

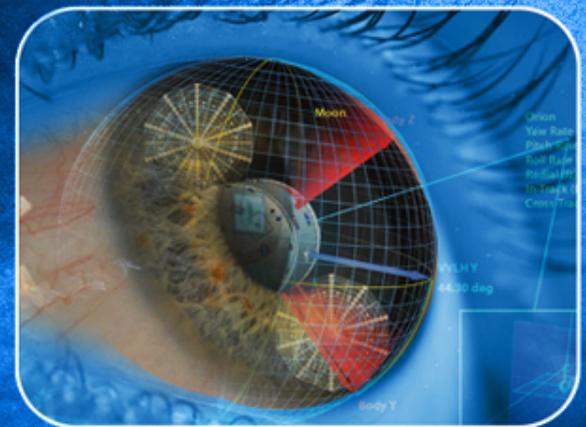
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TOTAL ACCESS

Processing GPS Receiver Data for Improved Fermi GLAST Navigation

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Company Overview

- NASA's Goddard Space Flight Center (GSFC) is in Greenbelt, Maryland, approximately 6.5 miles northeast of Washington, D. C.
- GSFC is a major U.S. laboratory for developing and operating unmanned scientific spacecraft.
- The Center manages many of NASA's Earth Observation, Astronomy, and Space Physics missions, including the Hubble Space Telescope (HST)



Program/Project Overview

- The Fermi Gamma-ray Large Area Space Telescope (GLAST) is a high-energy observatory launched June 11, 2008.
- Fermi GLAST's 5-year mission objectives:
 - Explore the most extreme environments in the Universe.
 - Search for signs of new laws of physics and what composes the mysterious Dark Matter.
 - Explain how black holes accelerate immense jets of material to nearly light speed.
 - Help crack the mysteries of gamma-ray bursts.
 - Answer long-standing questions across a broad range of topics, including solar flares, pulsars and the origin of cosmic rays.



Challenges

- Fermi GLAST uses a General Dynamics Viceroy GPS receiver for orbit determination – time, position & velocity
- The operations team needed to improve the Viceroy velocity estimates in order to produce accurate 6-week orbit prediction for mission planning

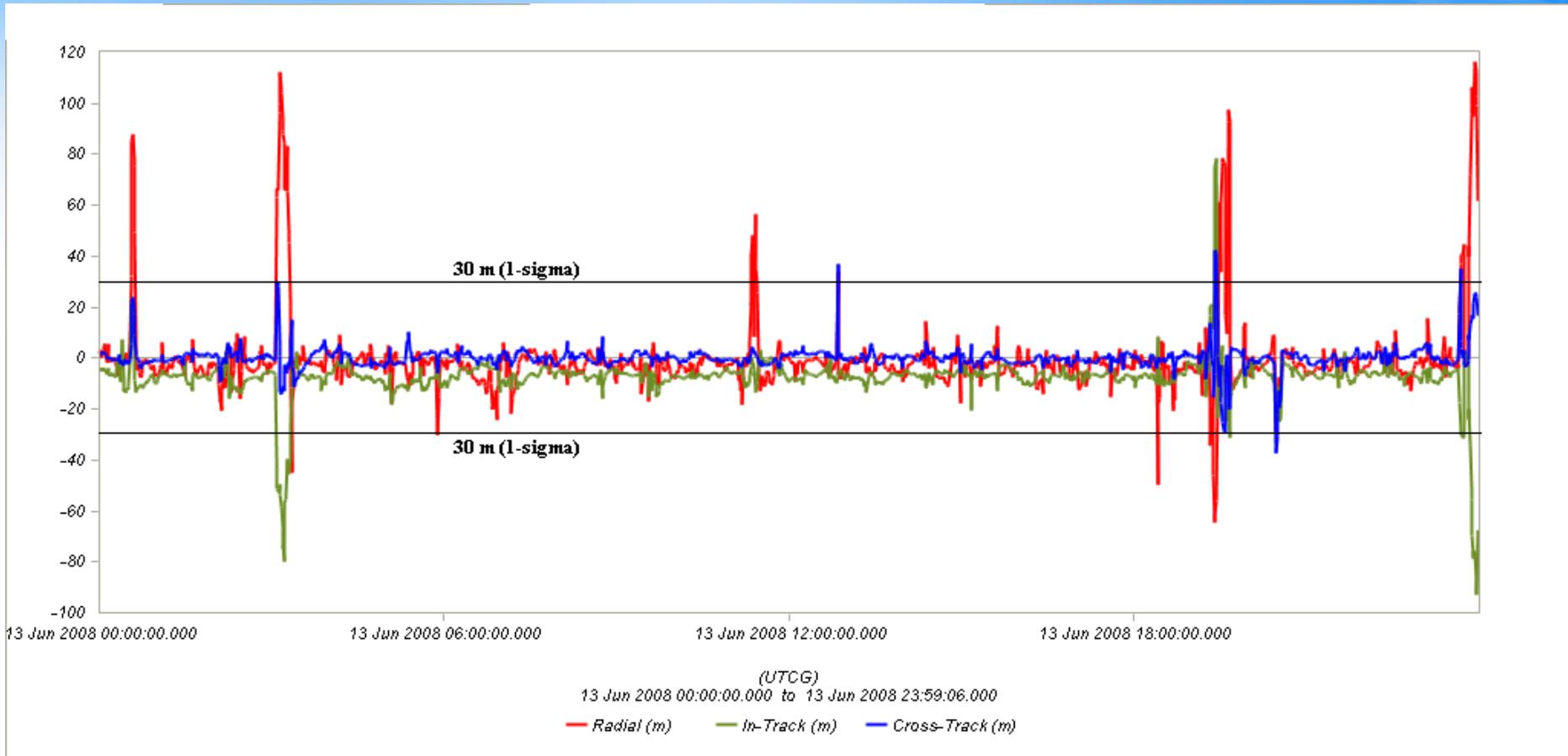


Solution

- ODTK provided a COTS solution to filter-smooth the Viceroy orbit data
- ODTK processed data formats were readily usable with other MOC STK products (STK/Pro, STK/Scheduler, etc.)
- We considered using a GOTS product - the Goddard Trajectory Determination System (GTDS)
 - Not practical to use GTDS with the MOC software architecture

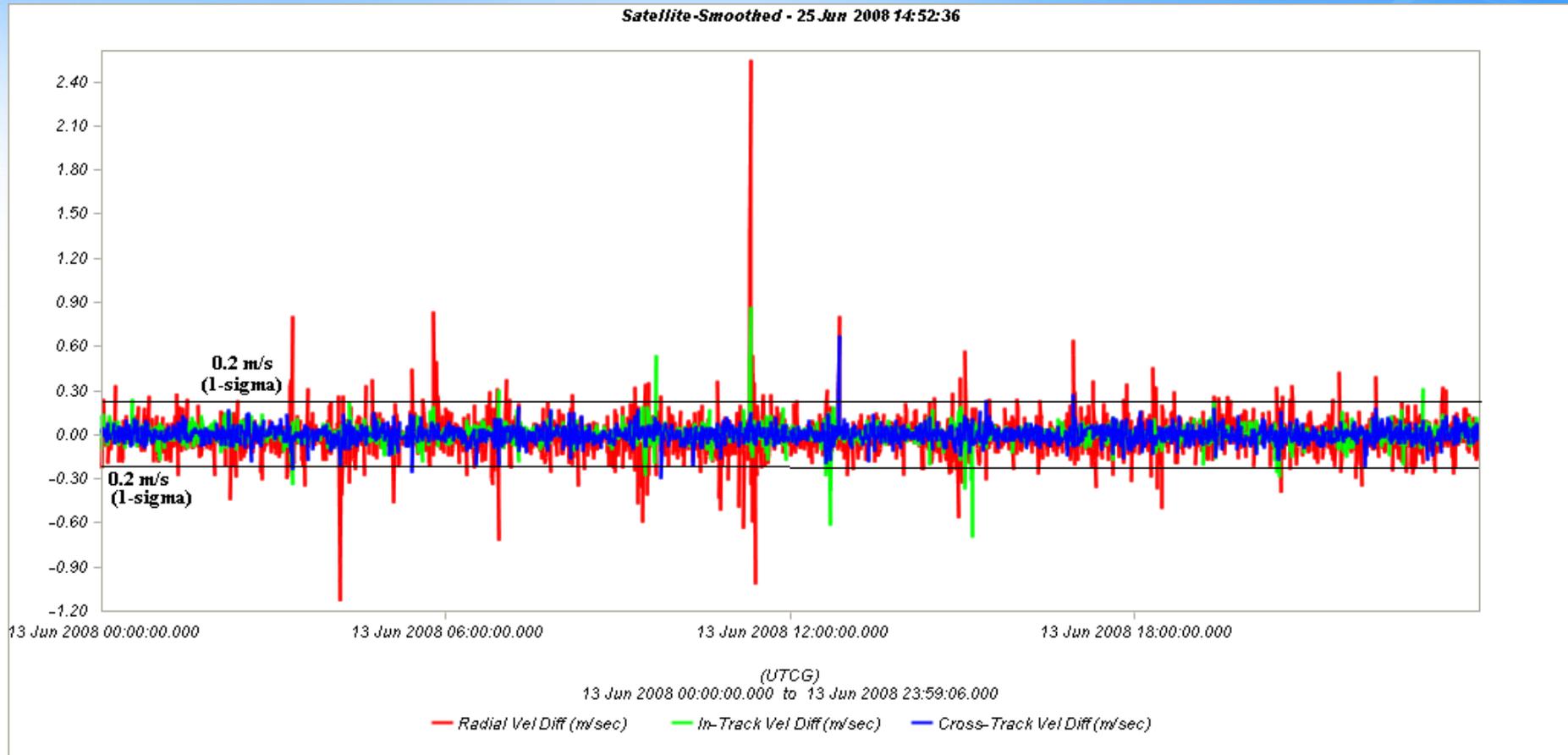


Results





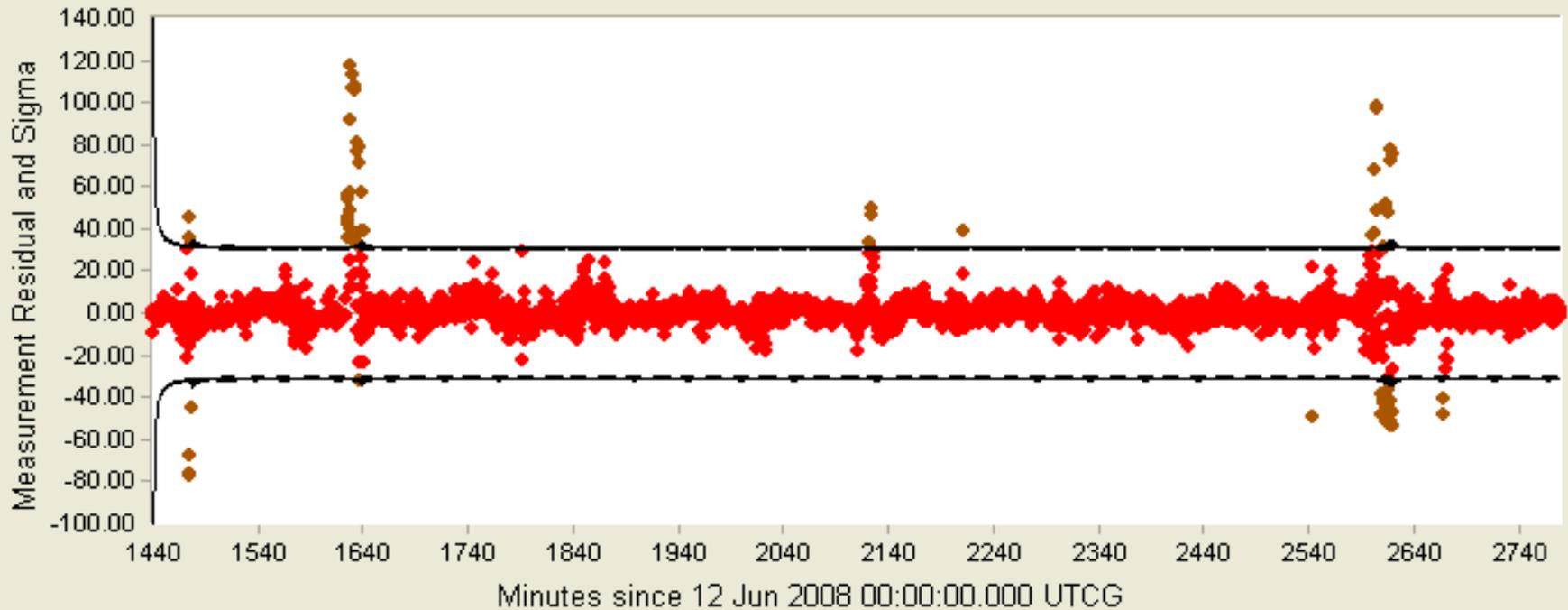
Results





Results

Measurement Residual and Sigma

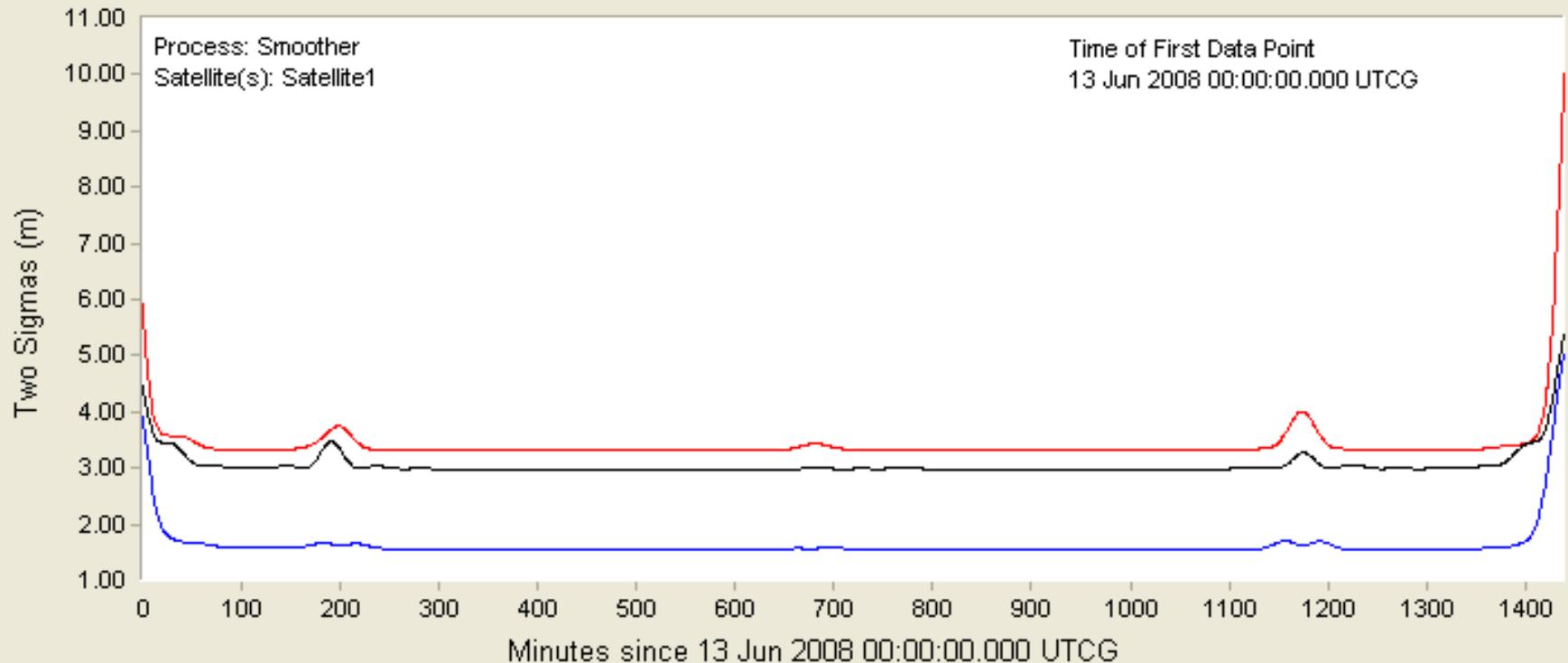


- ◆ A Satellite1.GPSReceiver1 Meas Residuals
- ◆ RE Satellite1.GPSReceiver1 Meas Residuals
- Satellite1.GPSReceiver1 3-Sigma Meas Residual
- Satellite1.GPSReceiver1 -3-Sigma Meas Residual



Results

Position Uncertainty (0.95P)



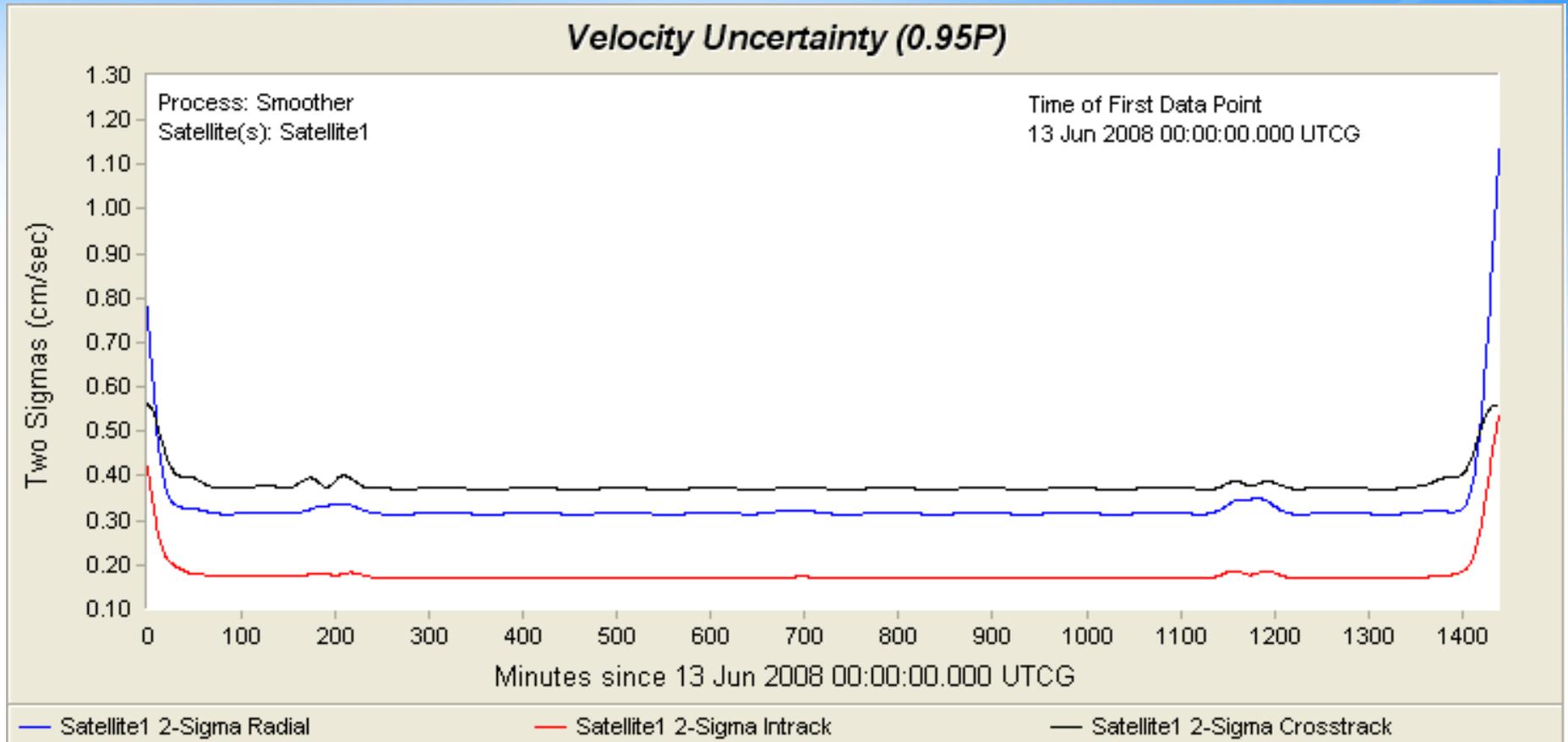
— Satellite1 2-Sigmas Radial

— Satellite1 2-Sigmas Intrack

— Satellite1 2-Sigmas Crosstrack



Results





Future Work

- ODTK is being considered for future GSFC missions that use GPS:
 - Global Precipitation Measurement (GPM) mission
 - Landsat Data Continuity Mission (LDCM)



Contact Information

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