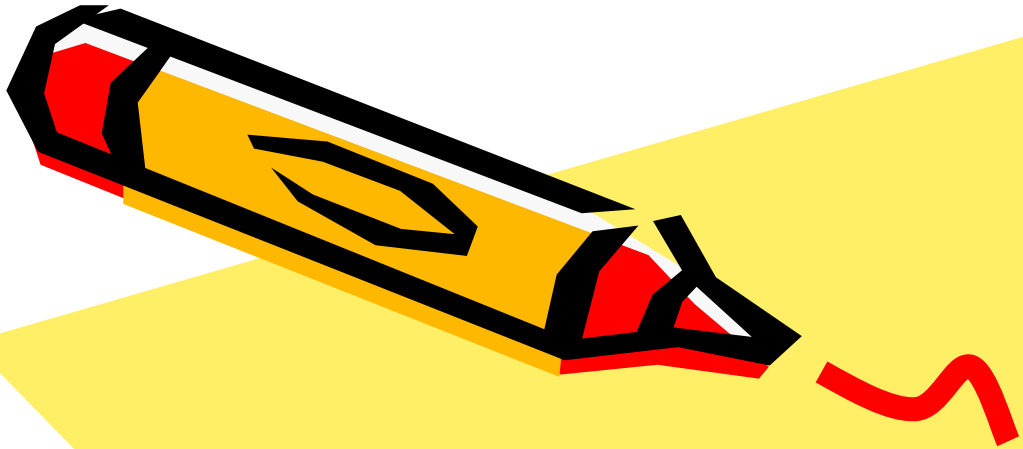

VLBI 2010

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IVS Working Groups

- IVS Working Group 1 (Feb.2000~Sep.2000)
  - GPS Phase Center Mapping
    - Examined feasibility to measure Phase Center of GPS Satellites with VLBI
- IVS Working Group 2 (Feb.2001~Feb.2002)
  - Product Specification and Observing Programs
    - Defined IVS's Purposes and Ovserving Strategies
- IVS Working Group 3 (Sep.2003~)
  - VLBI2010
    - Consider VLBI system in 2010 and beyond

VLBI2010

- Very Long Baseline Interferometry is the unique technique for measuring the orientation of the Earth in inertial space and is likely to remain so for the foreseeable future.

- Such measurements are necessary for studying the fundamental properties of the Earth, such as the shape of the Earth's inner core and the nature of the core-mantle coupling, as well as for practical applications such as deep-space navigation and maintaining the positions of earth-orbiting satellites.

- Next-generation VLBI systems are necessary to enable continued progress in all of these important areas.

VLBI2010 : Motivations

- The current geodetic VLBI network has achieved extraordinary success. However, a number of factors are converging which challenge continued progress. Among these are:
  - Most of the VLBI equipment now in use around the world for geodetic VLBI programs was developed in the 1970's and 1980's. This equipment is being pushed to its limits and is costly to maintain.
  - Radio interference at S-band has increased dramatically in the past few years, making observations in that band increasingly problematic at many locations.
  - Old, slow-moving antennas in many sites make it difficult to provide the agile whole-sky coverage needed for the highest accuracy.

VLBI2010 : Motivations

- The location of many of the antennas is not ideal; a number of gaps in the worldwide distribution leaves the Terrestrial Reference Frame incomplete and reduces the sensitivity for measurement of Earth Orientation Parameters.
- Operational costs remain high due to the fact that unmanned operations are generally not possible.
- Processing time to final results is long due to shipping times, tape-related problems at correlators, and inadequate automation of final-solution software.

- These factors motivate us to propose a comprehensive study to develop a plan for a next-generation VLBI system that will effectively and economically address these issues.

VLBI2010 : Charter (憲章)

- The VLBI2010 Working Group will examine current and future requirements for VLBI geodetic systems, including all components from antennas to analysis, and produce a report with recommendations for a new generation of systems that meet the following criteria:
  - Highest-precision geodetic and astrometric results
  - Low cost of construction
  - Low cost of operation
  - Fast turnaround of final results

VLBI2010 : Charter (憲章)

- Among the issues to be explored are:
  - Modernization of VLBI data-acquisition systems for higher stability and reliability, wider bandwidth, lower cost
  - Small, low-cost, fast-moving antennas
  - New observing strategies
  - Optimum and practical observing frequencies
  - Fully automated observations; remote monitoring
  - Transmission of data via high-speed network (e-VLBI)
  - Possible correlator upgrades
  - Fast turnaround of results by full pipelining of data from antennas to correlator to final analysis

VLBI2010：Charter（憲章）

- We propose to draw on the resources of both the astronomy and geodesy VLBI communities in these investigations, as well as other relevant expertise (such as SKA and ATA, for example).

VLBI2010 : Schedule

- Establishment : Sep. 28, 2003 (IVS Directing Board Meeting)
- Discussions : Feb., 2004 (IVS General Meeting)
- 1st. Draft : April, 2004
- Final Report : Fall, 2004

VLBI2010 : Members

Brian Corey	– antennas, RF/IF systems, calibration
Hayo Hase	– antenna systems
Ed Himwich	– control, data management
Hans Hinteregger	– digital backend systems, correlators
Tetsuro Kondo	– data systems, data transport, real-time
Yasuhiro Koyama	– data systems, data transport
Chopo Ma	– post-correlation analysis; data management
Zinovy Malkin	– post-correlation analysis
Arthur Niell	– atmospheric calibration, analysis
Bill Petrachenko	– antenna arrays, multi-beam VLBI, frequency standards
Wolfgang Schlueter	– antennas, observing strategies, frequency standards
Harald Schuh	– post-correlation analysis, cross-technique use
Dave Shaffer	- observing strategies, systems, analysis
Gino Tuccari	– digital backend systems
Nancy Vandenberg	– scheduling, observing strategies
Alan Whitney	- data systems, data transport, correlators

VLBI2010 : Sub-groups

- Observing strategies (Chair : Bill Petrachenko)
- RF/IF, frequency and time (Chair : Hayo Hase)
- Backend systems (Chair : Gino Tuccari)
- Data acquisition and transport (Chair : Alan Whitney)
- Correlation and fringe-finding (Chair : Yasuhiro Koyama)
- Data analysis (Chair : Harald Schuh)
- Data archiving and management (Chair : Chopo Ma)

Current Ideas

- Develop a few sets of global networks with 6~8 20-m class antennas surrounding the Earth.
- Small dish phased array antennas at multiple sites.
- Higher frequencies, software distributed correlation, digital BBCs, fringe rotation at sites, etc.