

GPS Time and Frequency Transfer Activities at NIST

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Code-Based Common-View

- Contributing NIST time scale to the computation of TAI and UTC
- Time and frequency comparison network in the Inter-American Metrology System (SIM)
- Synchronization of clocks in radio stations WWV/WWVB, and WWVH to UTC(NIST)
- Global Time Service
- Time Measurement and Analysis Service (TMAS)

Code-Based One-Way

- Frequency Measurement and Analysis Service (FMAS)
- GPS Disciplined Oscillator and GPS One-Way Receiver Calibration Service
- NIST GPS Data Archive

Carrier-Phase

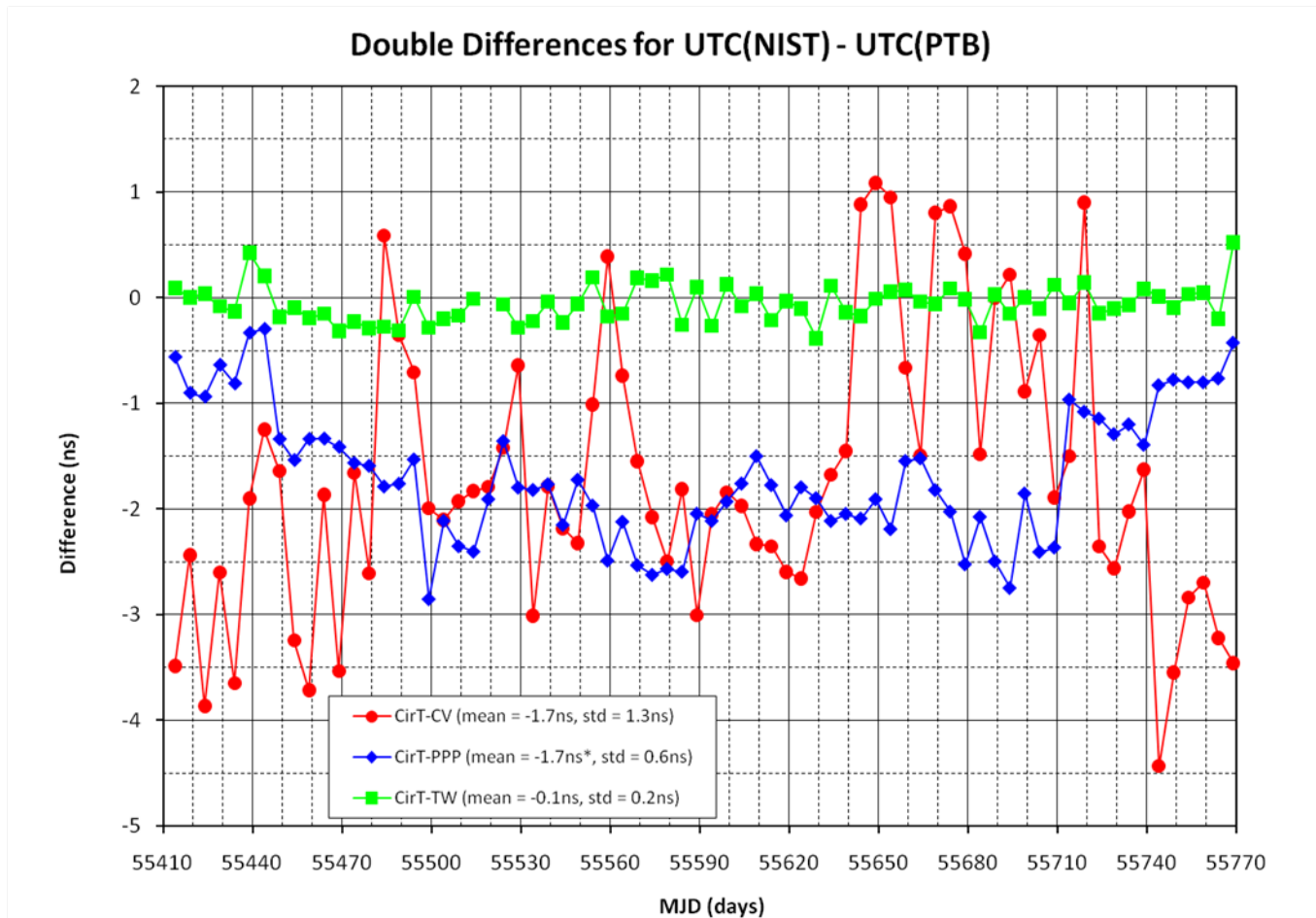
- Participate in the IGS tracking network
- Compare remote clock with the IGS clock products
- Compare remote clock with the BIPM TAI PPP results
- Analyze carrier-phase data for studies of receiver performance and remote clock comparison
(*Marc Weiss: mweiss@boulder.nist.gov*)

Recent Activities

- Monitor UTC(NIST) – GPST in near real time
(*Judah Levine: jlevine@boulder.nist.gov*)
- New dual-frequency receivers
- Study on receiver calibrations
- New antenna platform
- New timing facility in Precision Measurement Laboratory Building



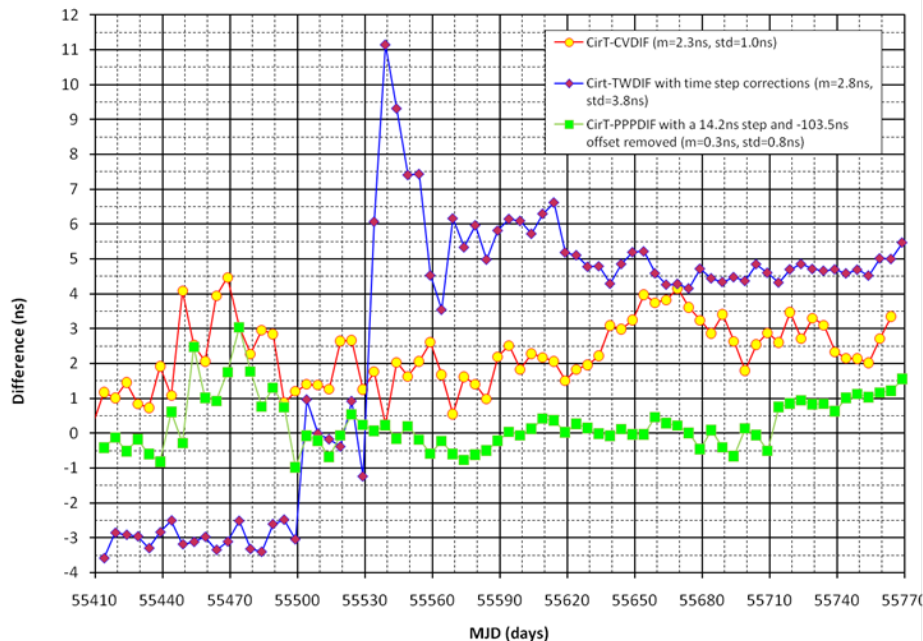
Primary Receiver Performance



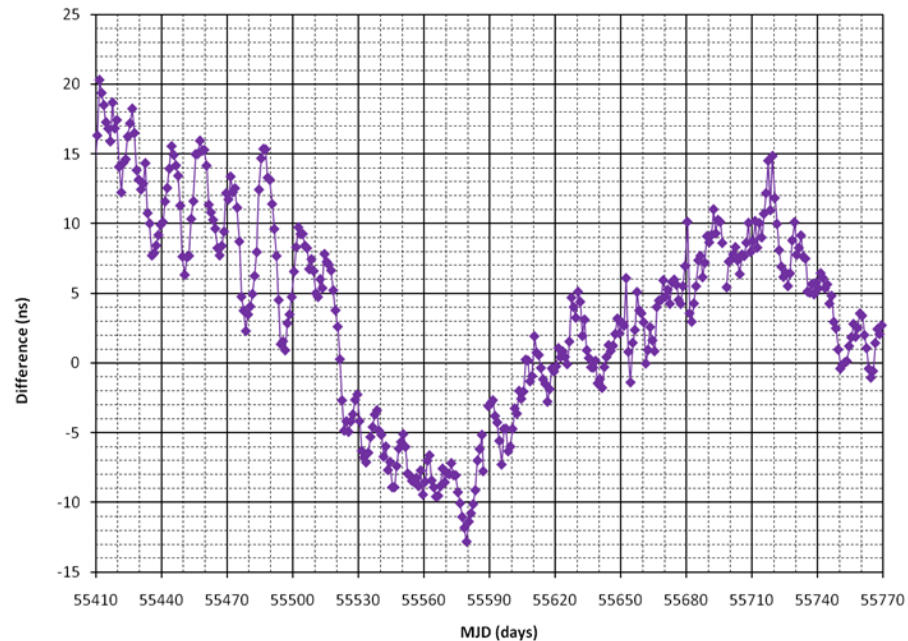
** Time steps of 14.2ns (on MJD 55173), 8.8ns (on MJD 55469) and a 415ns bias are removed from the TAIPPP result*

Primary Receiver Performance

Double Difference for UTC(NIST) - UTC(USNO)



UTC(NIST) - GPS Time

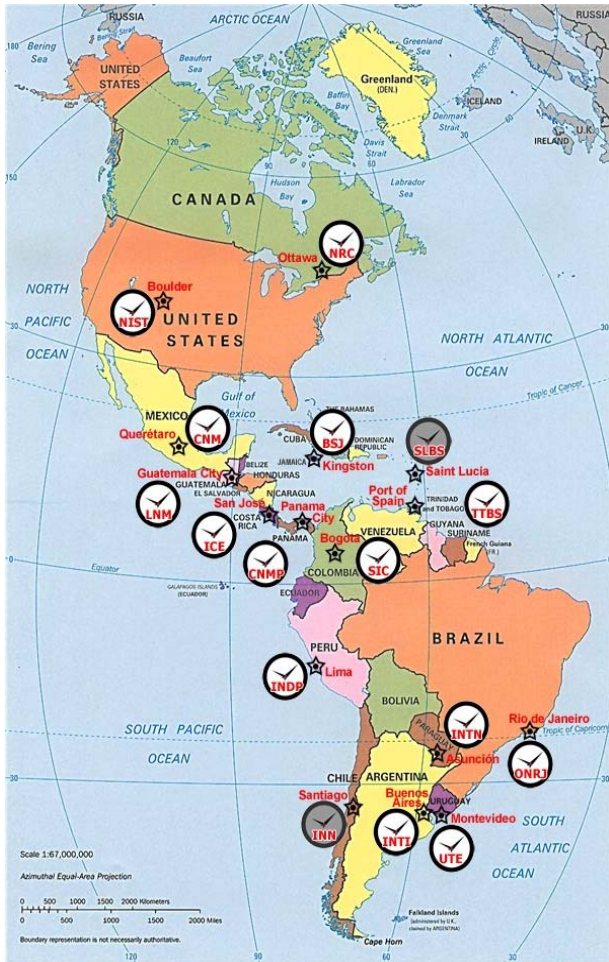


* A 14.2ns time step on MJD 55173 and a 103.5ns bias are removed from the TAIPPP results

** The NIST/USNO TWDIF is obtained from $[UTC(NIST)-UTC(PTB)]_{TWDIF} - [UTC(USNO)-UTC(PTB)]_{TWDIF}$



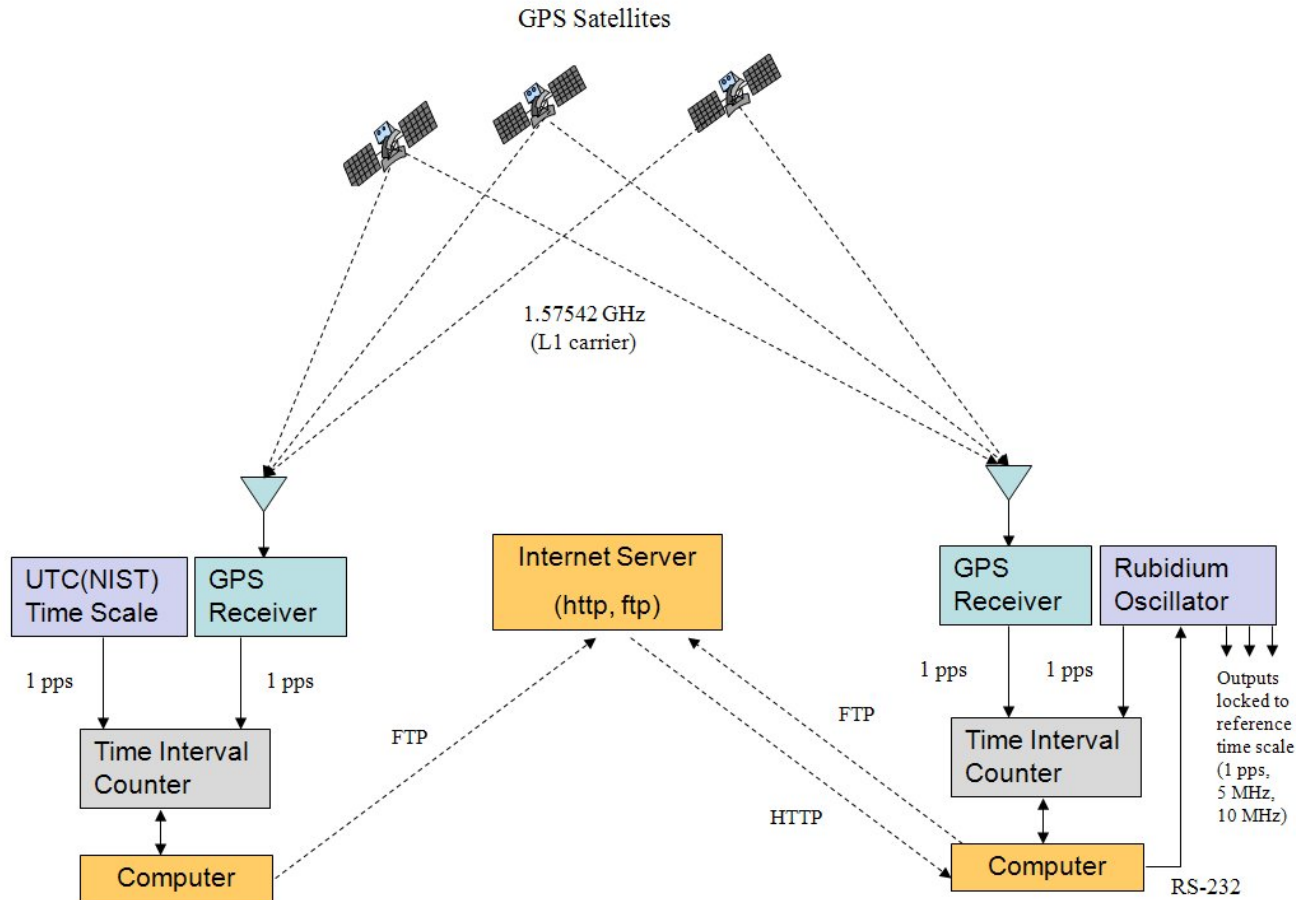
Time and Frequency Comparison Network in the Inter-American Metrology System



Laboratory and Country	Date of Operation	Reference Clock
NIST (U.S.A)	2005	UTC(NIST)
CNM (Mexico)	April 2005	UTC(CNM)
NRC (Canada)	May 2005	UTC(NRC)
CNMP (Panama)	October 2005	UTC(CNMP)
ONRJ (Brazil)	September 2006	UTC(ONRJ)
ICE (Costa Rica)	January 2007	Cesium
SIC (Colombia)	February 2007	Cesium
INTI (Argentina)	July 2007	UTC(INTI)
LNM (Guatemala)	August 2007	GPSDO
BSJ (Jamaica)	January 2008	Cesium
UTE (Uruguay)	September 2008	Disciplined Rubidium
INTN (Paraguay)	September 2008	Rubidium
INDECOPI (Peru)	August 2009	Rubidium
TTBS (Trinidad & Tobago)	August 2009	GPSDO
SLBS (St. Lucia)	June 2010	Rubidium
INN (Chile)	May 2011	Rubidium
ABBS (Antigua & Barbuda)	September 2011	Rubidium

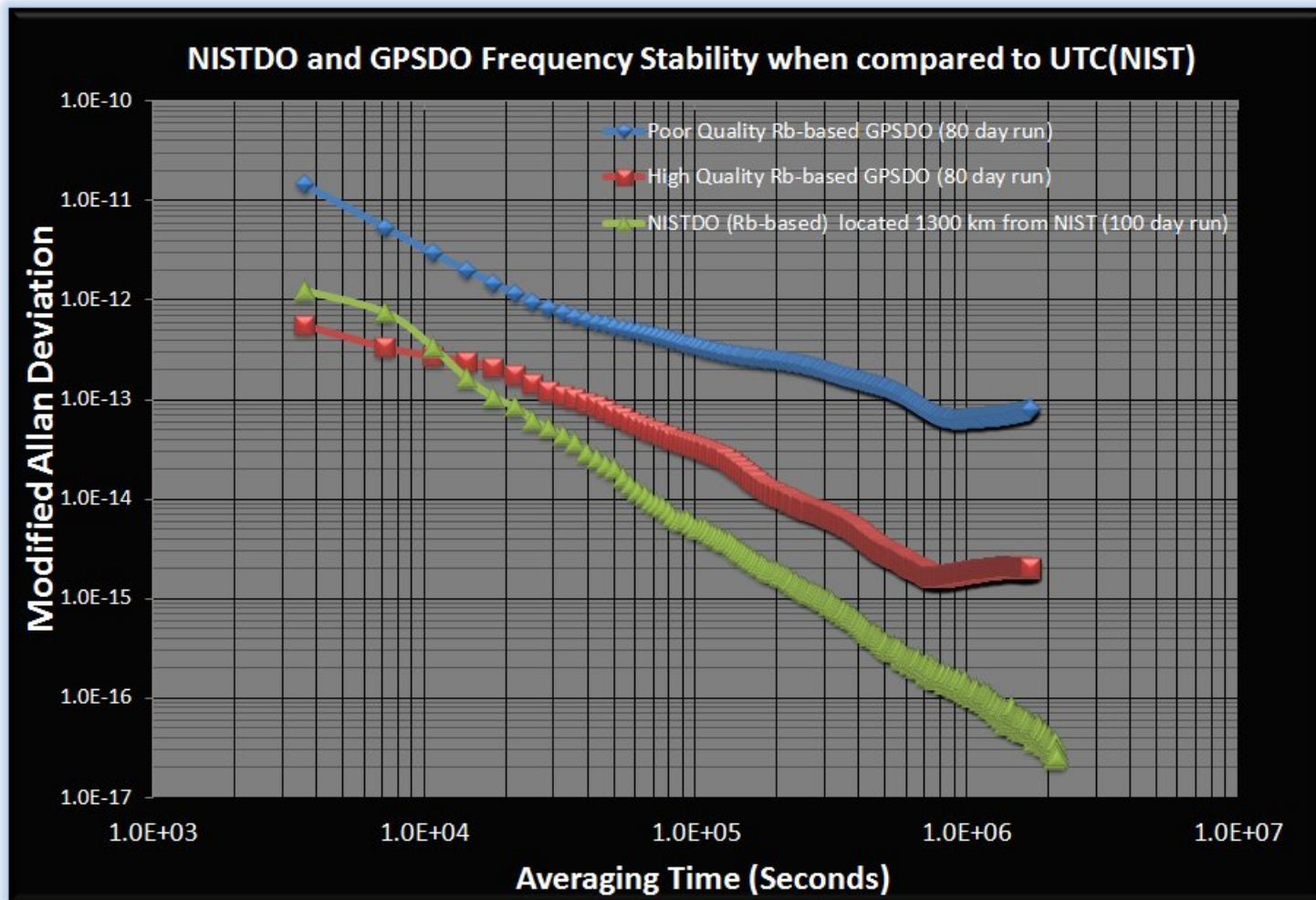


NIST Disciplined Oscillator (1)



For details about the NISTDO, Contact Michael Lombardi: michael.lombardi@nist.gov

NIST Disciplined Oscillator (2)



NIST GPS Time and Frequency Transfer Service

- Frequency Measurement and Analysis Service (FMAS)
(*Service ID#76100S*)
- Time Measurement and Analysis Service (TMAS)
(*Service ID#76101S*)
- Global Time Service (*Service ID#76110S*)
- Characterization of Global Positioning System (GPS) Satellite Receivers (*Service ID#76120S*)

http://ts.nist.gov/ts/htdocs/230/233/calibrations/time_freq/broadcast.htm

GPS Data Archive [GPS - UTC(NIST) all-in-view]

<http://tf.nist.gov/service/gpstrace.htm>

