High-Latitude Ionospheric Variability measured from Antarctica

The polar F region ionosphere frequently exhibits sporadic variability:

- Plasma density enhancements up to 10x the background
- 100s of km horizontally, embedded structures down to 100s of m
- Velocities up to several km/sec

More variable in January than in July in both hemispheres

- Confirmed by LEO satellites, ground-based GPS and modeling
- Same pattern seen in GPS signal loss statistics [Xiong et al. 2018]

Caused by 30% annual asymmetry in global plasma levels and thermospheric chemistry variations

First-principles modeling accurately predicts a major form of Space Weather at high latitudes