The future global VLBI2010 network of the IVS

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VLBI2010 Project Executive Group

20th EVGA Meeting & 12th IVS Analysis Workshop, Bonn, Germany, March 22-24, 2011

V2PEG

- The IVS Directing Board decided in its meeting in Bordeaux on March 23, 2009, to establish the IVS VLBI2010 Project Executive Group.
- It will provide strategic leadership to the VLBI2010 project and guide the transition from the VLBI2010 development phase to the VLBI2010 implementation phase.

VLBI2010 in a nutshell

- continuous observation in 30s slew/track cycles
- very fast radio telescopes, ≥12m reflector class, kinematic parameters: v_{Az}=12°/s, v_{El}=6°/s, a_{AzEl}=3°/s²
- wideband feed, 2-14 GHz (2-18 GHz)
- digital baseband converter
- high-sampling data acquisition rate, ≥ 8Gb/s
- e-transfer, e-VLBI
- distributed remote controlled continuous operation
- software correlator
- automated analysis

Why VLBI2010?

- IVS is a Service of International Association of Geodesy (IAG).
- IAG contributes to the Global Earth Observing System of Systems (GEOSS) with the Global Geodetic Observing System (GGOS) .
- GGOS goal is to reach on a global scale:
  - 1mm position accuracy, 0.1mm/yr velocity accuracy
  - continuous observations
  - availability of results in near real-time

The realization of GGOS requires the application of the VLBI2010 concept to IVS components.

IVS Network Station Survey

December 2010

Objectives:

- gather information about VLBI2010 plans,
- trigger VLBI2010 discussion at network station level,
- get input on what the V2PEG can do to best support individual VLBI2010 projects.

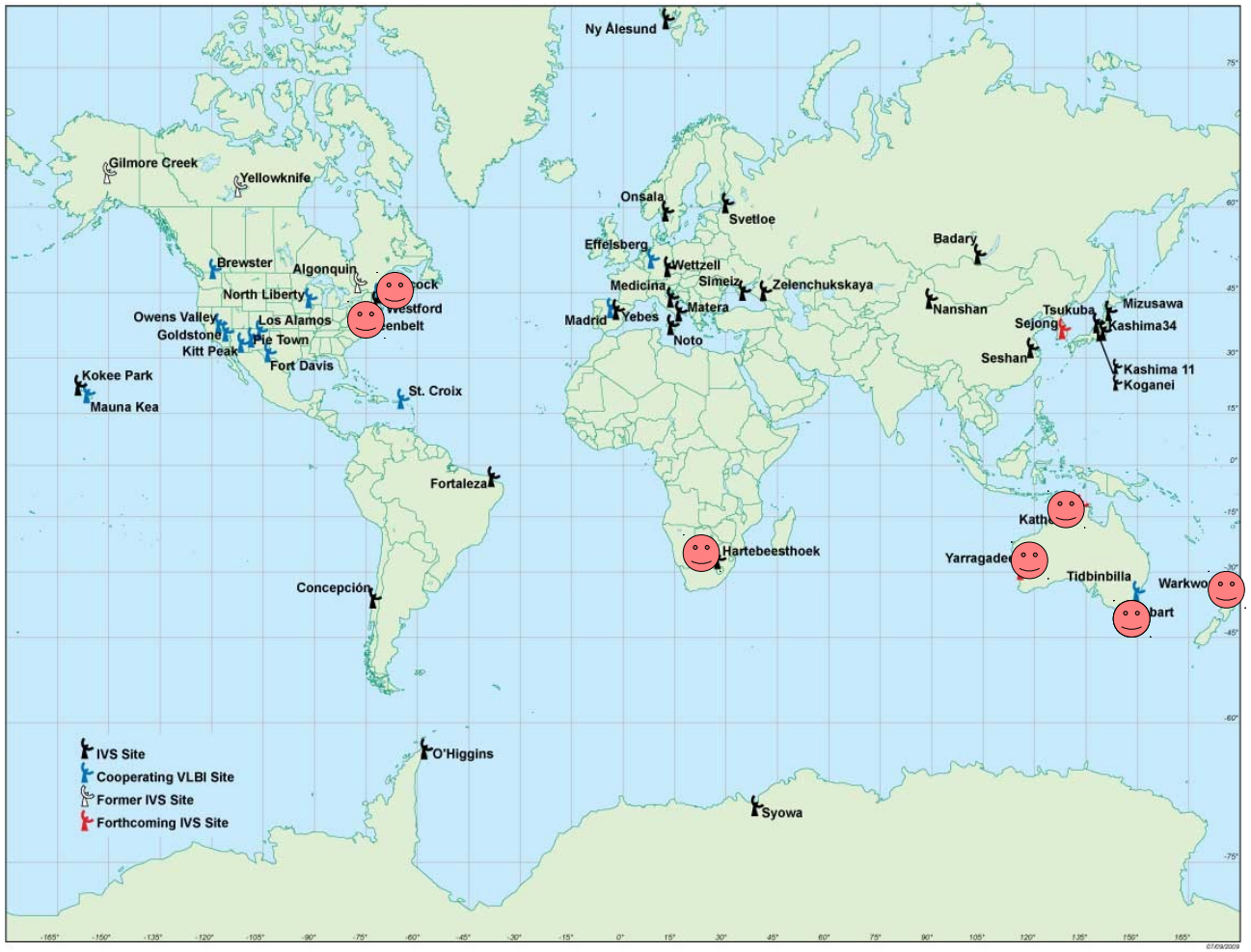
31/31 network station responded to the survey.

An analysis report was redistributed to the IVS network stations in January 2011.

Six Questions

1. Specify plan to upgrade your site to full VLBI2010 capability.
2. Do you plan to acquire a new radio telescope that doesn't fully meet the VLBI2010 recommendations?
3. Do you plan to continue operating your existing legacy radio telescope in the future?
4. What is the best estimate of the year in which your VLBI2010 capability will become operational?
5. At what stage are you in the planning process?
6. What support do you need from the IVS?

VLBI2010 Network in 2011



VLBI2010 very fast

radio telescope

twin radio telescope

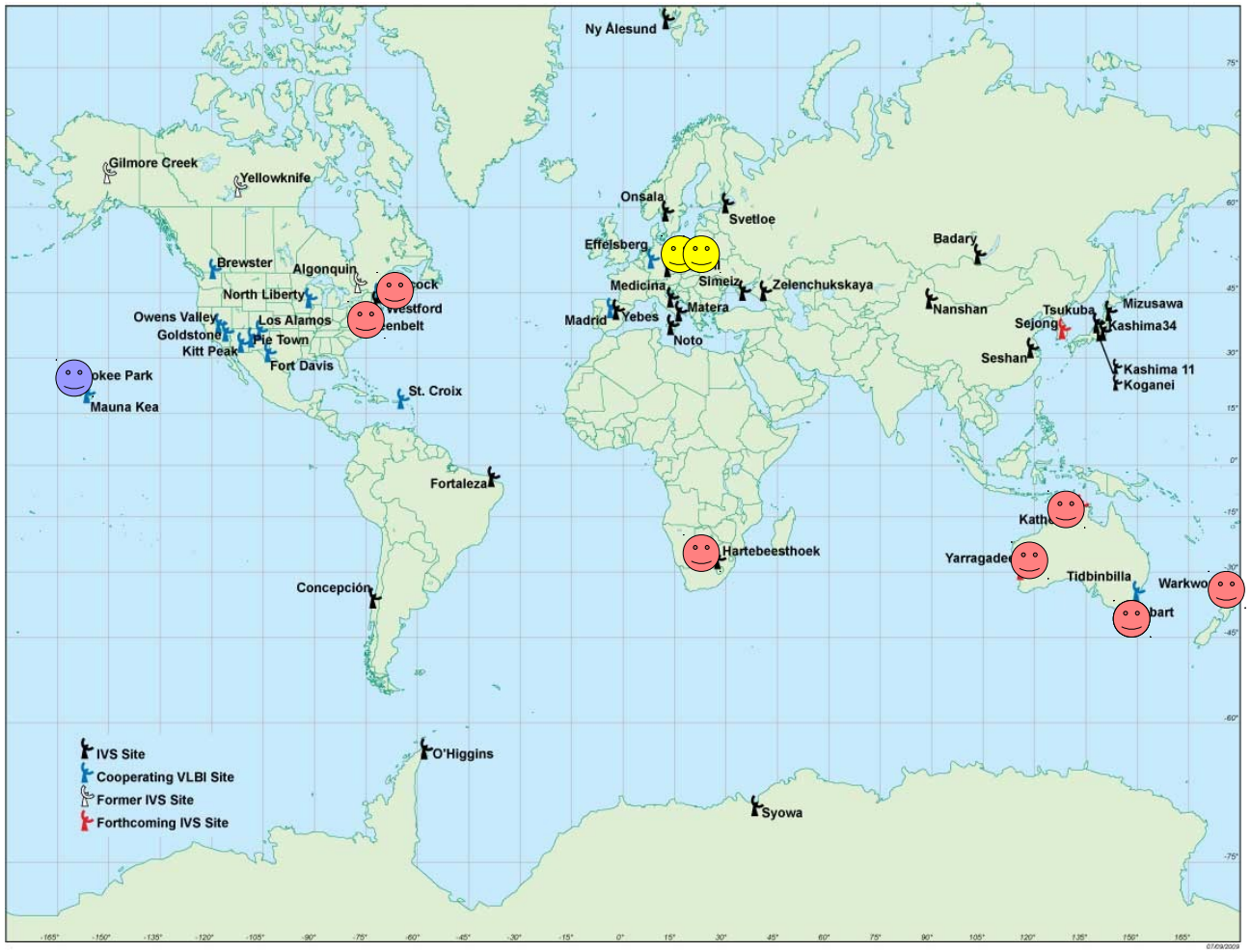
VLBI2010 fast

radio telescope

upgrade legacy

radio telescope

VLBI2010 Network in 2012



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VLBI2010 fast

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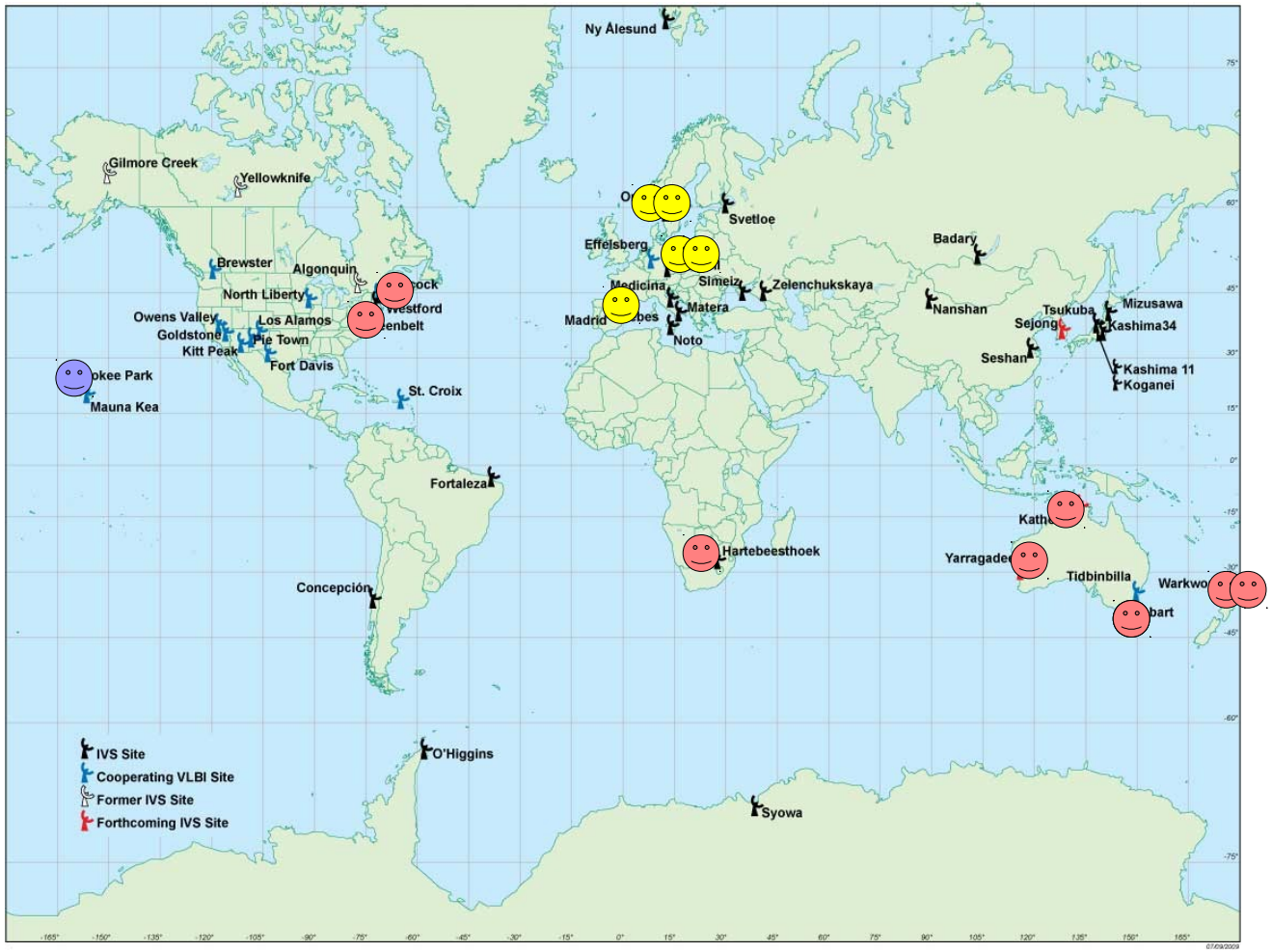
VLBI2010 Network in 2013



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VLBI2010 fast

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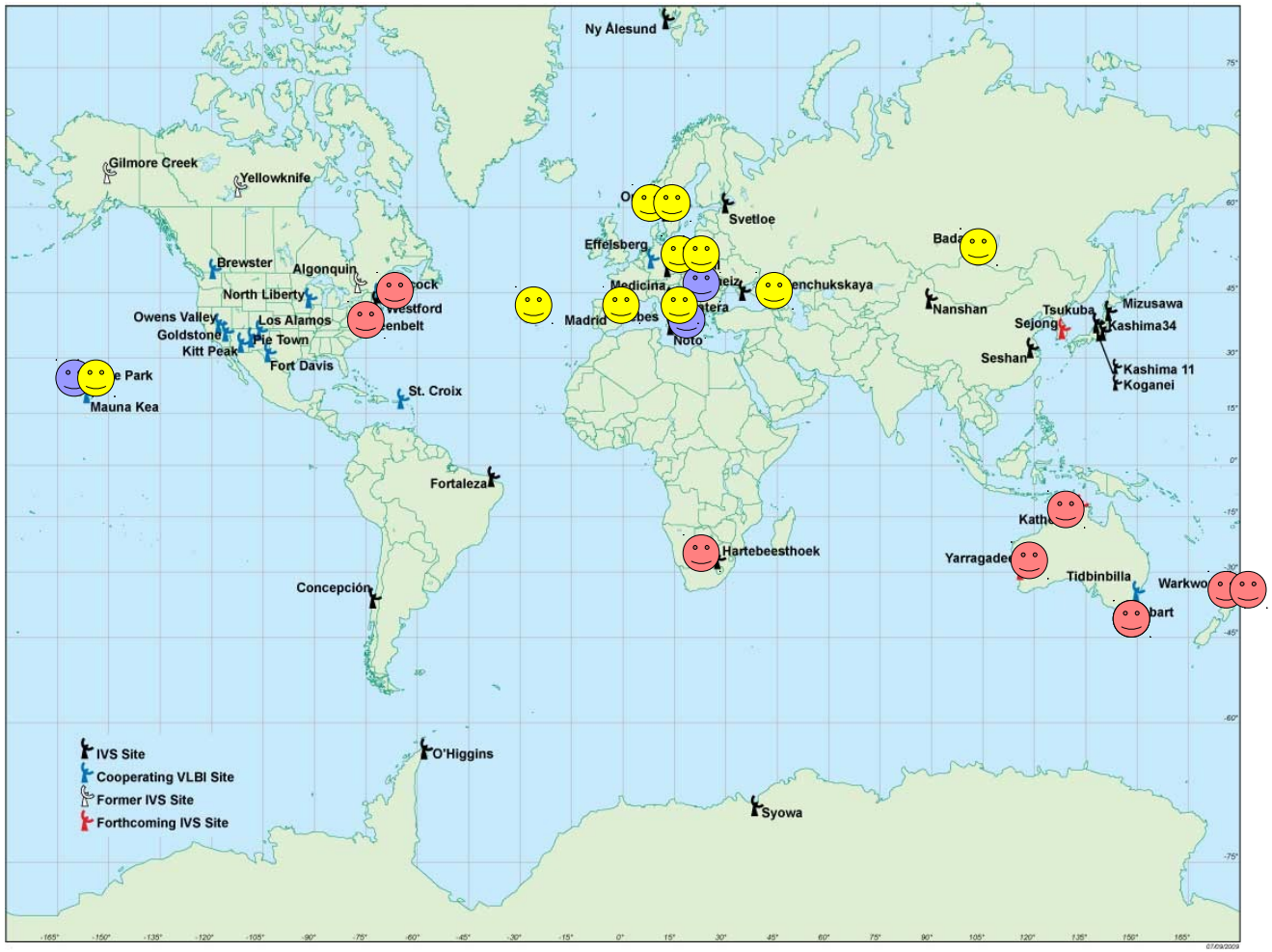
VLBI2010 Network in 2014



VLBI2010 very fast

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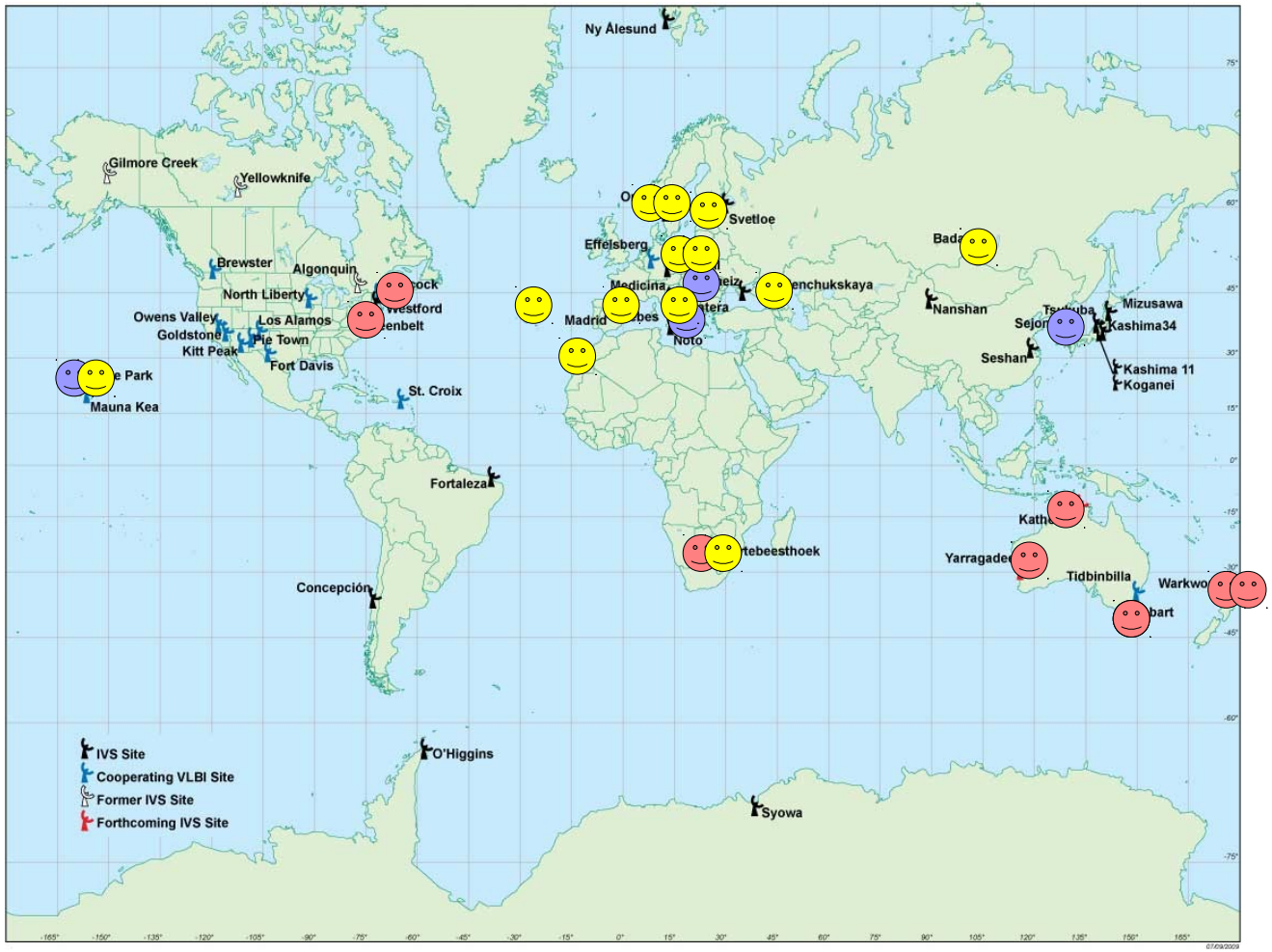
VLBI2010 fast

- radio telescope

upgrade legacy

- radio telescope

VLBI2010 Network in 2015



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twin radio telescope

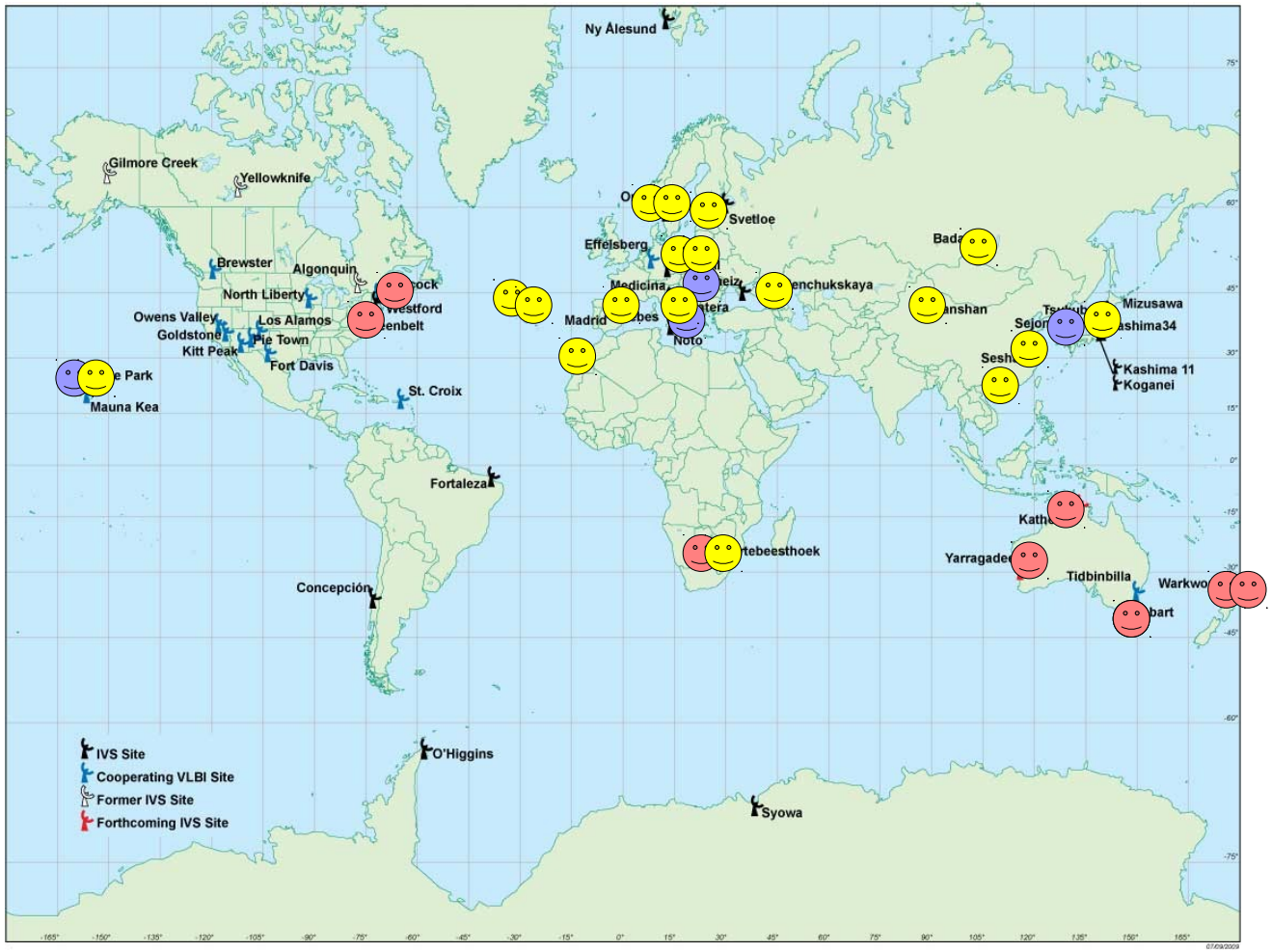
VLBI2010 fast

radio telescope

upgrade legacy

radio telescope

VLBI2010 Network in 2016



VLBI2010 very fast

radio telescope

twin radio telescope

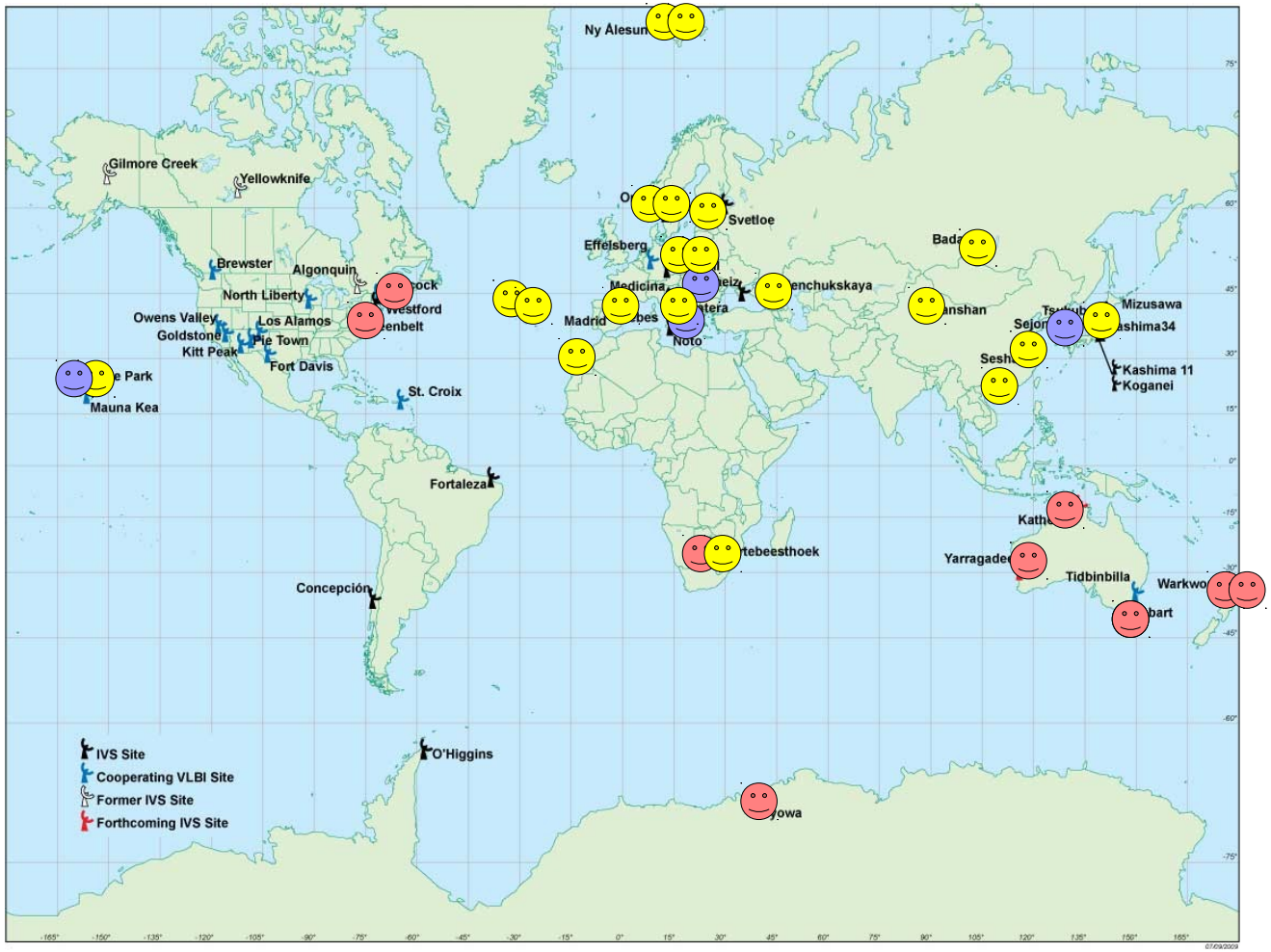
VLBI2010 fast

radio telescope

upgrade legacy

radio telescope

VLBI2010 Network in 2017



VLBI2010 very fast

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VLBI2010 fast

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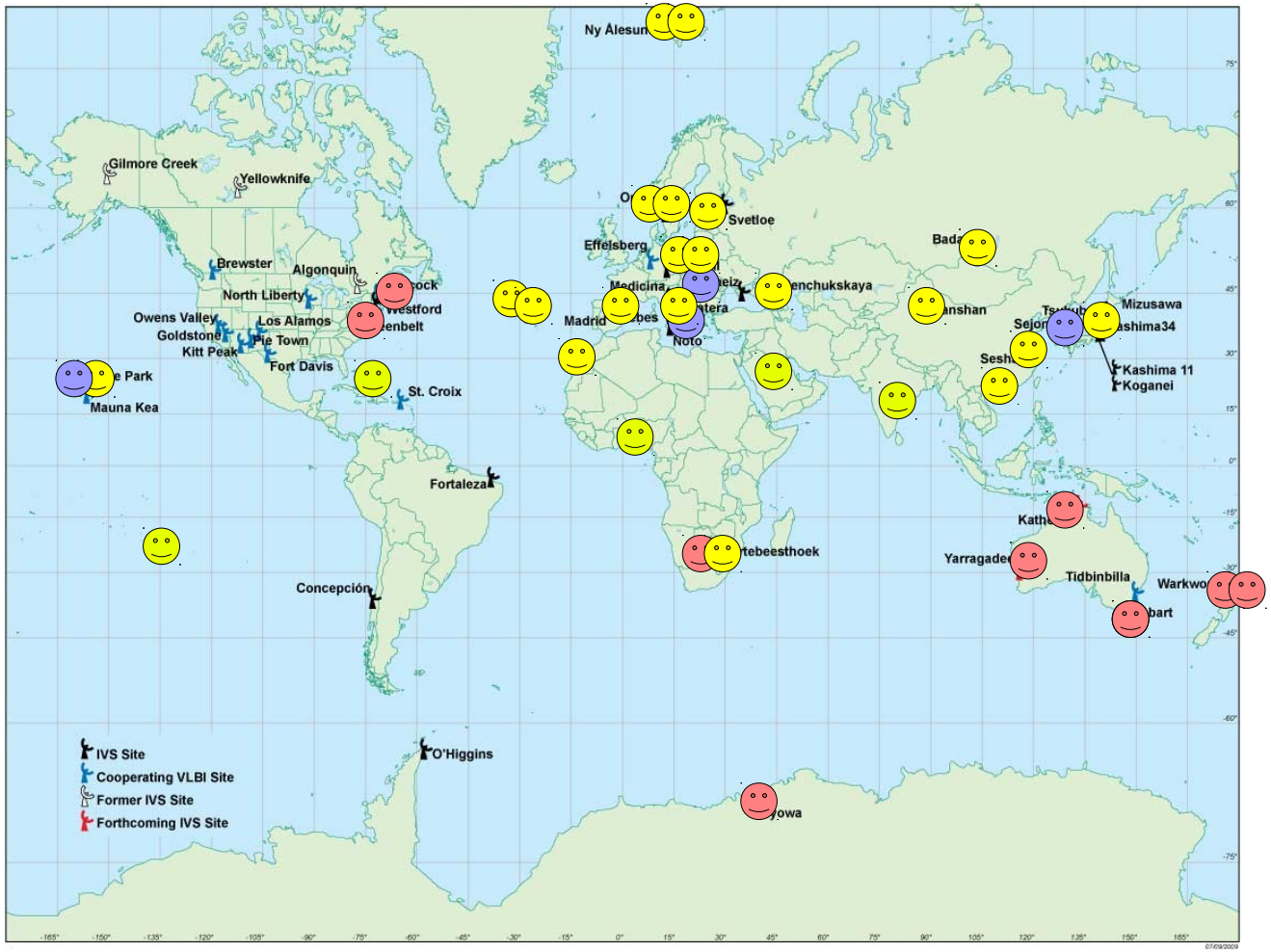
VLBI2010 Network in 2017 including potential new sites



VLBI2010 very fast

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VLBI2010 fast

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upgrade legacy

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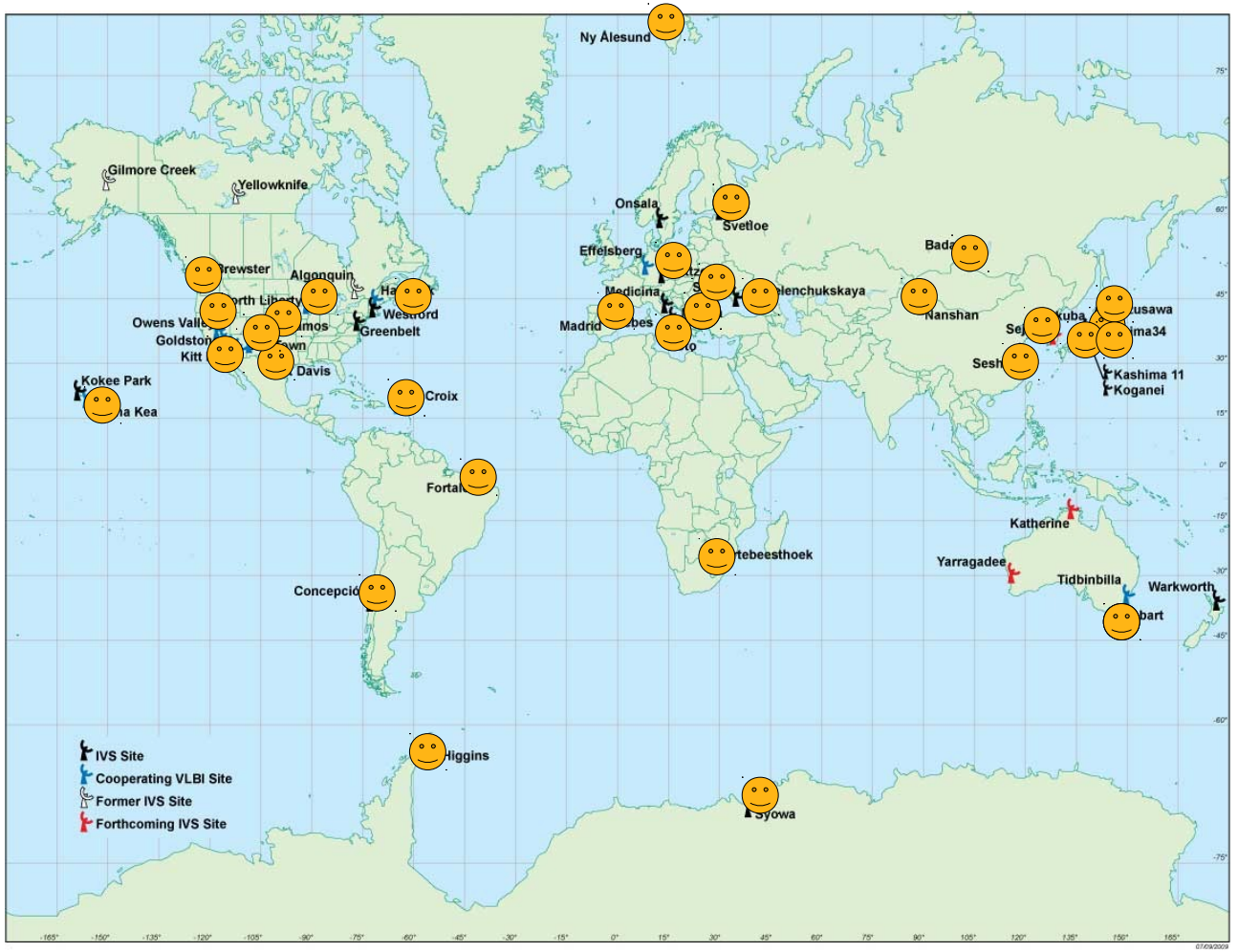
potential new site

- radio telescope

Survey Summary VLBI2010

- 20 new radio telescopes at 17 sites with full VLBI2010 compliance should become operational by 2017.
- Additional new stations might join in.
- 13 radio telescopes will operate with partial VLBI2010 compliance.
- By 2014/2015 a sufficient number of VLBI2010 compatible radio telescopes will be available for initial VLBI2010 operations.
- The American/Pacific region will lack presence of VLBI2010 network stations.

VLBI Network in 2015
S/X Network Stations



VLBI S/X-station

radio telescope

Conclusions

- IVS will implement the VLBI2010 concept within this decade successfully.
- The S/X operation mode will be maintained in parallel to the VLBI2010 operation at least until 2015.
- Large (legacy) radio telescopes will be useful for astrometry, space applications, data continuity also in the future.
- In the long term VLBI2010 will significantly outperform the current standard S/X operation.
- IVS will meet the goals of GGOS only by a new global infrastructure based on VLBI2010.

Announcement

IVS Workshop on

VLBI2010 Technical Specifications

Bad Kötzting / Wettzell

March 1, 2012: Radio Telescopes (Twin-Demo)

March 2, 2012: Front End, Back End

IVS General Meeting 2012

Madrid

March 5-9, 2012

Survey Report available

http://ivscc.gsfc.nasa.gov/.../NetworkStationSurvey2010.pdf