Laboratory Report

National Institute of Information and Communications Technology (NICT)

Research for Primary Frequency Standards

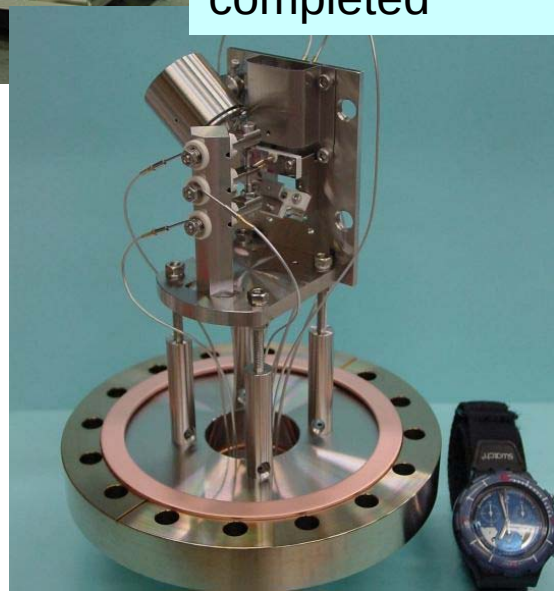
【Fountain-Type Cs Standard】

- 1st system:stability 2×10^{-12}@1sec
- 2nd system :completed in 2005.

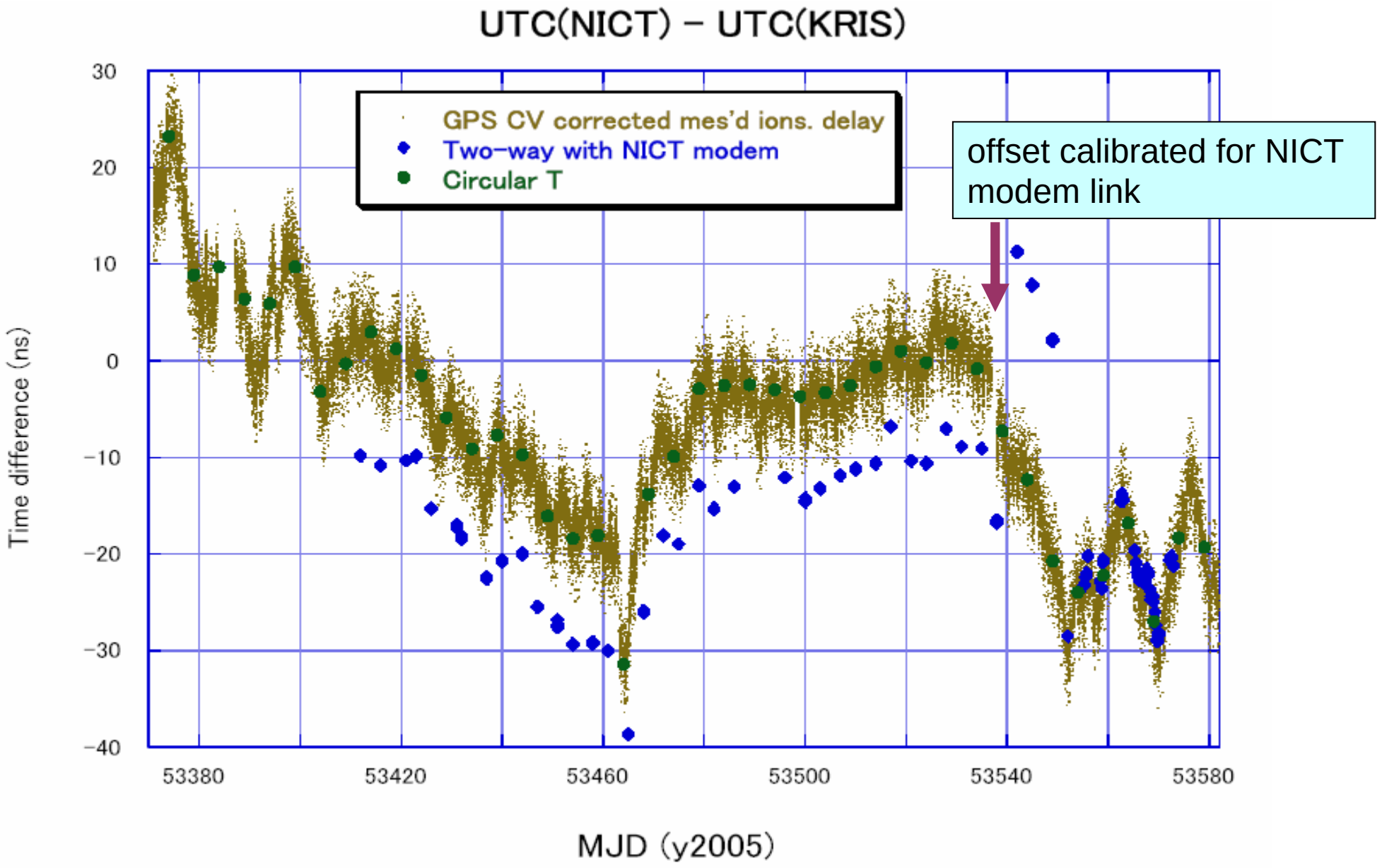
【Optical Frequency Standard】

- Clock laser developed to observe the 729 nm of a single $^{43}Ca^{+}$ ion.
- Linewidth: a few tens Hz
- Stability :10^{-13}

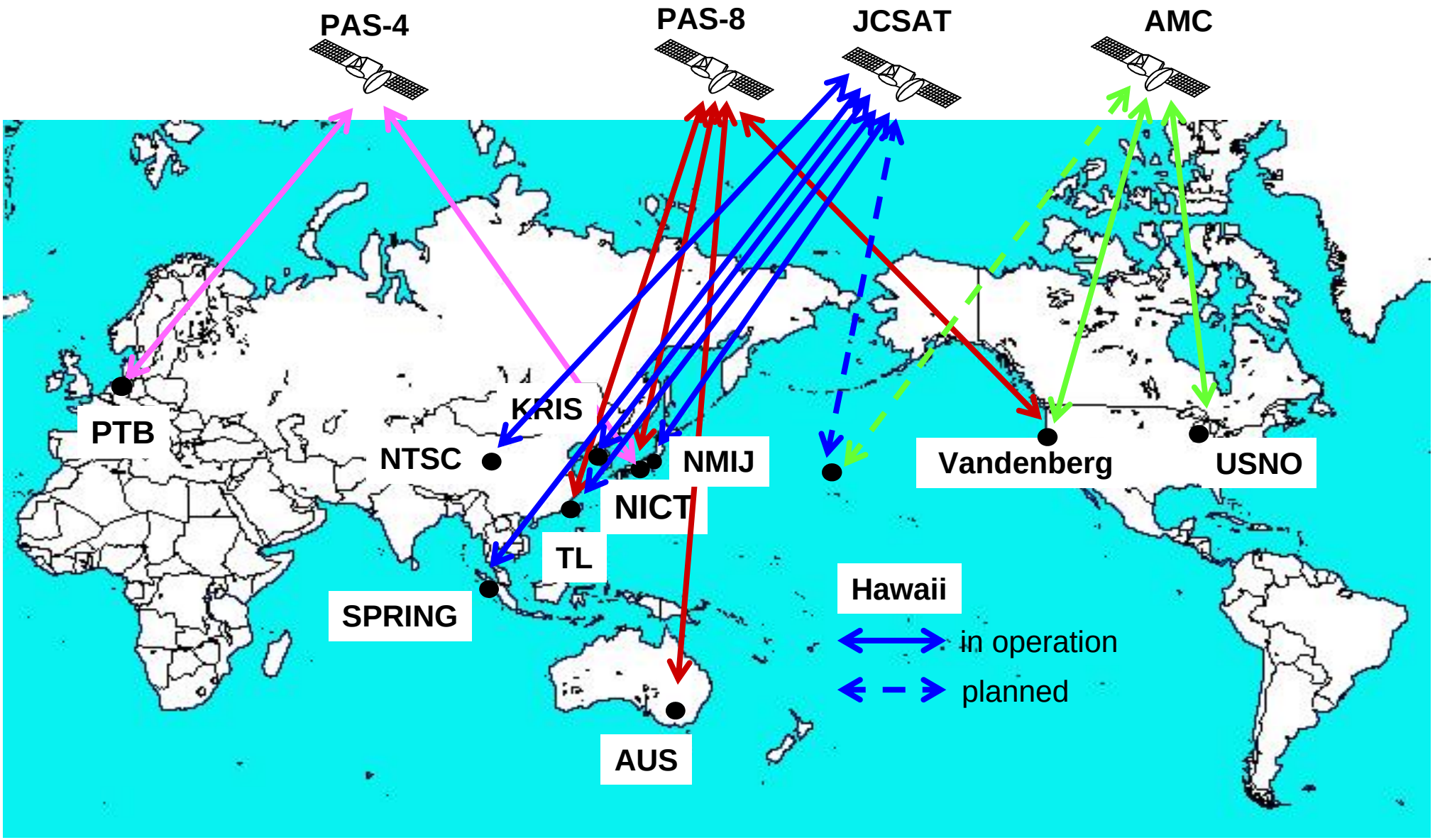
Miniature trap completed



Time comparison



TWSTFT network related with NICT



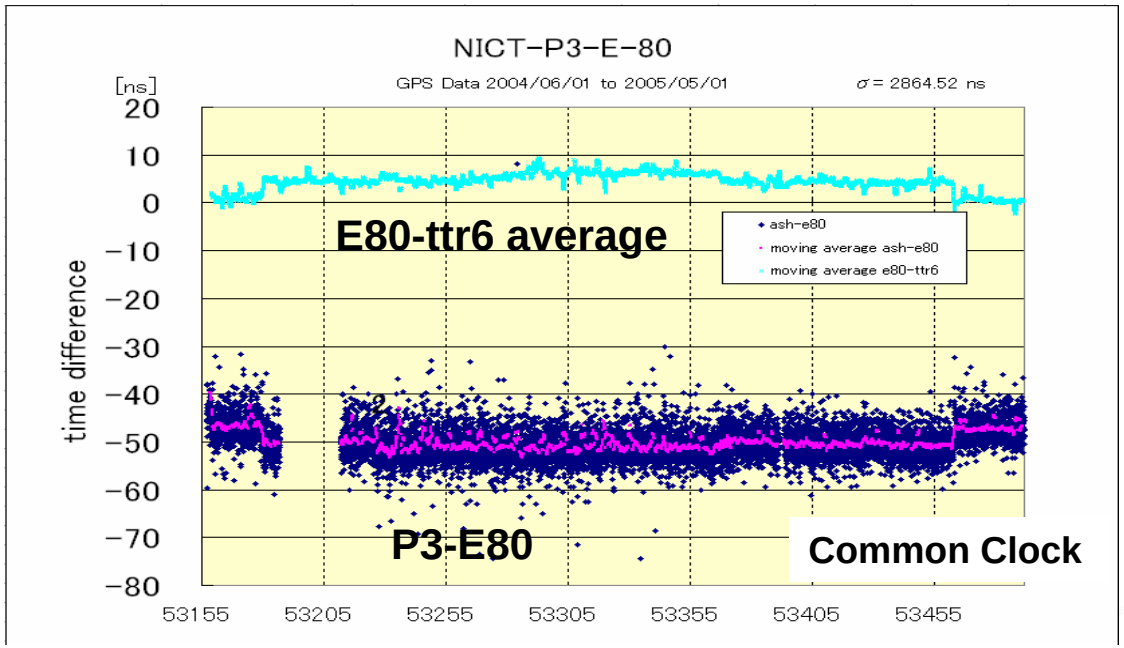
GPS time Comparison observation

NICT

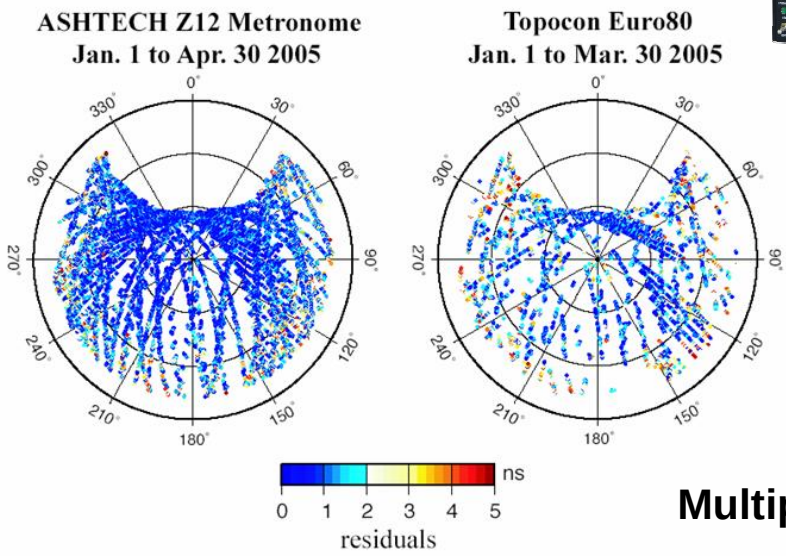
NICT is conducting the daily time transfer observations using GPS common-view method.

【NICT GPS system】

ASHTEC	**P3**	**1 set**	**send to BIPM since June in 2004**
Septentrio	**P3**	**1 set (2 sets in future)**	**exchange from ASHTEC**
E80		**1 set (Backup1)**	**send to BIPM**
TTR6		**1 set (In this September, the open of data is terminated)**	
JRC (single frequency and multisatellite and cheap)			**3 sets (Backup2)**



JRC



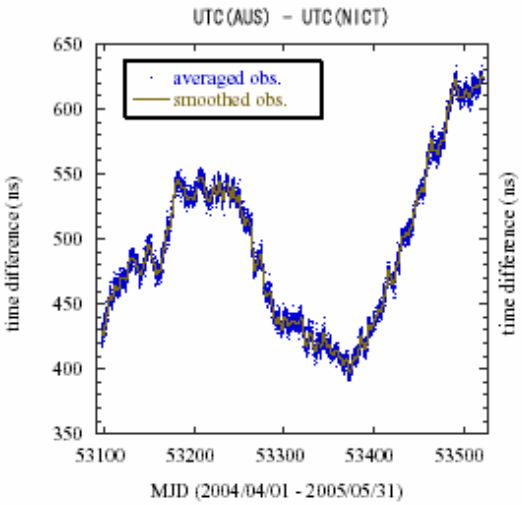
Multipath

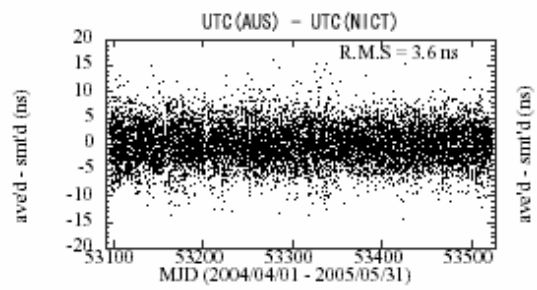
The residuals between observed and smoothed time differences of UTC(NICT)-GPS time(the Smoothing method is Vondrak smoothing).

Comparison of GPS Common-view and All-in-view

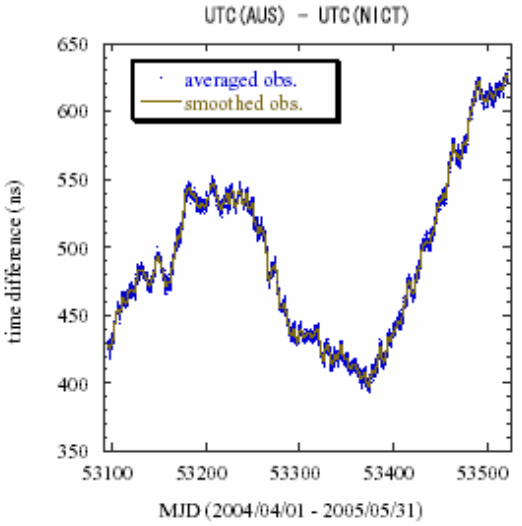
NiCT

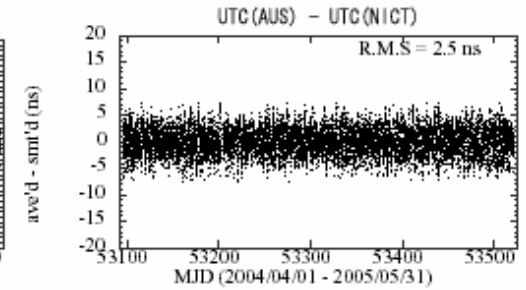
CV



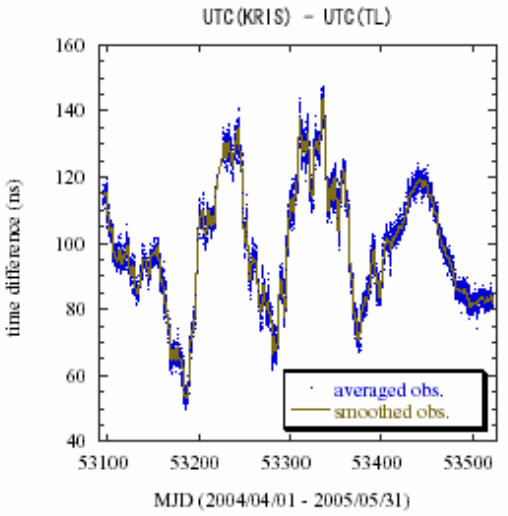


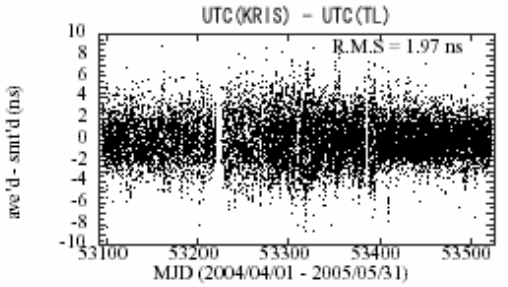
All-in-View



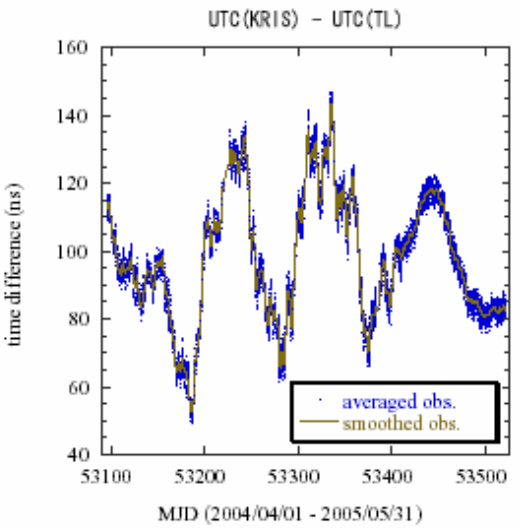


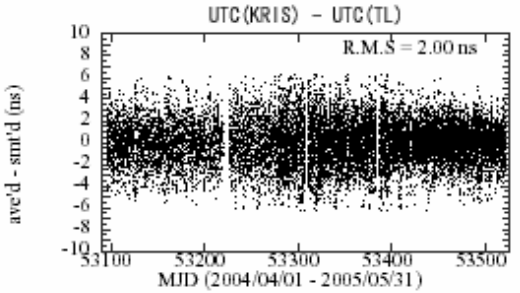
CV





All-in-View





Long baseline: UTC(AUS) - UTC(NICT)

improve

Short baseline: UTC(NICT) - UTC(KRISS)

same

Left: Common-View Right: All-in-

New Japan Standard Time System

“Characteristic”

The new Japan Standard Time system is designed;

(1) to synchronize with UTC within 10ns

(2) to achieve a high short-term stability by using Hydrogen masers

(3) to use newly developed DMTD (Dual Mixer Time Difference) and improve measurement precision

(4) to adopt the new time-scale algorithm for a hydrogen-maser-based timescale

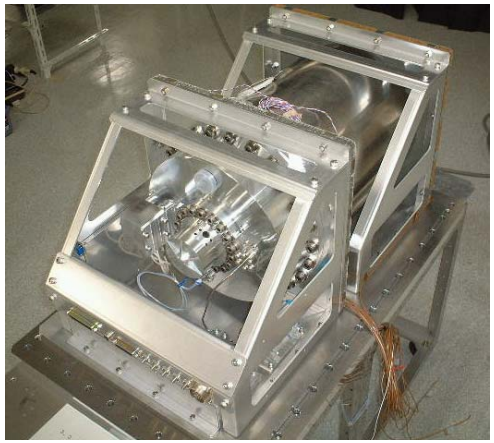
(5) to have three redundant units for high reliability and a robustness

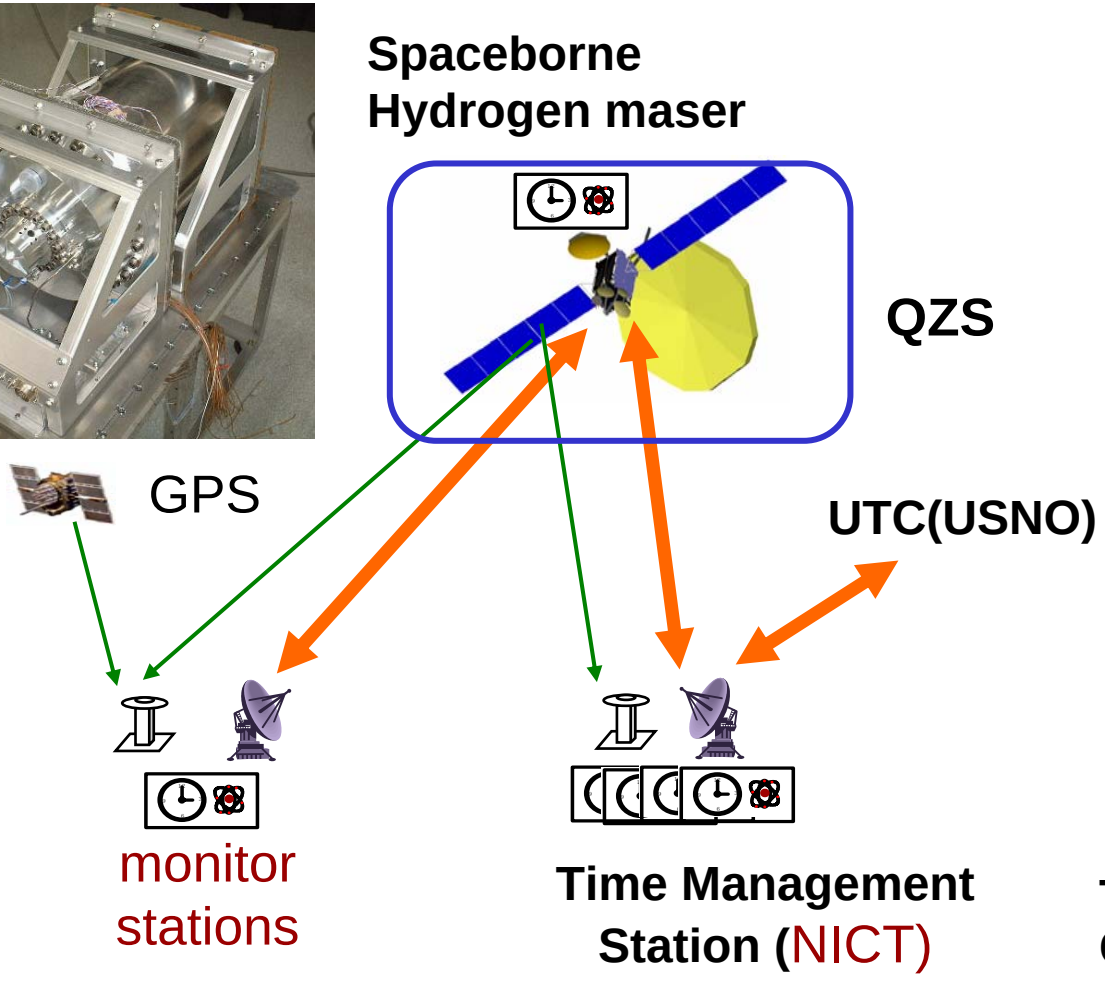
“Schedule”

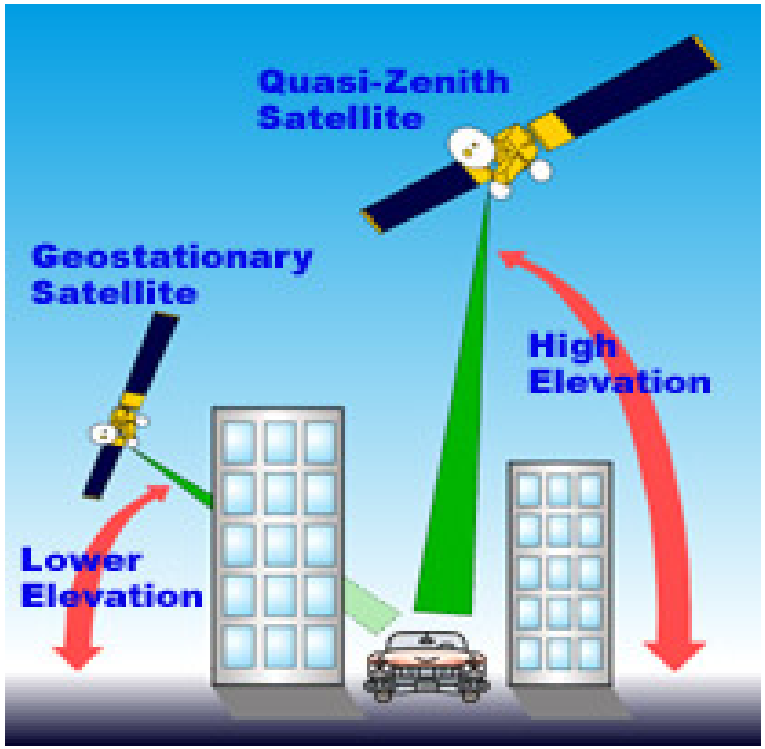
In the early next year, the new Japan Standard System will be started (replaced).

Time Management System of QZSS

NICT is developing the engineering models of a space-borne hydrogen maser and time management for the quasi-zenith satellite system (QZSS).







TWSTFT or On-board Time Comparison Unit of QZS