

# WAAS LPV and RNP Coverage During Ionosphere Storms

Presented to: Space Weather Enterprise Forum

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Federal Aviation  
Administration



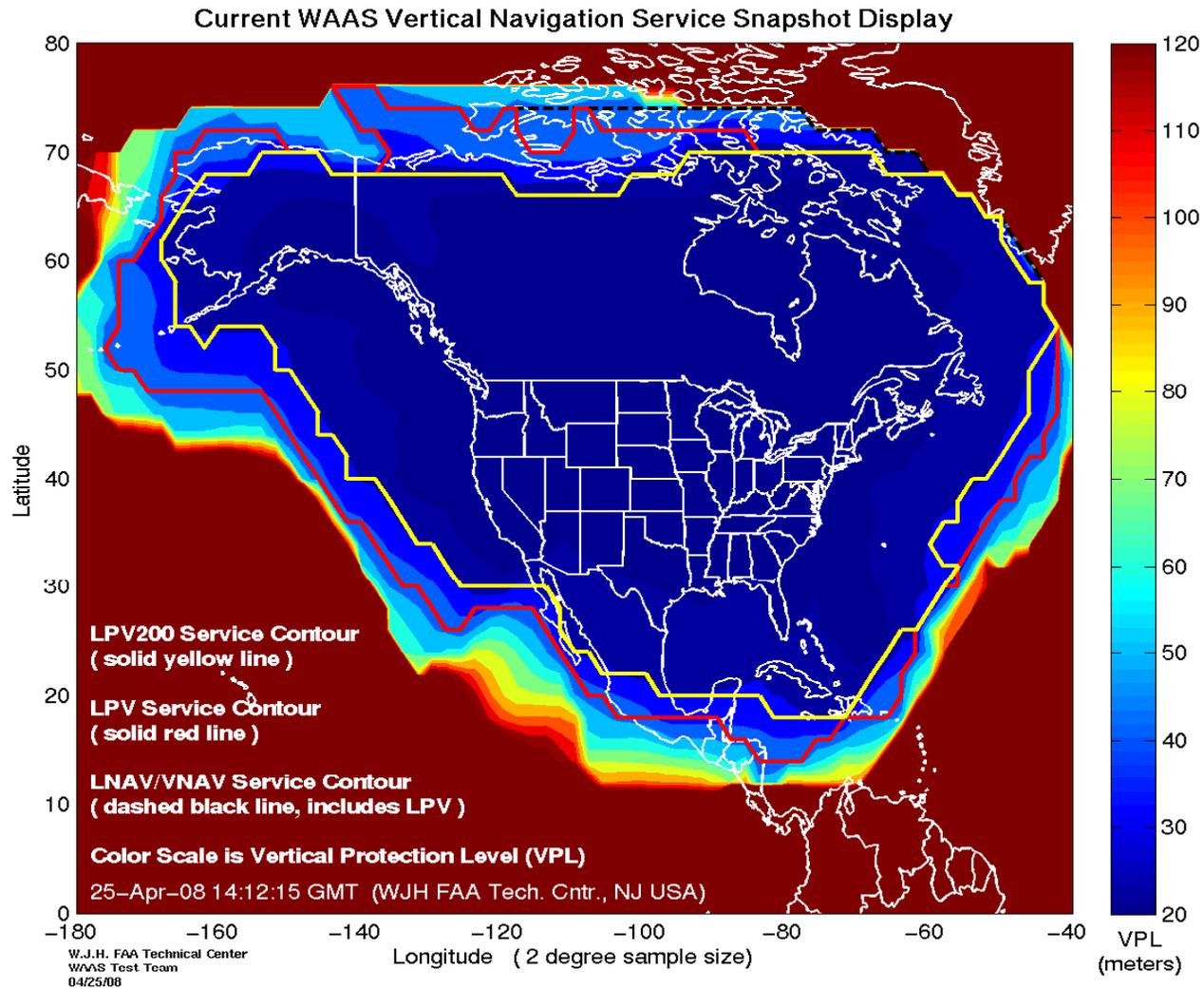
# Overview

- **WAAS Localizer Performance Vertical (LPV) Service Outages During Ionosphere Storms**
- **RNP-0.3/0.1 Service Availability During Ionosphere Storms for WAAS Users**
- **Operational Impacts for Users**

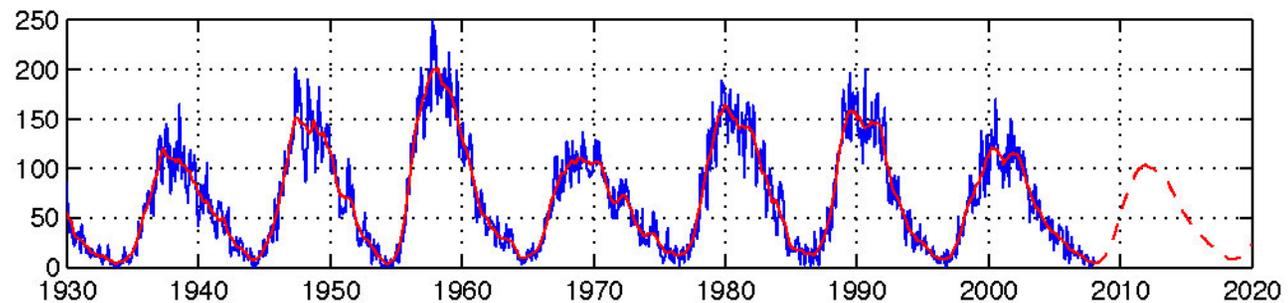
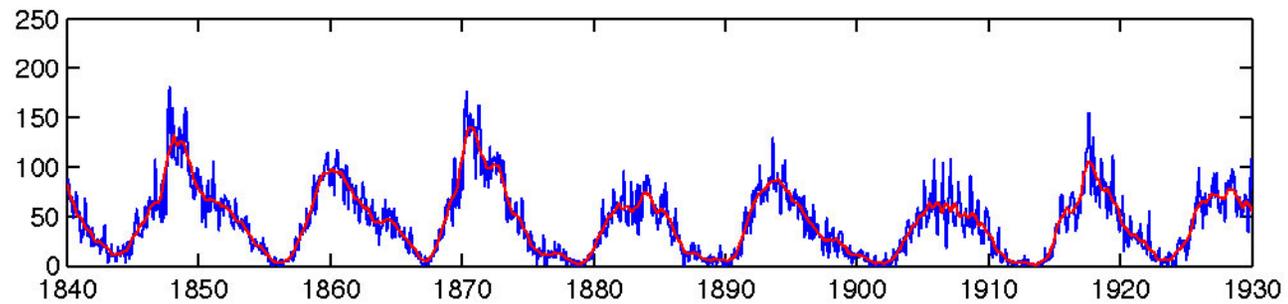
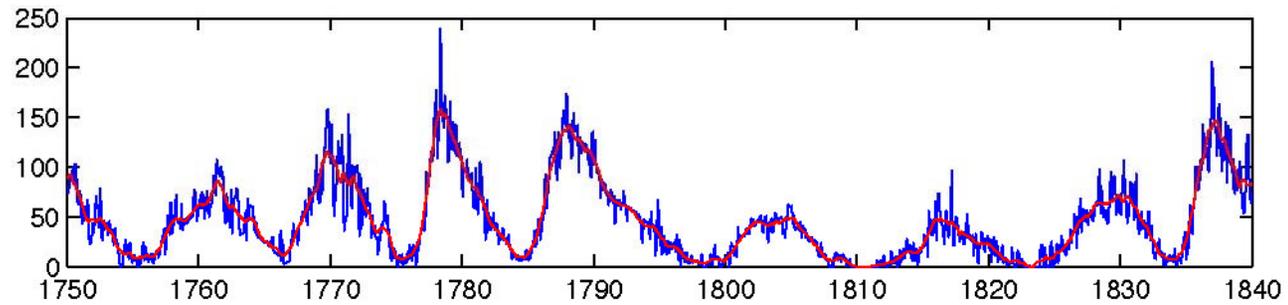




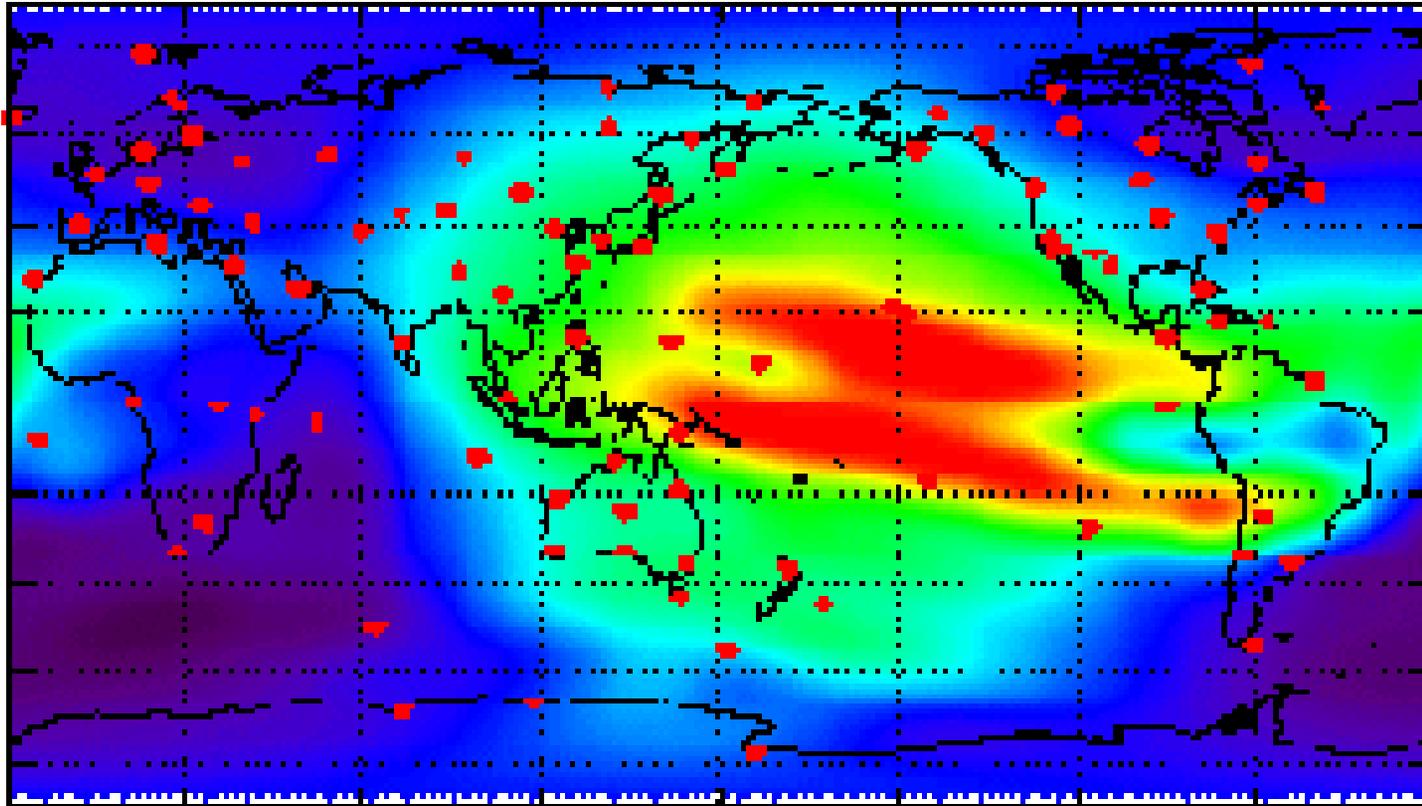
# WAAS LPV Coverage



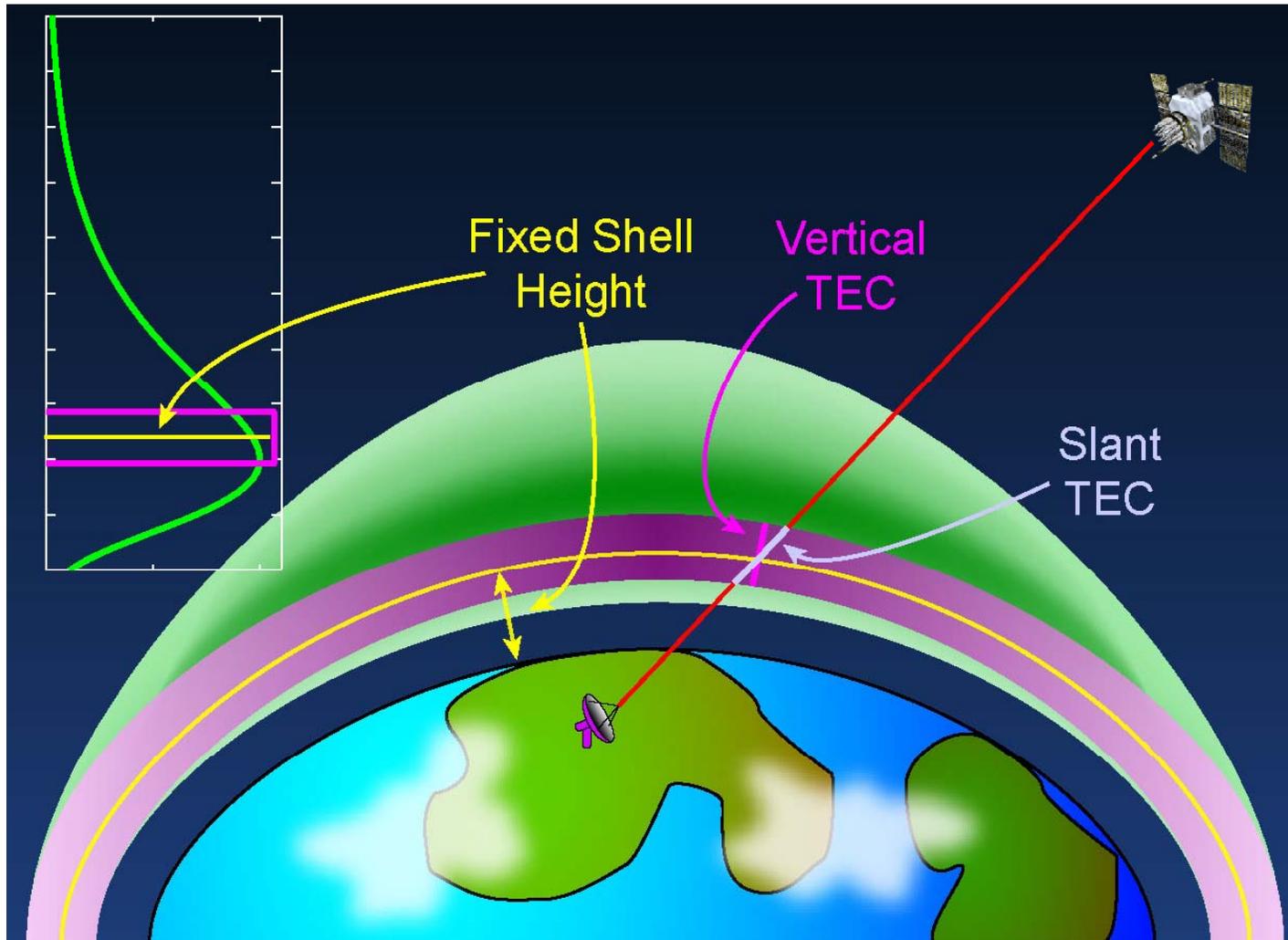
# Solar Cycle



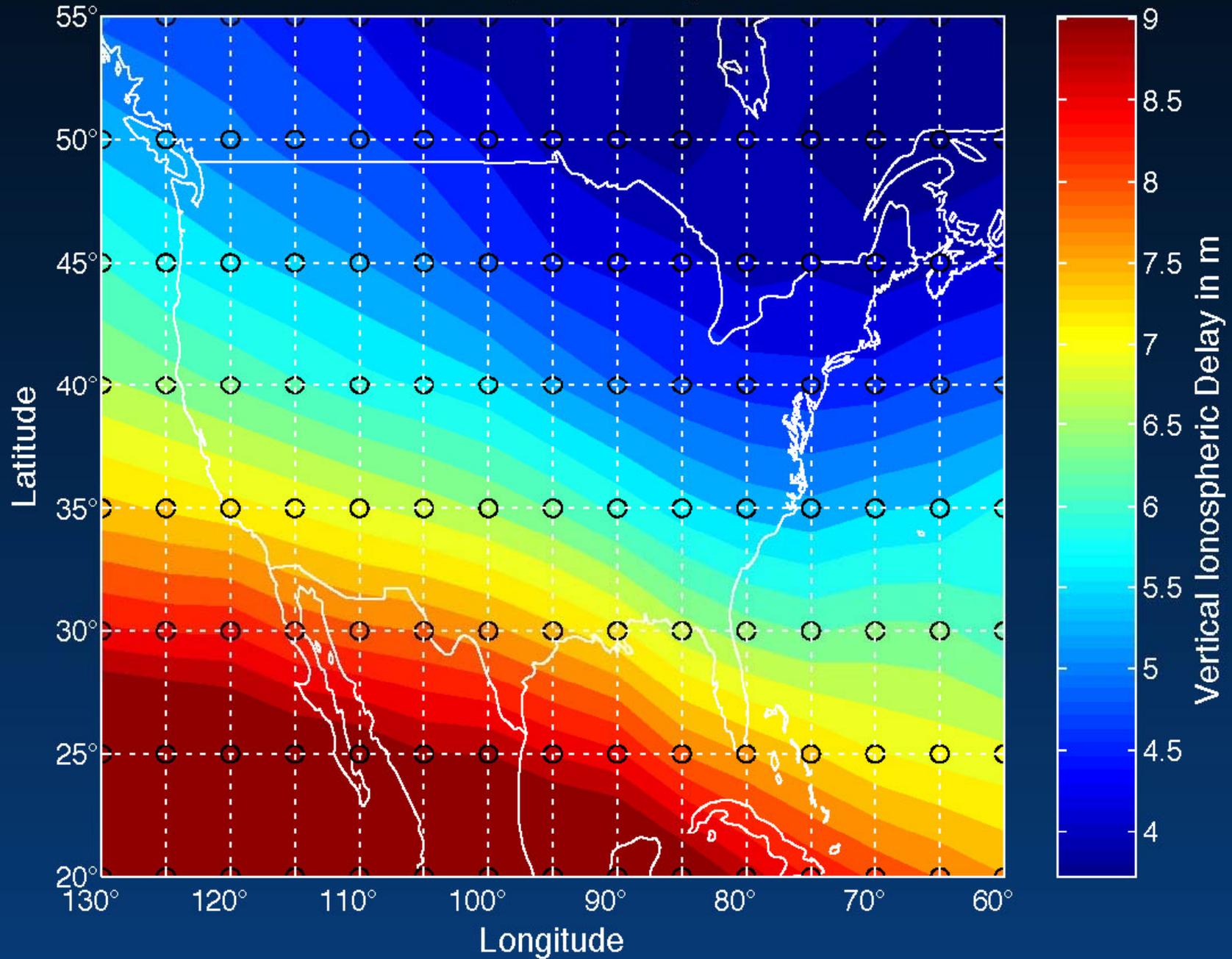
# Ionosphere Storm



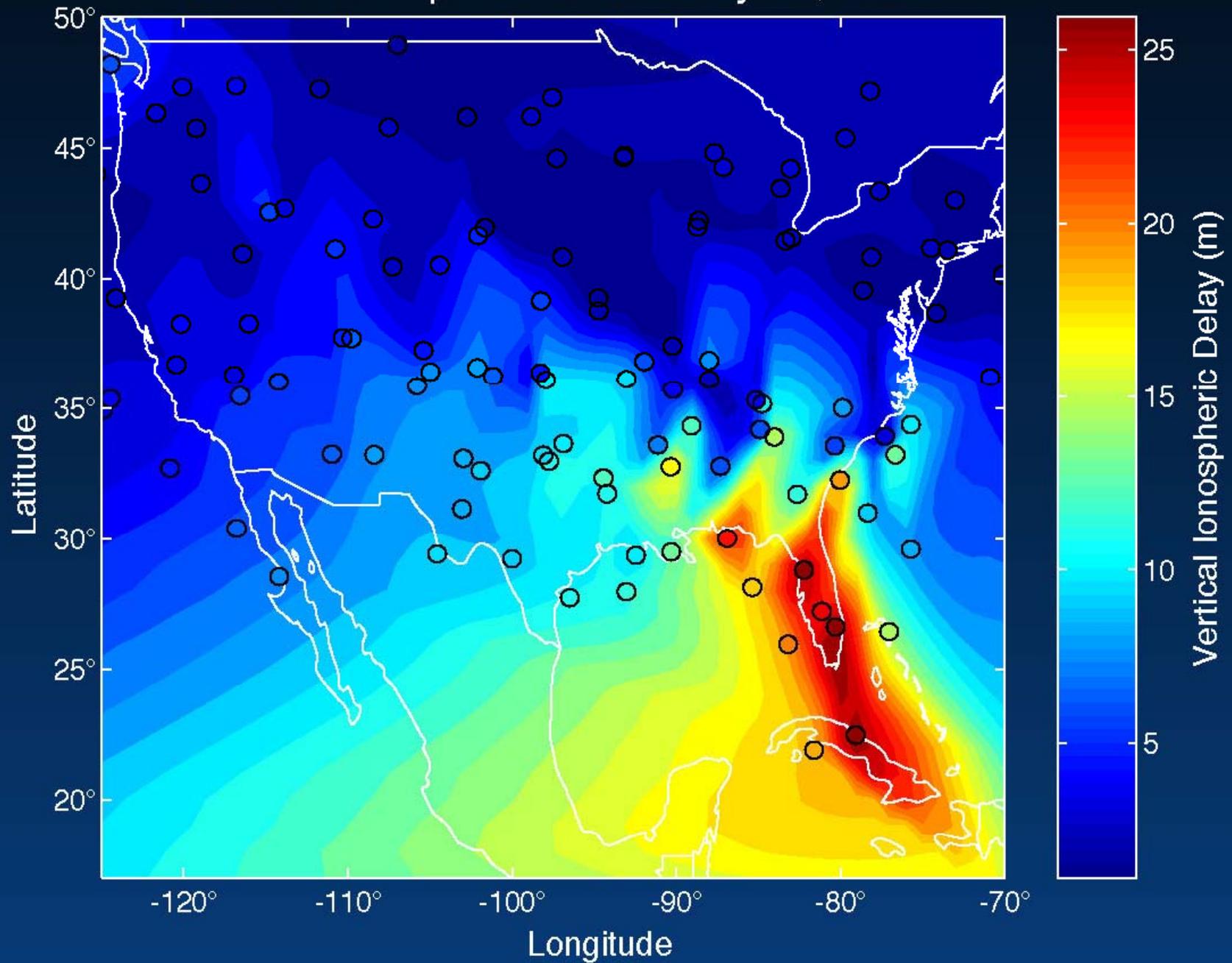
# Thin Shell Model



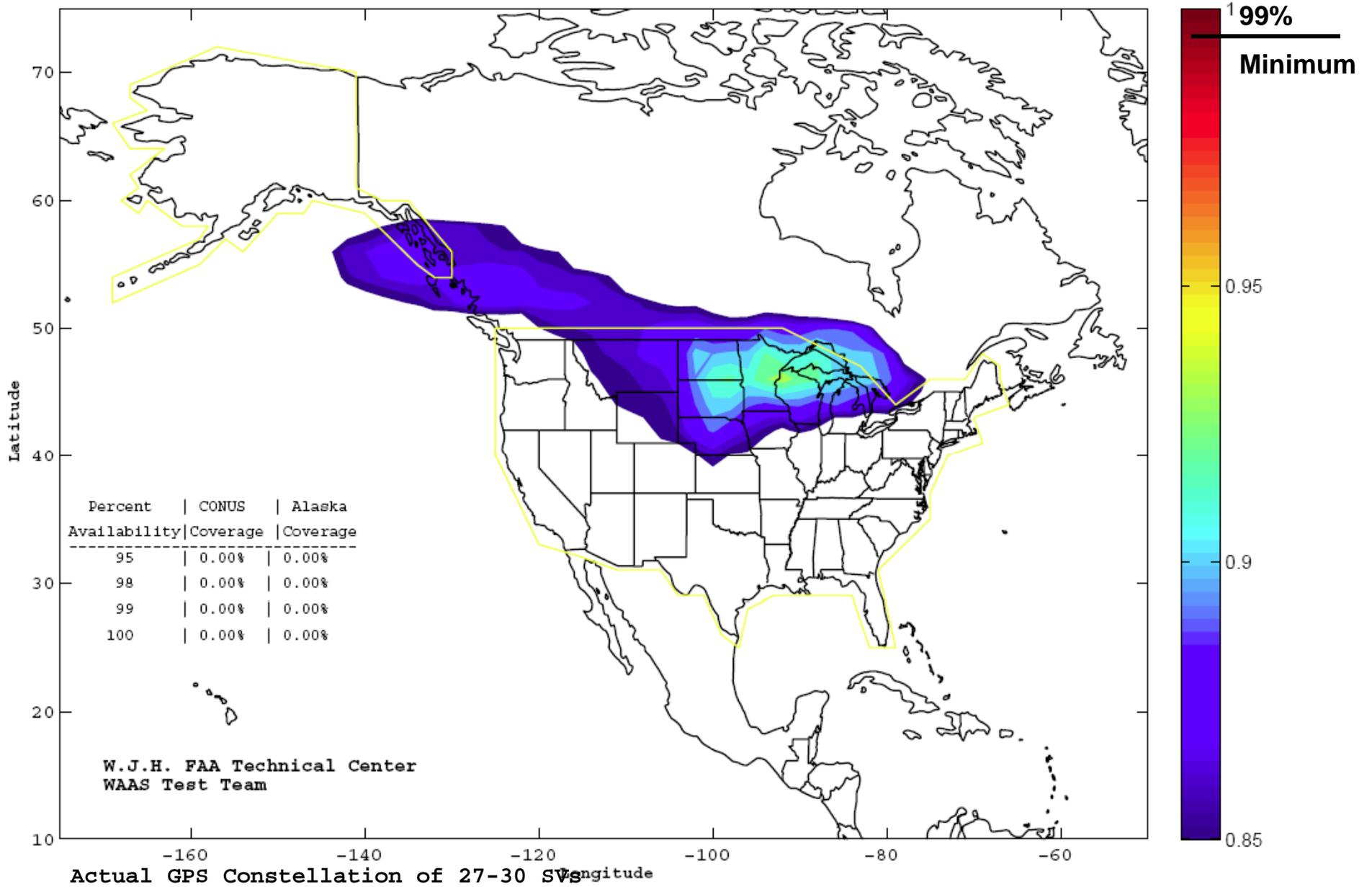
# Nominal Ionosphere July 2, 2000



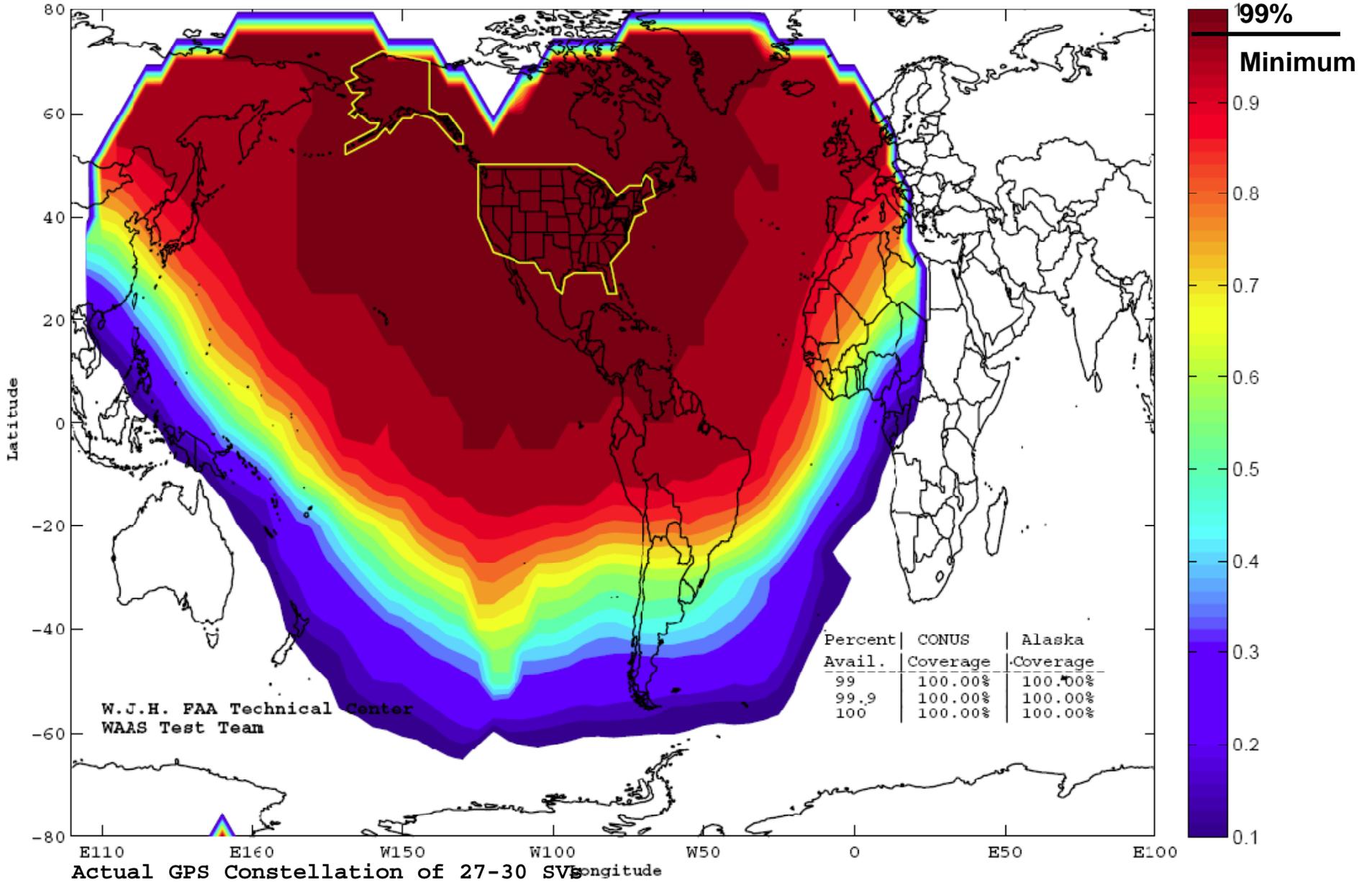
# Severe Ionospheric Storm July 16, 2000



# LPV Availability During Ionosphere Storm



WAAS RNP 0.3 Coverage Contours  
 10/29/03  
 Week 1242 Day 3



# Operational Impacts

- **Ionosphere Storms Have Minor Operational Impact**
  - WAAS Equipped Aircraft Are Not Required to Carry Alternate/Substitute Navigation Equipment (Part 91)
  - Filing to a Destination
    - Plan for LPV line of minima unless unreliable NOTAM for airport
    - Availability of LNAV During Ionosphere Storms Typically 100%
  - Designating and Alternate
    - Weather +/- 1 hour of arrival less than 2000 foot ceiling and 3 mile visibility
  - Alternate Requirements
    - Weather 800 foot ceiling and 2 statute mile visibility
    - LNAV/VNAV or LPV may be used, if available, otherwise LNAV
  - RNP-0.3-0.1 Availability Near 100% During Severe Ionosphere Storms
- **Forecasting for Solar Weather for Aviation Purposes is Unreliable**



