USNO Station Report

Jonathan Hirschauer

Demetrios Matsakis

METAS

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Time Transfer Team

Jim Brad

Angela McKinley

Lee Breakiron

Mark Bergman

Jonathan Hirschauer

Jonathan Morales (new)

Evan Hoffman (new)

Issues Addressed at AMC

- AMC1
  - Transceiver, LNC, and antenna are all outside
  - New fibers, old modules
  - Diurnals > 1ns
    - Due to fiber modules and transceiver temperature
- AMC2
  - LNC and antenna outside
  - Transceiver inside, no thermal regulation
  - New fibers, new modules
  - Diurnals ~1ns

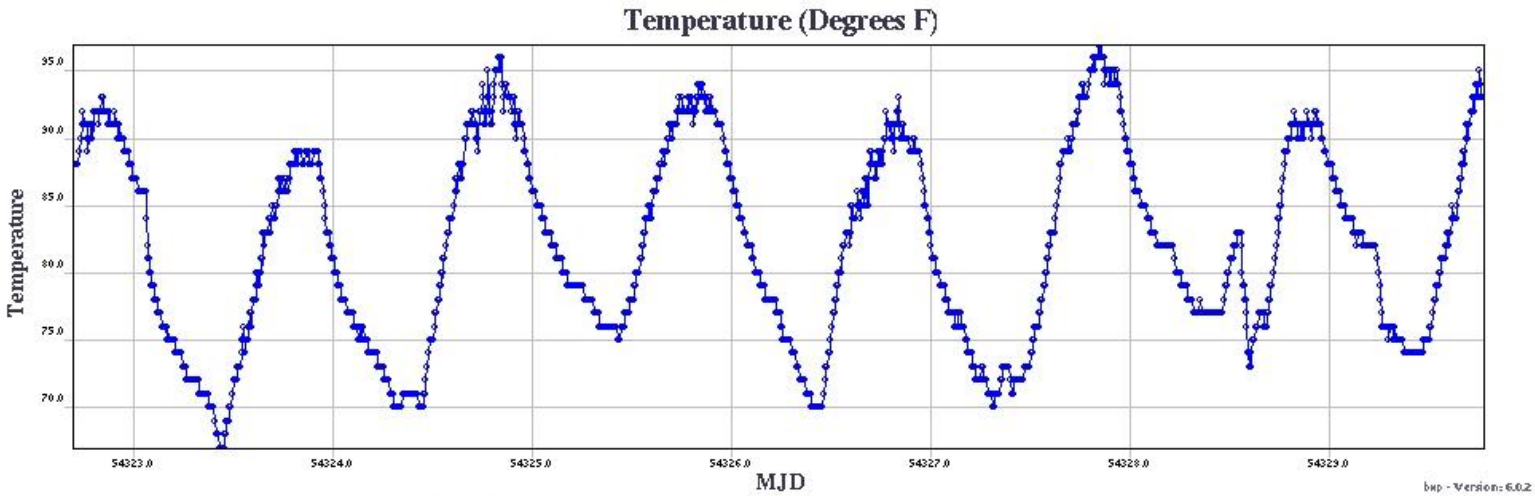
TWSTFT Calibration

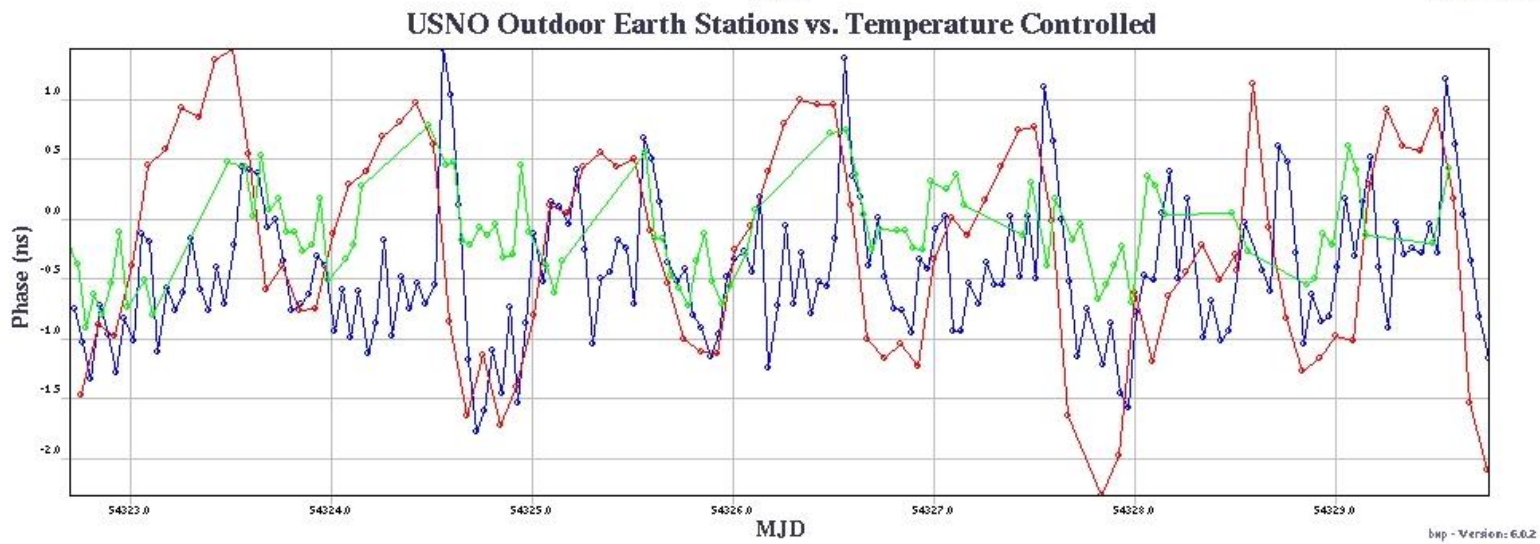
- Flyaway TWSTFT systems
  - Shipping costs too high
  - Use smaller more portable equipment
- Carrier Phase GPS
  - For verification of TWSTFT calibration
  - Installation Issues
    - Many cycle slips, antenna in non-ideal location
    - Novatel OEM3 – uses trailing edge of pulse
  - Data surprisingly good, though it seems too good
  - Upcoming: New receiver to test, Novatel OEM4

What we hope to do next year

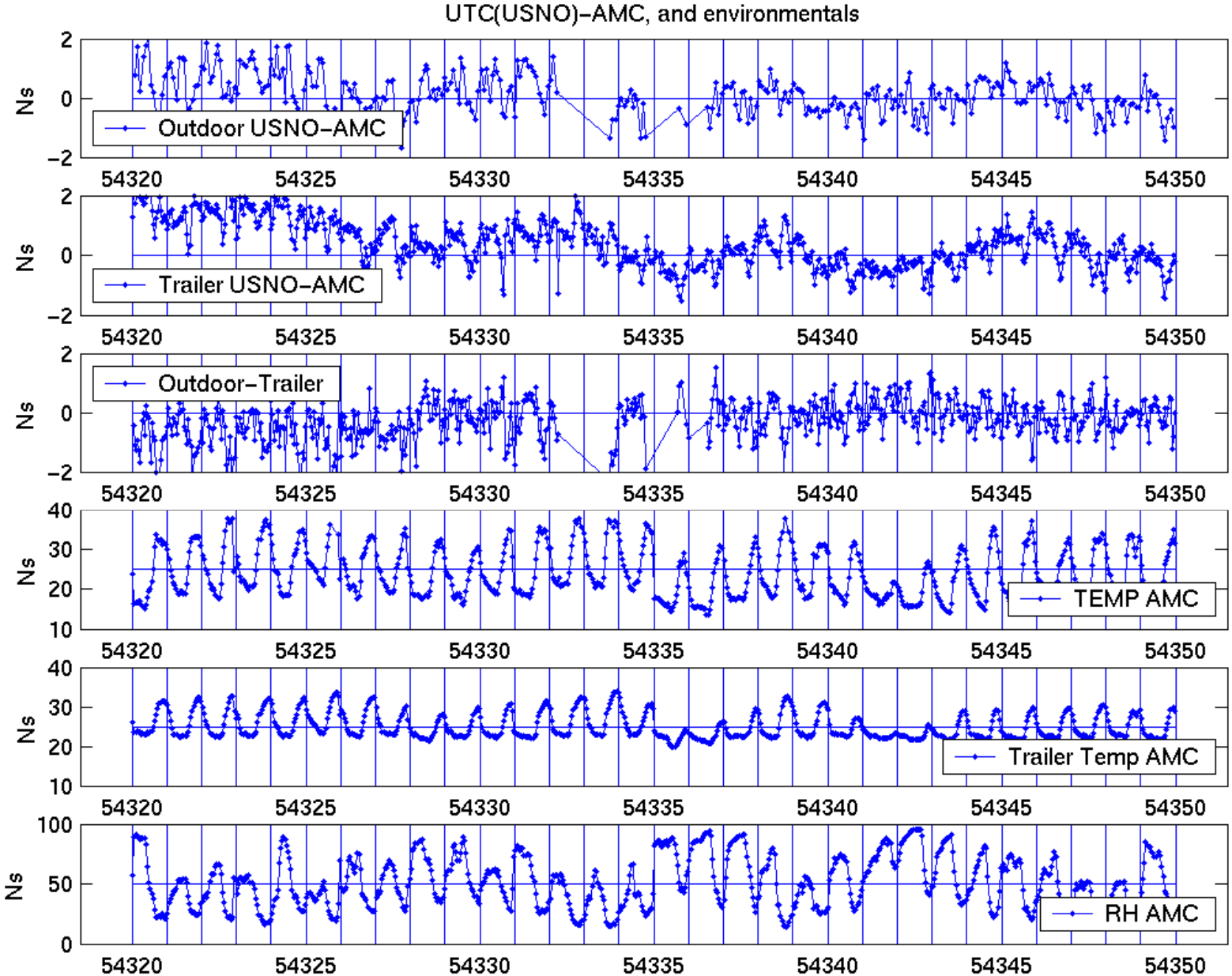
- Set up station in Hawaii
  - Still in progress
  - State Department handling negotiations
- Upgrade TWSTFT systems
  - Develop system for data acquisition and control
  - Temperature stability and Diurnals
- Still in our dreams
  - High and Low-bandwidth experimentation
  - Timetech Satsim on shelf waiting to be tested at USNO

Temperature and Diurnals





Temperature Effects are Not Easily Modelable

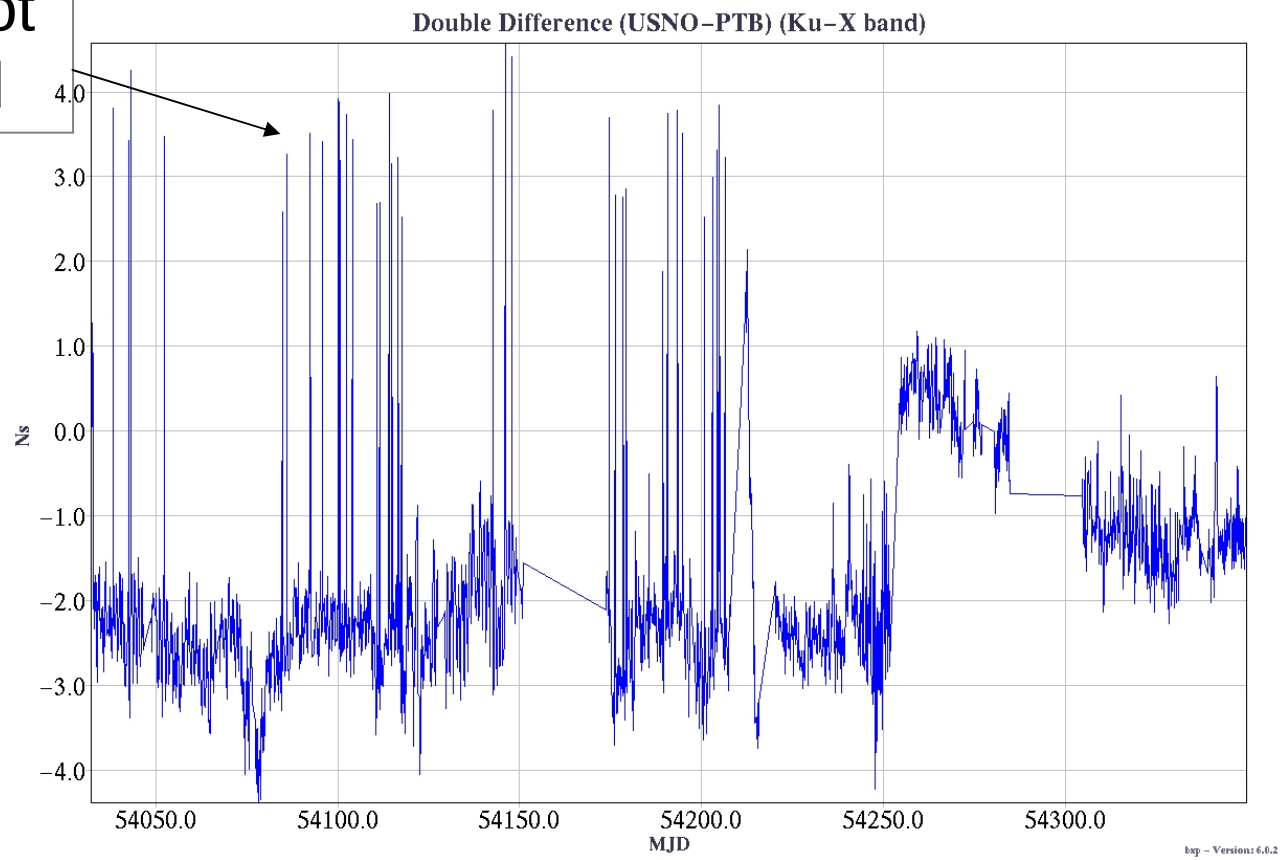


USNO-NIST Calibration May 16, 2007 (MJD 54236)

- UTC(USNO)-UTC(NIST)
  - TWSTT calibration 16.4 ns
  - GPS CV 11.4 ns
  - Circular T 10.7 ns
  - Via PTB: Ku (NIST)+X band (USNO) 10.4 ns
  - Via PTB: Ku-band (ITU) 8.2 ns
- Analysis Error, in ITU-format corrections
  - USNO-PTB, Ku(ITU)-X -2.5 ns
  - USNO-PTB, Ku(ITU)-Ku(1sec) -2.1 ns

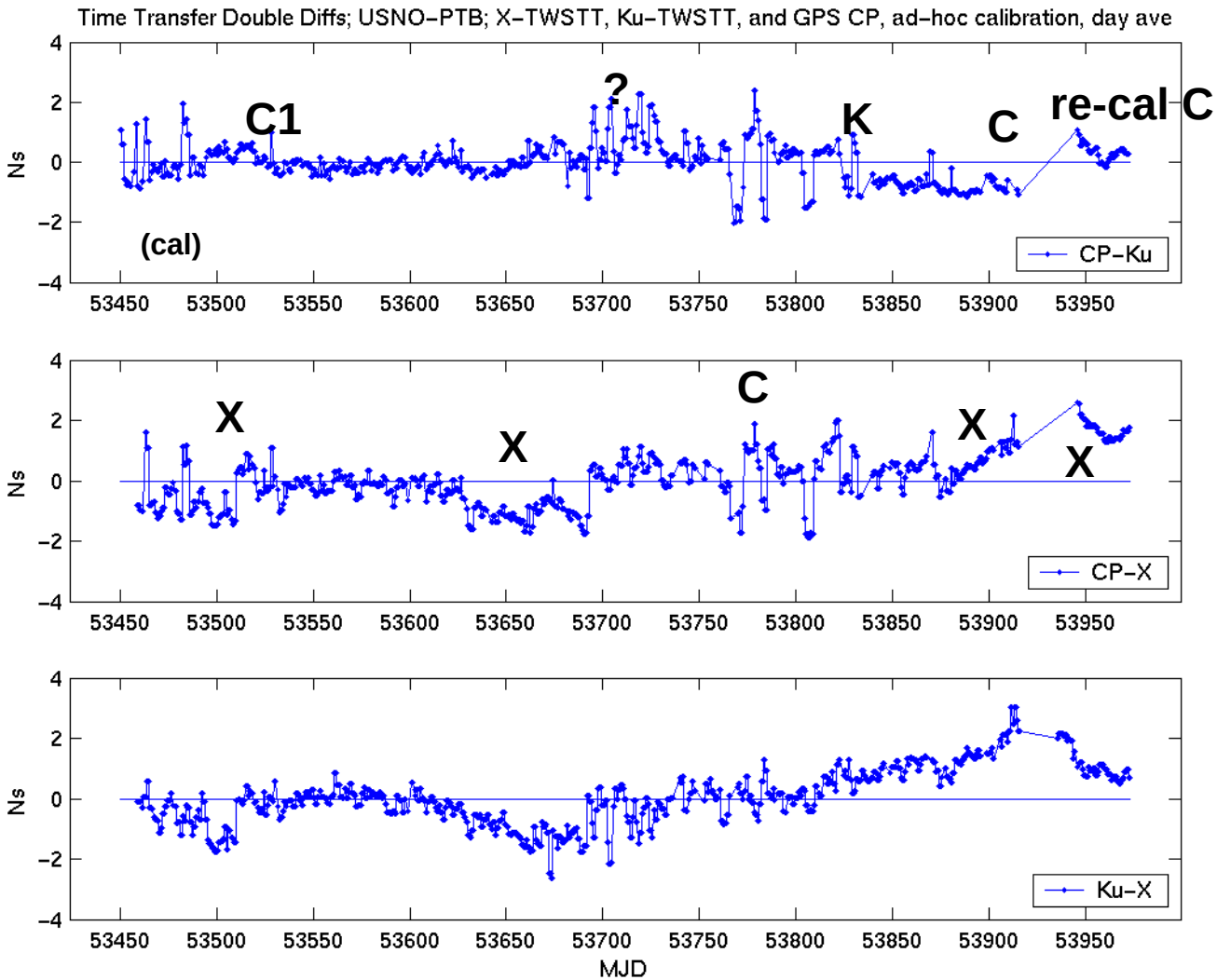
USNO-PTB link differences since the Ku-band Satellite Change

Outliers not removed



PTB Modem change

No Hardware is Perfect
K,X,C identify technique at fault (C=CP)



Carrier Phase GPS Receivers Under Test