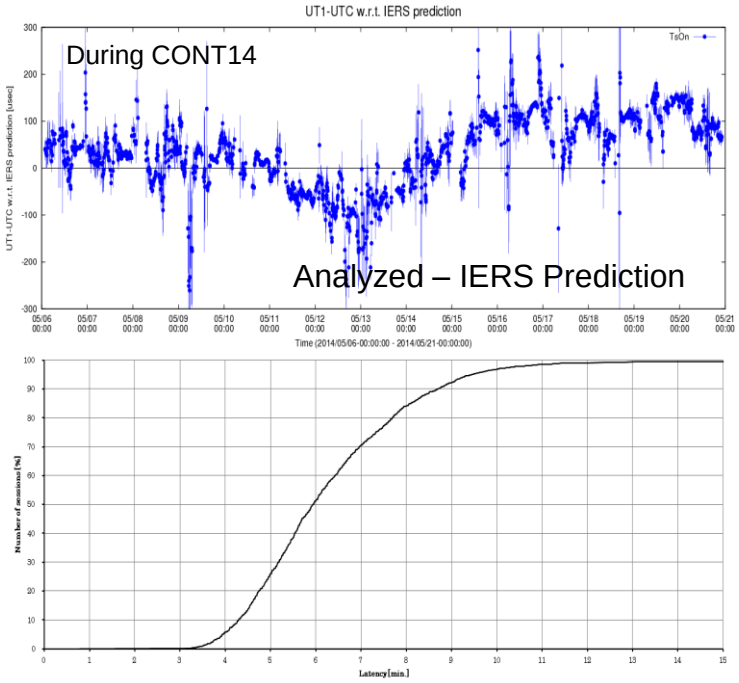


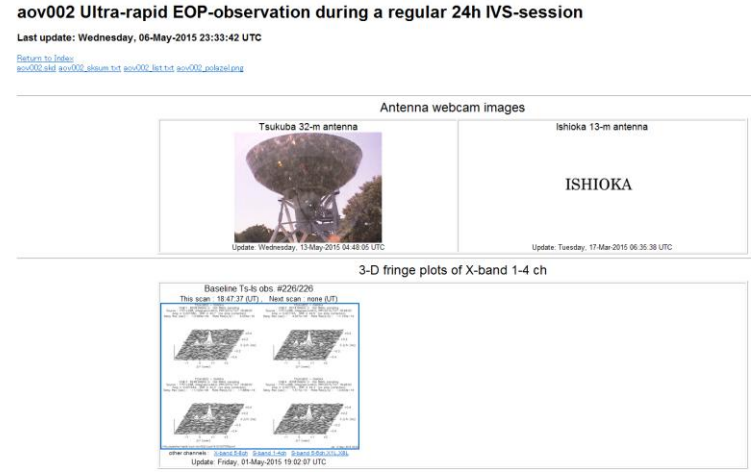
Near Real-time Process in AOV

- Ultra-rapid EOP determination by Automated Correlation/Analysis
  - Some Experiments with Hobart, HartRAO, Onsala

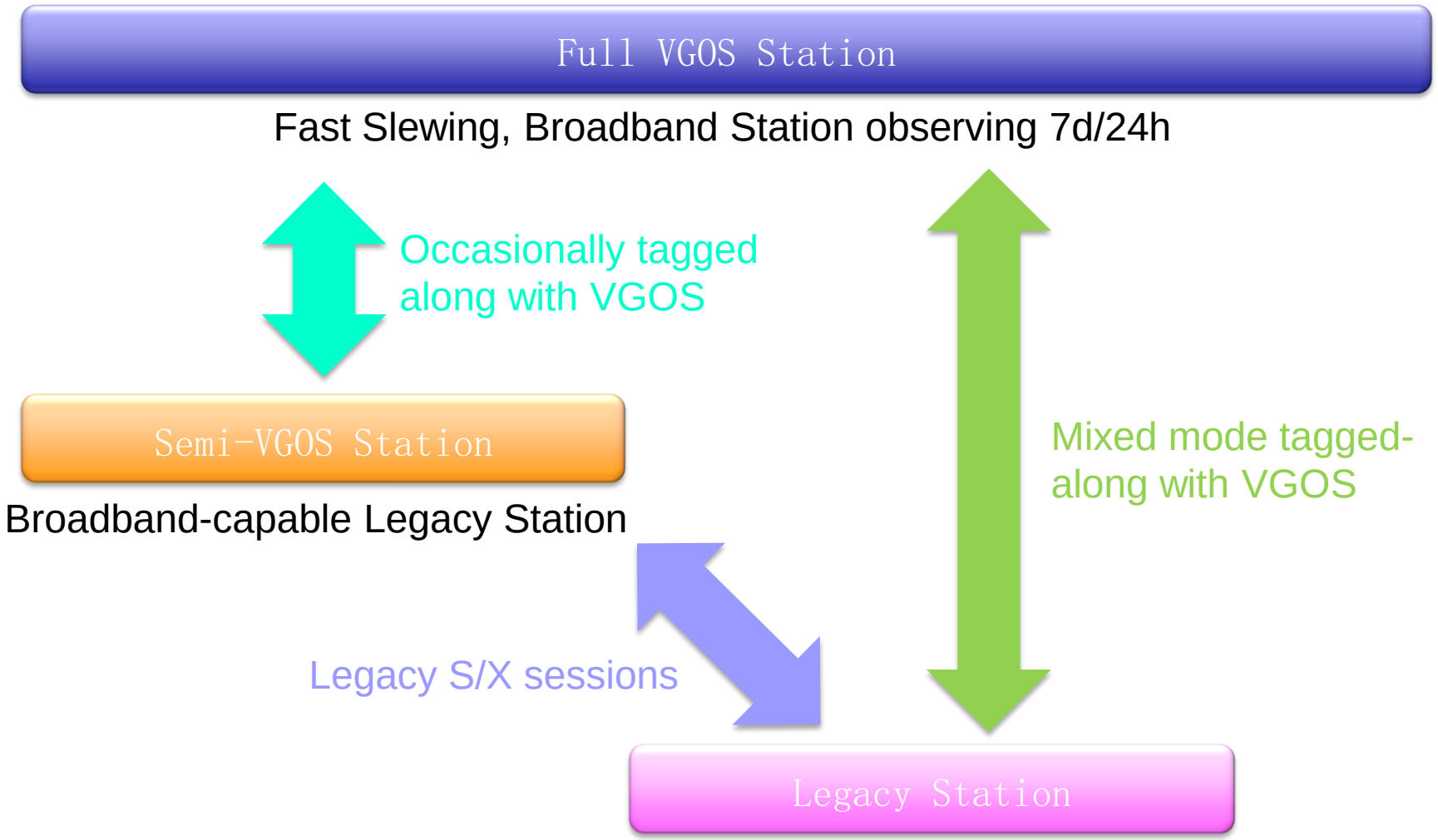
For AOV network,

- Ultra-rapid Correlation
  - Real time Check for Antenna system
- Ultra-rapid EOP determination
  - Network suitable for Polar Motion?
- Stations with enough bandwidth?





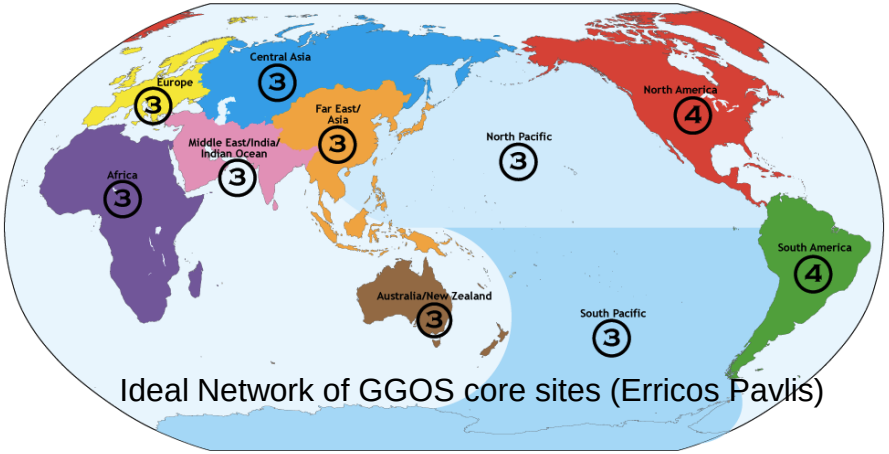
VGOS-Legacy Tie



Collaboration for GGOS

- Other Space Geodetic Techniques (GNSS, SLR, DORIS)
- Local Tie Surveying

⇒ Sharing Technical and/or Operational Information



Ideal Network of GGOS core sites (Erricos Pavlis)

Local Tie with GSI VLBI

Year, Month	Site	σ for Baseline	Submission to IERS	Contribution to ITRF
2001, Mar.	Tsukuba	---	Yes	ITRF2005
2006, Oct.	Chichijima	1.4 mm	---	---
2008, Feb	Tsukuba	1.0 mm	Yes	ITRF2008
2008, Oct.	Aira	2.3 mm	Yes	ITRF2014?
2010, Sep.	Shintotsukawa	0.4 mm	Yes	ITRF2014?
2011, Jul.	Tsukuba	1.1 mm	Yes	ITRF2014?
2013, Feb.	Chichijima	1.0 mm	Yes	ITRF2014?
2015, Jan.	Ishioka	0.6 mm (Preliminary)	Not yet	ITRF20xx?

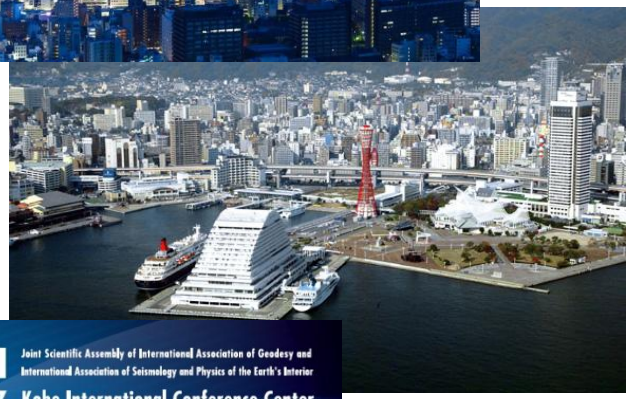
IAGGOS

iGOS
Ishioka Geodetic Observing Station

IAG 2017

- Joint Assembly of IAG and IASPEI
- Date: July. 30 – Aug. 4, 2017
- Venue: Kobe International Conference Center
- AOV-Related Meeting?


Great Hanshin Earthquake, Jan. 17, 1995



Summary

- Current Situation of GSI VLBI
  - Developing Automated process
  - Transition to VGOS by Ishioka
  - AOV activities for GSI VLBI
- Future Vision for AOV
  - Collaboration in VGOS Era
  - GGOS

Thank you !!