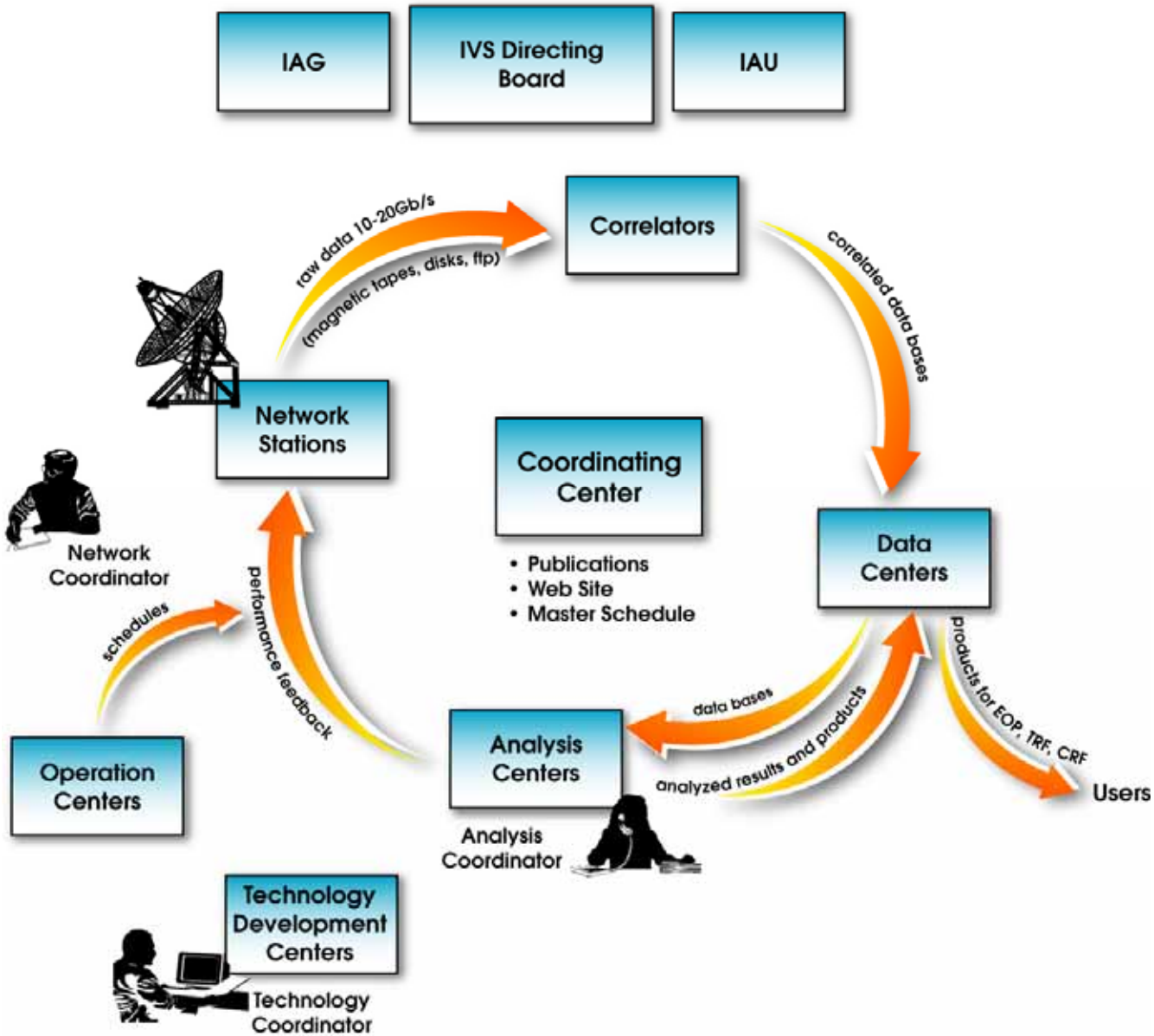
国際測地ＶＬＢＩ

ＮＩＣＴ鹿島宇宙通信研究センター
小山泰弘

ORGANIZATION OF INTERNATIONAL VLBI SERVICE



Contributions from Japan

- Participating Organizations from Japan
  - GSI
  - NAO
  - NICT
  - NIPR
- Network Stations in Japan
  - Kashima (34m, 11m)
  - Koganei (11m)
  - Mizusawa (10m)
  - Syowa (10m)
  - Tsukuba (32m)

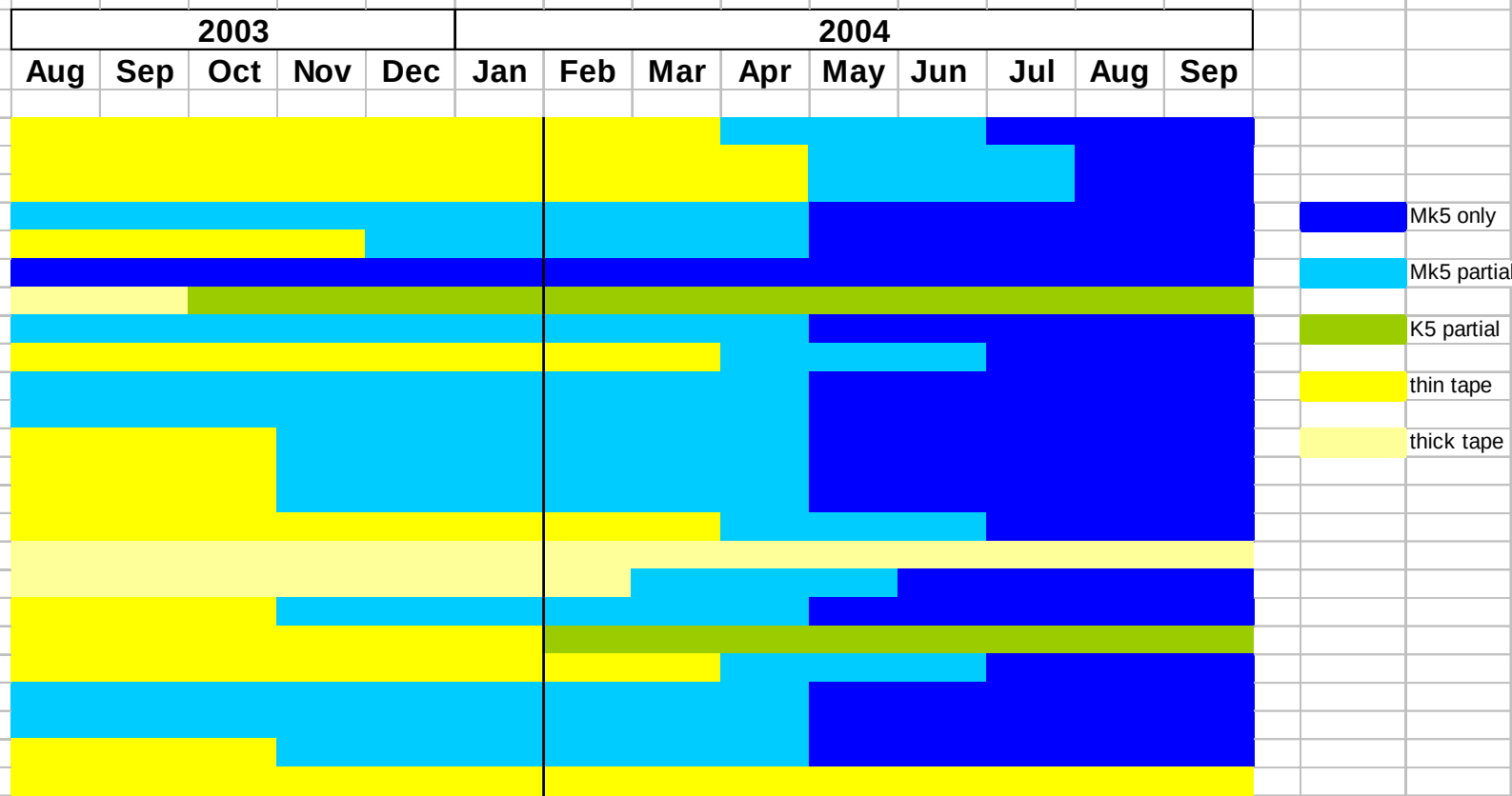
2004 Observing Plan Summary

Session purpose	Session code	Total sessions	Average # participating stations	Total station days	Average GB recorded per station	Mb/s for transfer in 1 day	Total TB per year
Rapid turnaround EOP (Monday)	IVS-R1	52	6.8	356	1200	111	427
TRF, all stations 3-4 times per year	IVS-T2	12	7.8	94	400	37	38
EOP, TRF using S2	IVS-E3	12	5.3	64	600	56	38
Rapid turnaround EOP (Thursday)	IVS-R4	52	6.9	357	500	46	179
CRF, emphasis on south	IVS-CRF	13	2.7	35	400	37	14
20-station EOP/TRF/CRF sessions	RDV	6	20.0	120	1000	93	120
R&D Gigabit/s investigations	IVS-R&D	10	6.1	61	3000	278	183
Regional - Antarctica	IVS-OHIG	6	6.0	36	300	28	11
Regional - Europe	EURO	4	8.8	35	300	28	11
Regional - Antarctica	SYOWA	4	3.0	12	300	28	4
Regional - Asia/Pacific	APSG	2	6.0	12	300	28	4
	Totals	**173**		**1182**			**1027**

Mark 5 + K5 Usage Plan

NRV last updated 040208

	2003					2004								
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Correlator														
Bonn	4	8	8	8	8	8	8	8	8	8	8	8	8	8
Haystack	2	2	2	4	4	4	4	6	6	6	6	6	6	6
Washington	2	2	2	4	4	6	6	8	8	8	8	8	8	8



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

WG2 on Product Specification and Observing Programs

Products		Status	Goals(2002-2005)
polar motion	accuracy	x_p ~100 μs, y_p ~200 μs	x_p, y_p: 50 ... 25 μs
	latency	1-4 weeks... 4 months	4 - 3 days...1day
	resolution	1 day	1 day...1h... 10min
	freq. of sessions	~3 d/week	.....7d/week
UT1	accuracy	5... 20 μs	3..... 2 μs
	latency	1 week	4 - 3 days 1day
	resolution	1 day	1 day 10min
Δε, Δψ	accuracy	100... 400 μarcsec	50...25 μarcsec
	latency	1-4 weeks... 4 months	4 - 3days... 1 day
	resolution	1 day	1 day
	freq. of sessions	~3 d/week	..... 7 d/week
TRF (x,x,z)	accuracy	5-20 mm	5 ..... 2 mm
	....	....	....
CRF	accuracy	0.25-3 mas	0.25 mas (improved distribution)
	freq. of solution	1 y	1 y
	latency	3-6 months	3 ..... 1 month(s)
.....	.....	.....	.....

After WG2 Report

- IVS Observing Program Committee established in Sept. 2001
  - Members : OPC members : W. Himwich, K. Kingham, A. Searle, C. Ma, A. Niell, A. Nothnagel, K. Takashima, Y. Koyama, C. Thomas, N. Vandenberg
  - Discuss observing programs and review proposals
- Observing program 2002: geodetic VLBI observations increased by about 30% from 2001
- Goal: future increase by ~100% till 2005

VLBI2010 : Motivations and Aims

- Motivations :
  - Many aged VLBI stations
  - RFI, especially in S-band
  - Un-even distribution of VLBI stations
  - High operational costs
  - Long processing time
- Aims at :
  - Better geodetic and astrometric data
  - Low cost construction and operation
  - Fast turn-around of results

VLBI2010 : Discussion Items

- 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 : Schedule

- Establishment : Sep. 28, 2003 (IVS Directing Board Meeting)
- Discussions : Feb., 2004 (IVS General Meeting)
- 1st. Draft : April, 2004
- Discussions : October 5, 2004 (e-VLBI Workshop)
- 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.

Items for Discussions

- VLBI2010
  - How to summarize?
  - How to realize?
- Participation of VERA station(s) to the IVS sessions?
- Participation of KVN station(s) to the IVS sessions?