



Space Weather Action Plan

Items of Interest for the GPS/GNSS Community...and a SWPC Update

Rob Steenburgh
Space Weather Prediction Center
Boulder, CO
robert.steenburgh@noaa.gov



Acknowledgements:

Mihail Codrescu

Dominic Fuller-Rowell



Space Weather Action Plan

Benchmarks for **Ionospheric Disturbances** (1.3) SWPC POC: Rodney Viereck

Benchmarks for **Solar Radio Bursts** (1.4) SWPC POC: Doug Biesecker

Benchmarks for **Upper Atmosphere Expansion** (1.5.1) POCs: Tim Fuller-Rowell,
Mihail Codrescu

Improve Operational Impact **Forecasting and Communications** (survey of
community - 4.4) SWPC POC: Bob Rutledge

Improve Assessment, Modeling, and Prediction of Impacts on **Critical
Infrastructure** (4.2.6-8) POCs: Rodney Viereck, Bill Denig;



Space Weather Action Plan

The following actions define requirements for real-time assessment and reporting of impacts to radio and satellite communications and space-based PNT systems:

4.2.6 DOC, in coordination with NSF and DOI, and commercial communication and PNT system stakeholders, will define **requirements for real-time monitoring systems** to assess atmospheric conditions that could affect these systems during ionospheric disturbances and geomagnetic storms.

Deliverable: Define requirements for a national operational network of real-time ionospheric monitoring stations

Timeline: Within 1 year of the publication of this Action Plan



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4.2.7 DOC, DOD, and DHS, in coordination with government and commercial communications and PNT system users, will define the scope and observational requirements for **a system that provides near-real-time situational awareness of the space environment for communication and PNT systems.**

Deliverable: Complete report with scope and observational requirements

Timeline: Within 1 year of the publication of this Action Plan



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4.2.8 DOC and DOD will create and support **a satellite-anomaly database** to enable secure collection and analysis of satellite-anomaly data related to space weather.

Deliverable: Complete development of a satellite-anomaly database in a secure format at DOC

Timeline: Within 1 year of the publication of this Action Plan



SWPC Update

NATEC vs USTEC

USCG shutdown - impact and mitigation

CTIPe

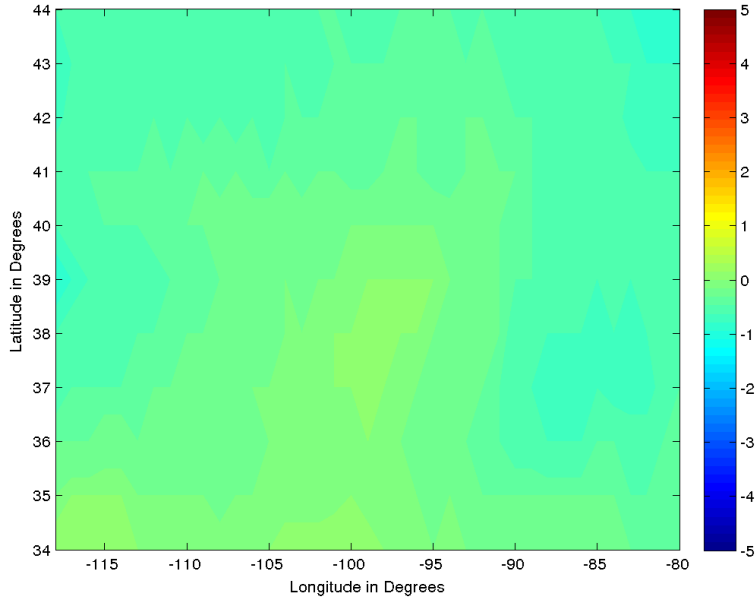
Cooperative Research And Development Agreement with ASTRA

Questions for the Community

NATEC vs USTEC - an example from 23 August

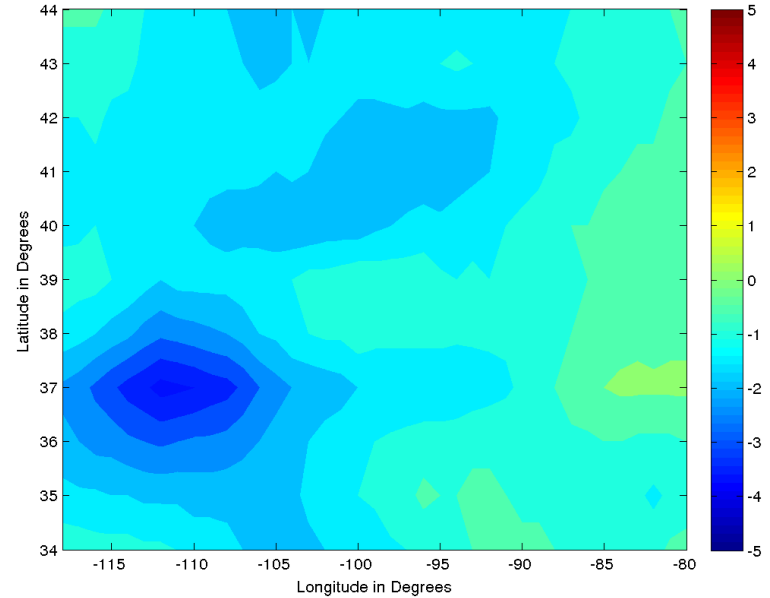


NA-TEC Vertical TEC Deviation From US-TEC
August 23, 2014 10:15
Maximum Absolute Deviation: 0.8 TECu



0.8 TECU

NA-TEC Vertical TEC Deviation From US-TEC
August 23, 2014 21:30
Maximum Absolute Deviation: 3.7 TECu

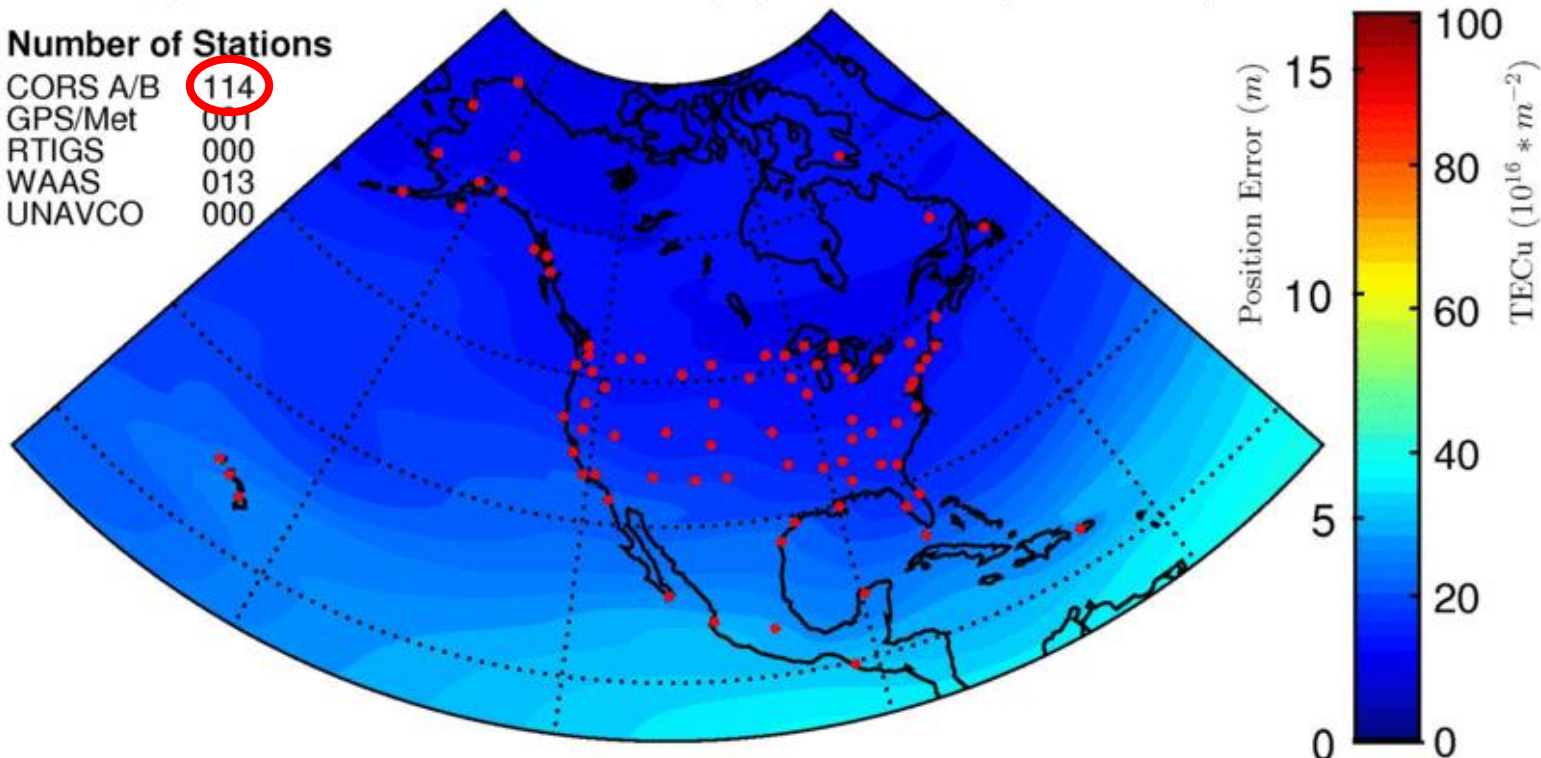


3.7 TECU

Approximate L1 Position Error (m) and TECu ($10^{16} * m^{-2}$)

Number of Stations

CORS A/B	114
GPS/Met	001
RTIGS	000
WAAS	013
UNAVCO	000



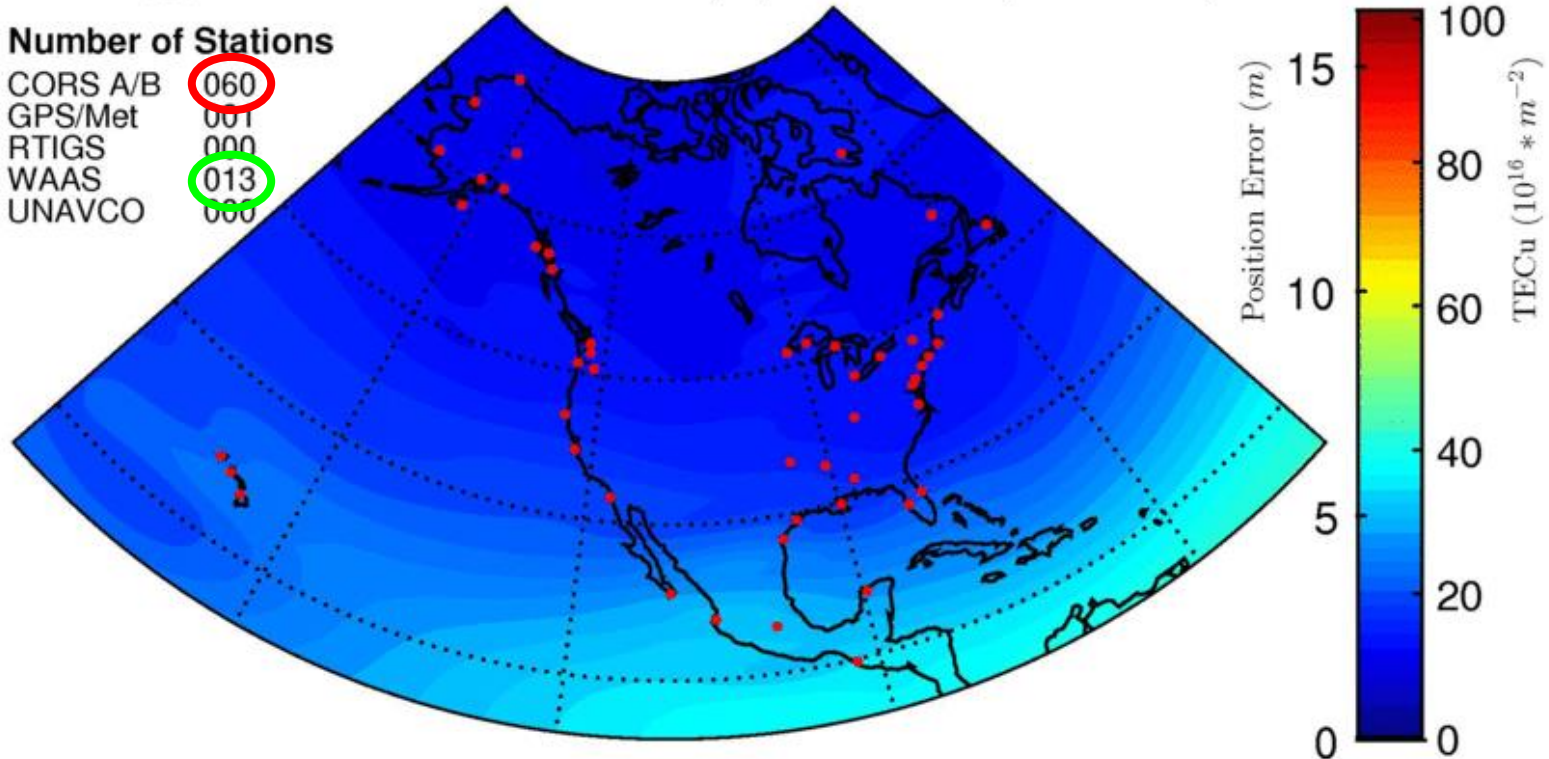
02-Aug-2016 from 19:00 to 19:15 UT

NOAA/SWPC Boulder, CO USA (op.ver: 2.0)

Approximate L1 Position Error (m) and TECu ($10^{16} * m^{-2}$)

Number of Stations

CORS A/B	060
GPS/Met	001
RTIGS	000
WAAS	013
UNAVCO	000



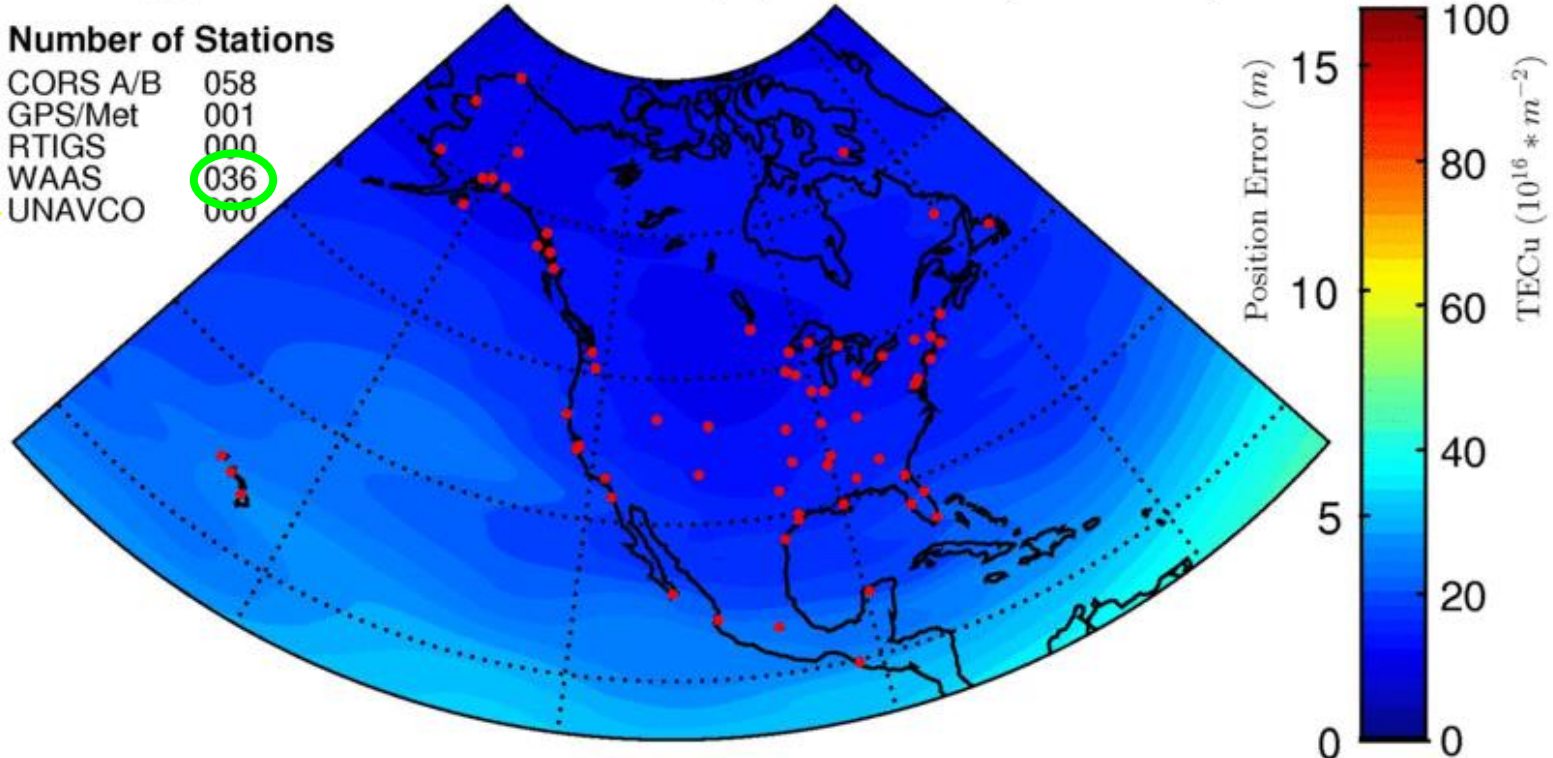
05-Aug-2016 from 19:00 to 19:15 UT

NOAA/SWPC Boulder, CO USA (op.ver: 2.0)

Approximate L1 Position Error (m) and TECu ($10^{16} * m^{-2}$)

Number of Stations

CORS A/B	058
GPS/Met	001
RTIGS	000
WAAS	036
UNAVCO	000



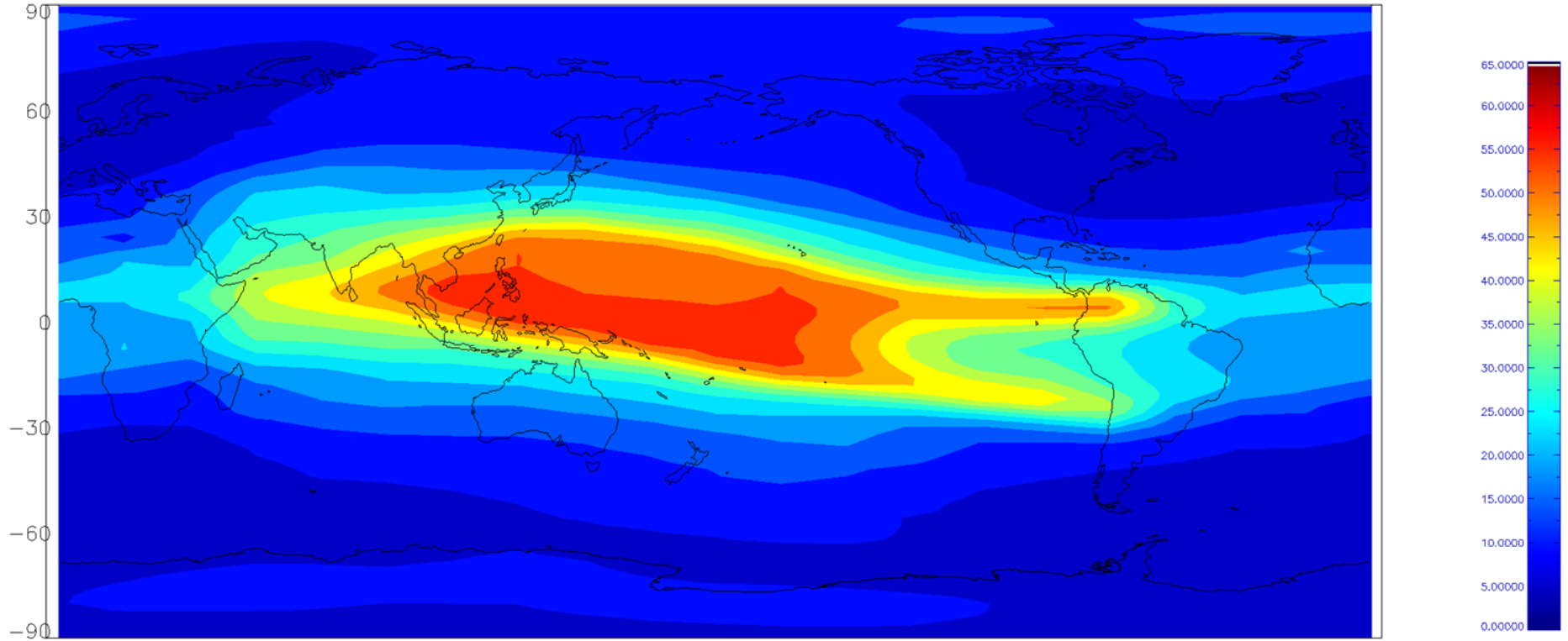
25-Aug-2016 from 19:00 to 19:15 UT

NOAA/SWPC Boulder, CO USA (op.ver: 2.0)

CTIPe TEC is now available at <http://www.swpc.noaa.gov/products/ctipe-total-electron-content-forecast>



CTIPe tec



09-08-2016T03:40:00



Cooperative Research and Development Agreement with ASTRA

ASTRA provides **AK receiver data** (S_4 , sigma-phi, TEC) for evaluation & SWPC shares some NOAA sites with ASTRA for GPS installation

Joint product development of a **public GPS position accuracy product**

Joint product development which integrates ASTRA GPS **scintillation data and OVATION** model auroral boundary output (SWPC provides OVATION)

Joint design of an optimal distribution of sites for measuring scintillation and TEC data from **NOAA Buoys** for use in SWPC products

ASTRA **acknowledgement** on applicable products hosted on SWPC web site.



Questions for the GNSS Community

Do you use NATEC/USTEC? If so, how?

Is there interest in an ionosphere disturbance index derived from the comparison of position errors obtained from dual and single frequency PPP algorithms at reference stations?

How useful is a 3-6 hour forecast of an ionosphere disturbance?