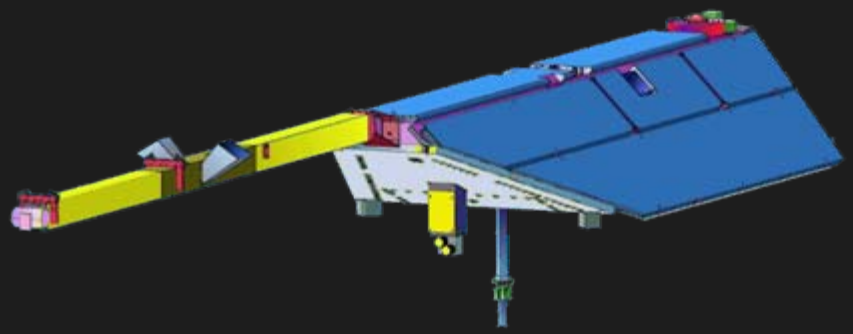
Magnetic field signatures of irregularities observed by CHAMP

- Dedicated magnetic field satellites
- CHAMP magnetic field profiles
- Maps of F-region irregularities

Stefan Maus (CIRES/NGDC)

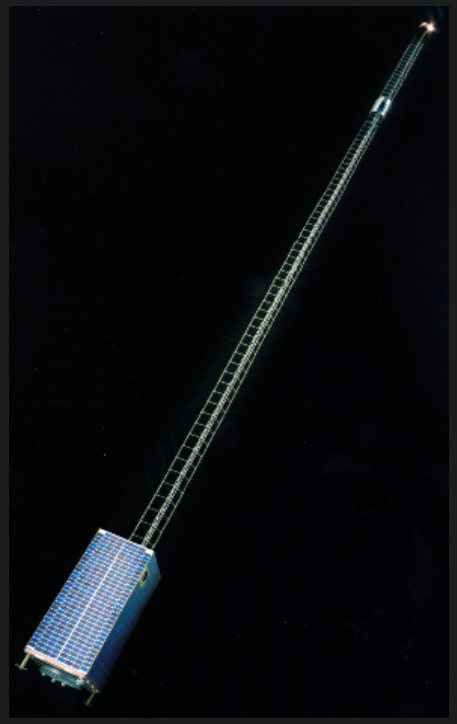
Hermann Lühr, George Balasis (GFZ Potsdam)

Magnetic Satellites



CHAMP (since 2000)

- 450 km altitude, descending
- Drifts rapidly in local time



Oersted (since 1999)

- 600 – 800 km altitude
- Drifts slowly in local time

SAC-C (since 2000)

- 700 km altitude
- Sun-sync noon-midnight orbit

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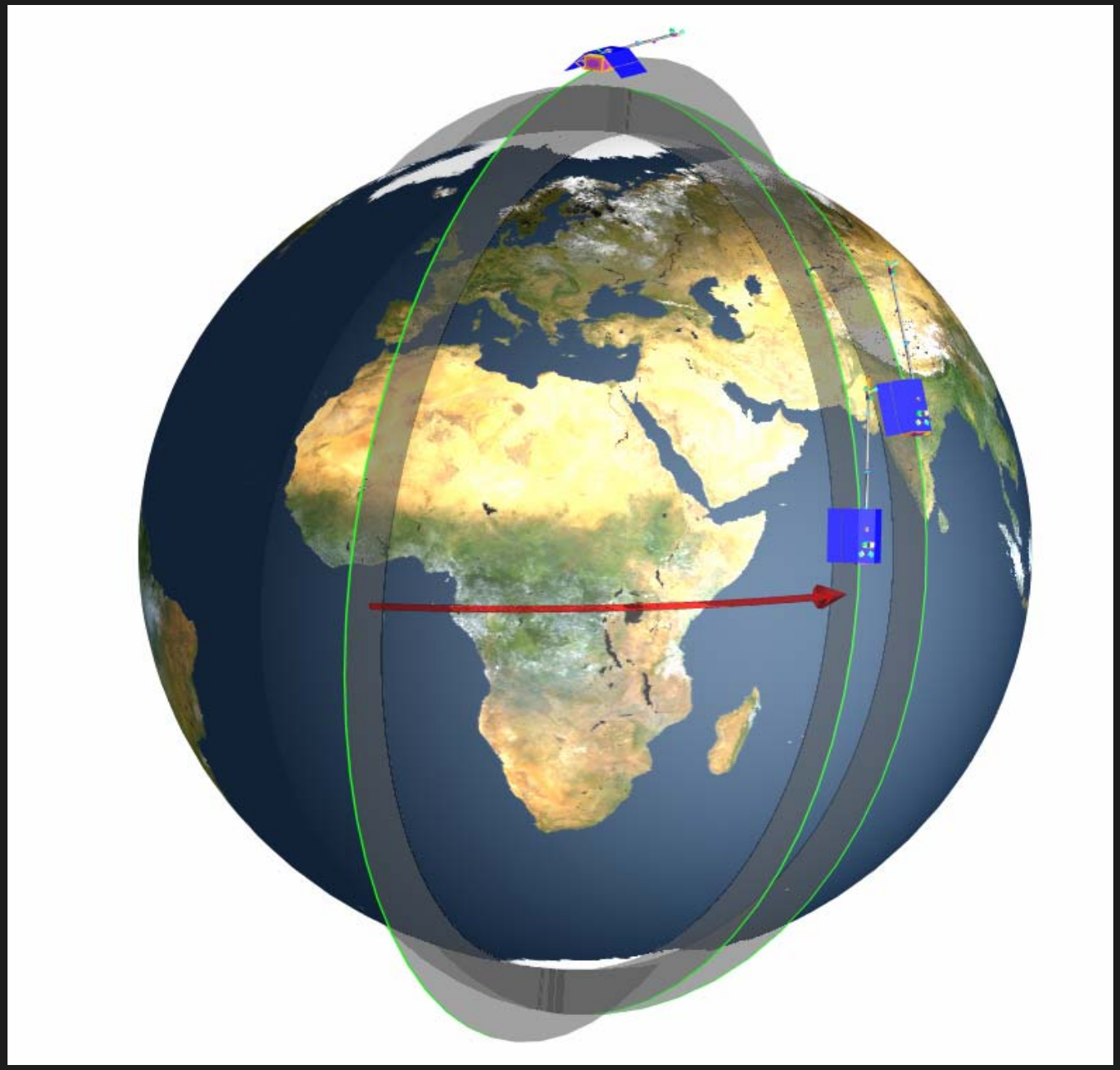
Swarm

Orbit
Constellation

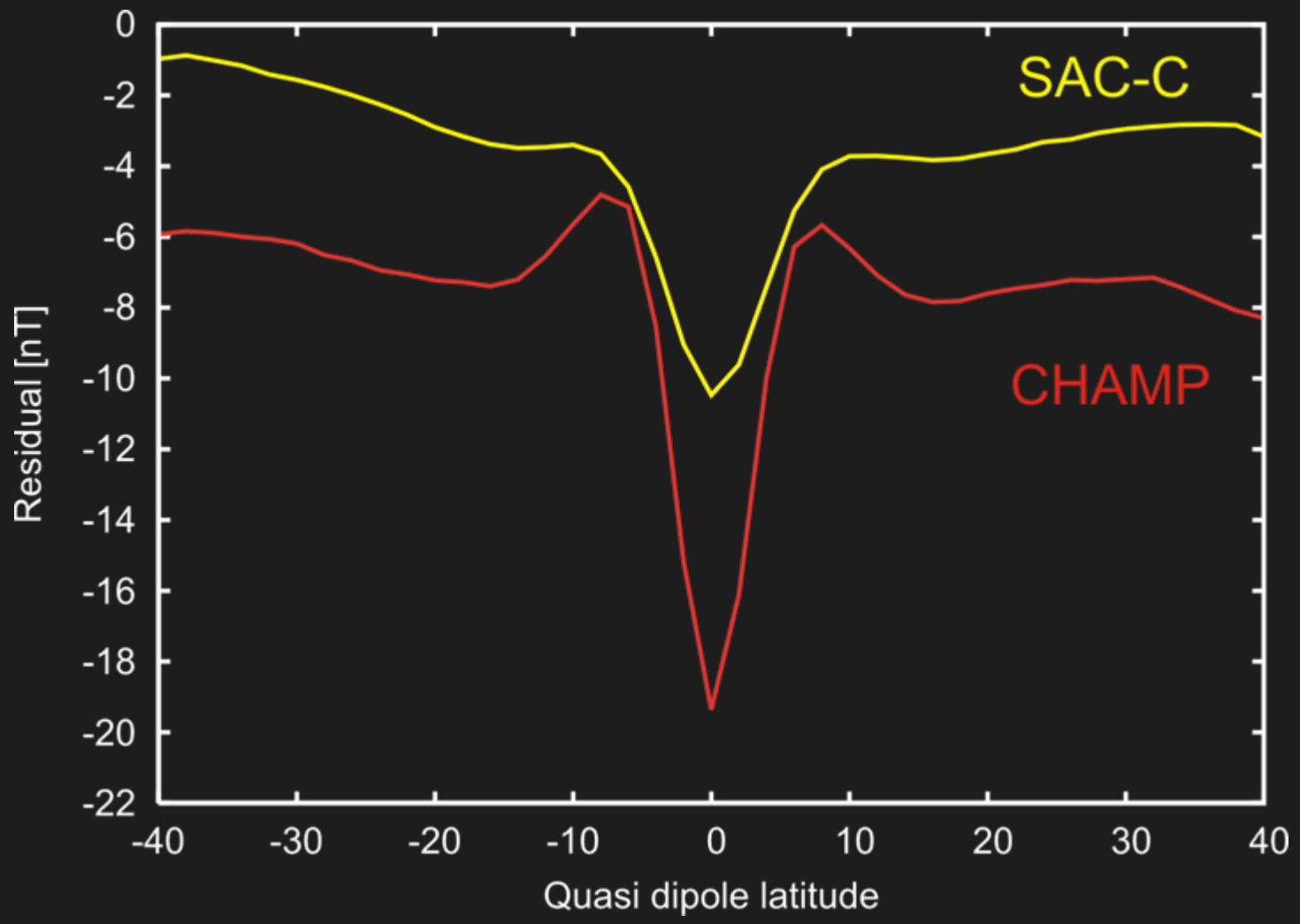


Launch
Scheduled
2009

4 year
mission

S. Maus *et al*, C/NOFS Workshop, 2005

Mean Residual in |B| at 10-11 LT



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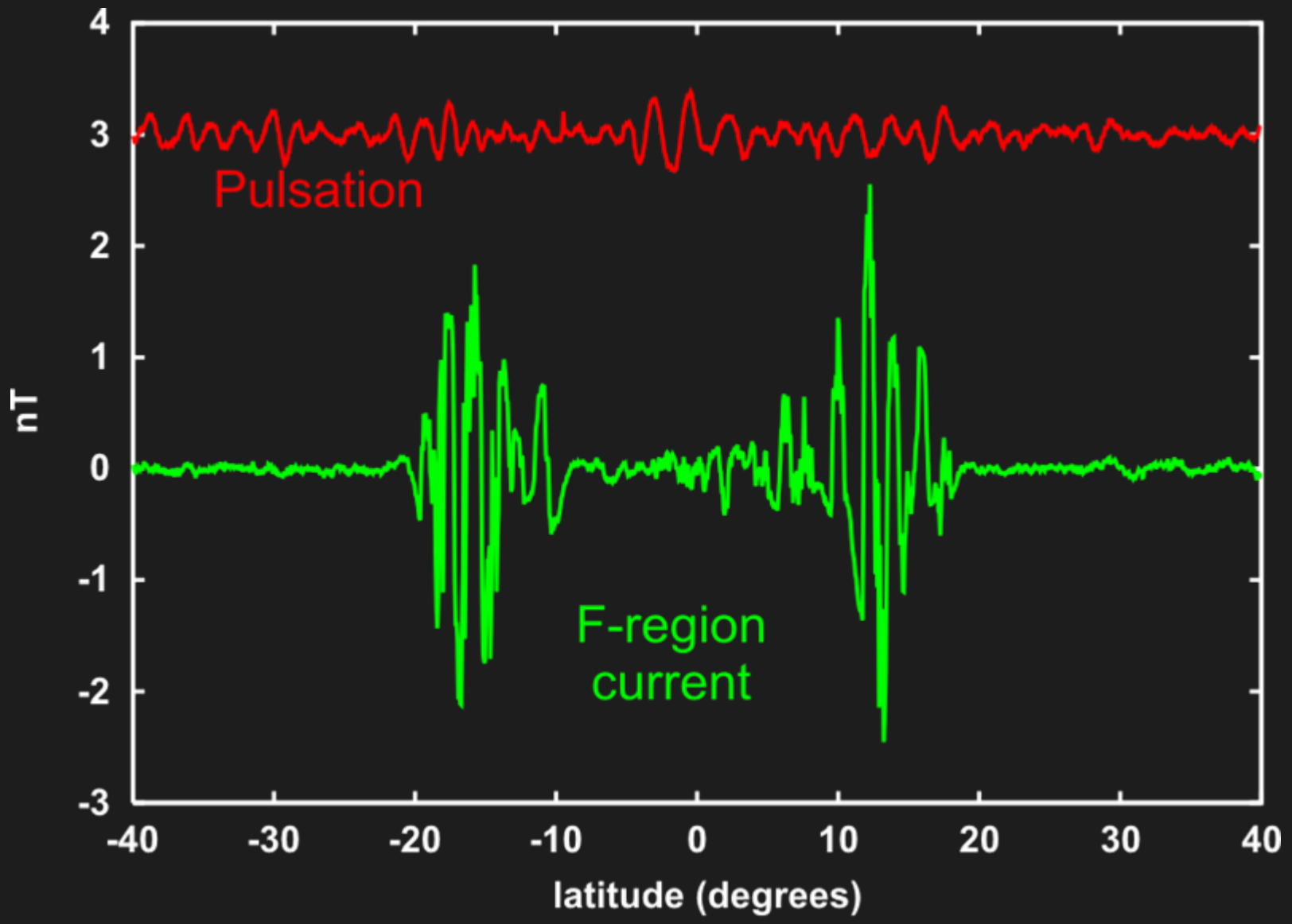
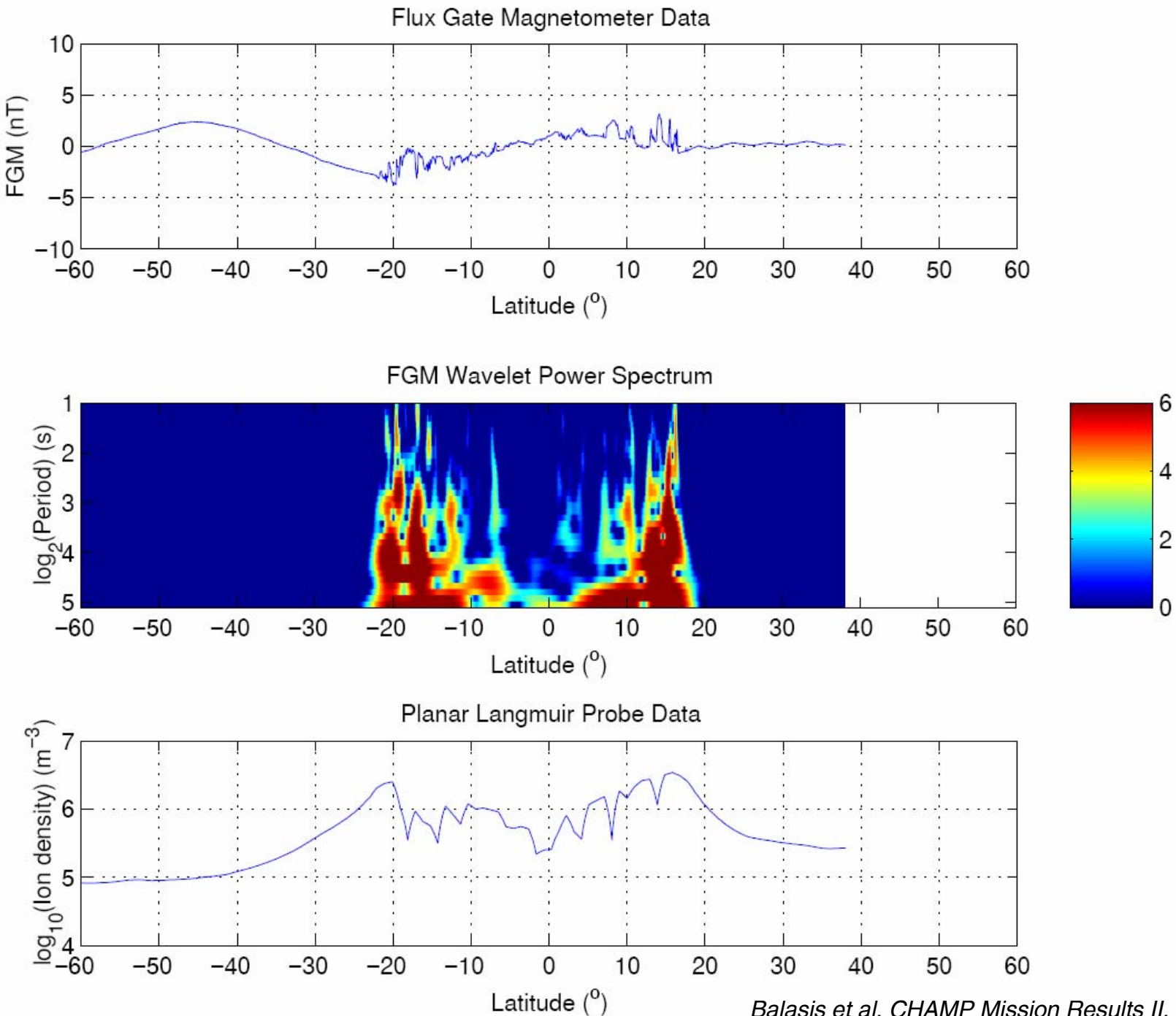
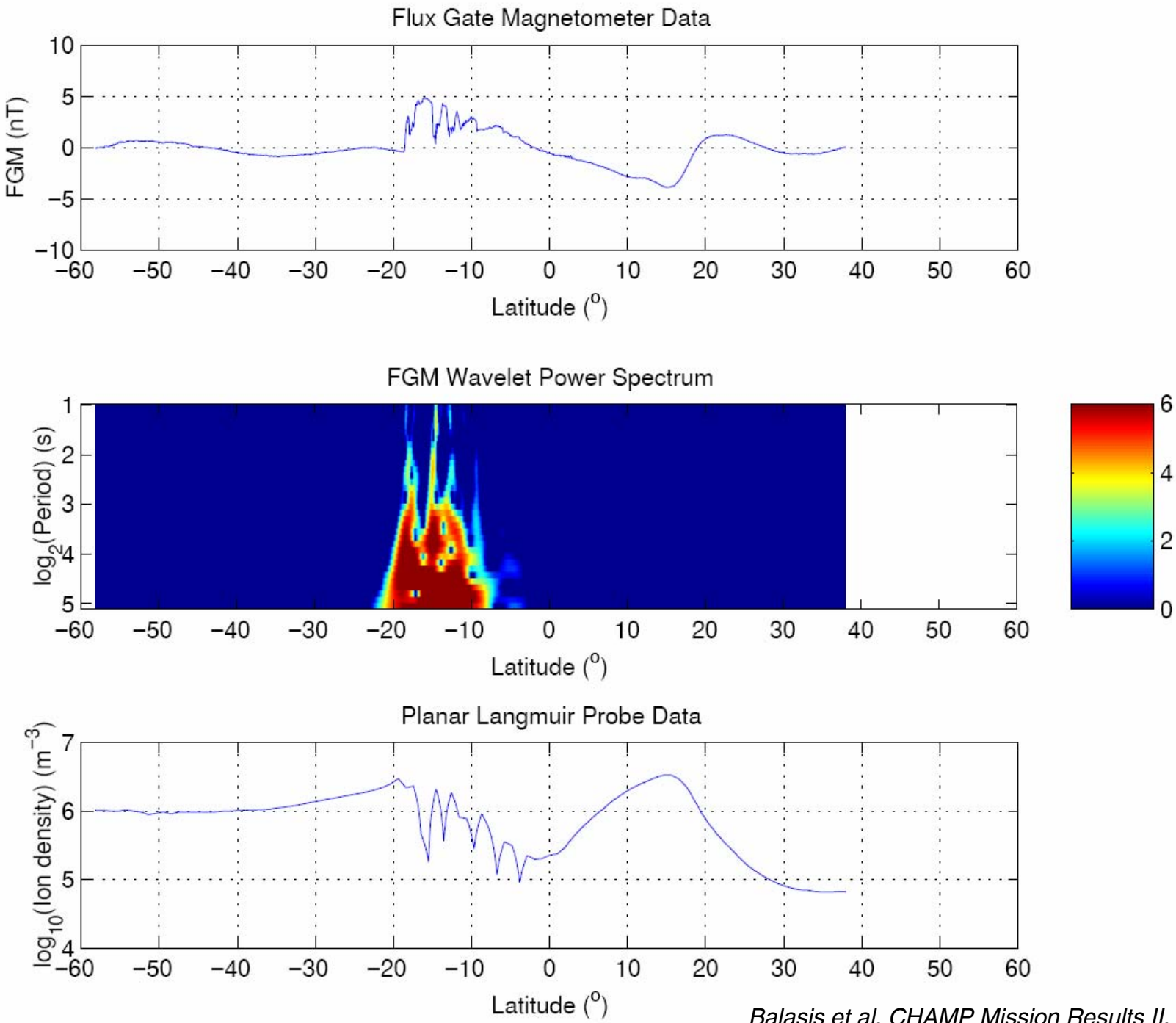
Examples of genuine magnetic disturbances



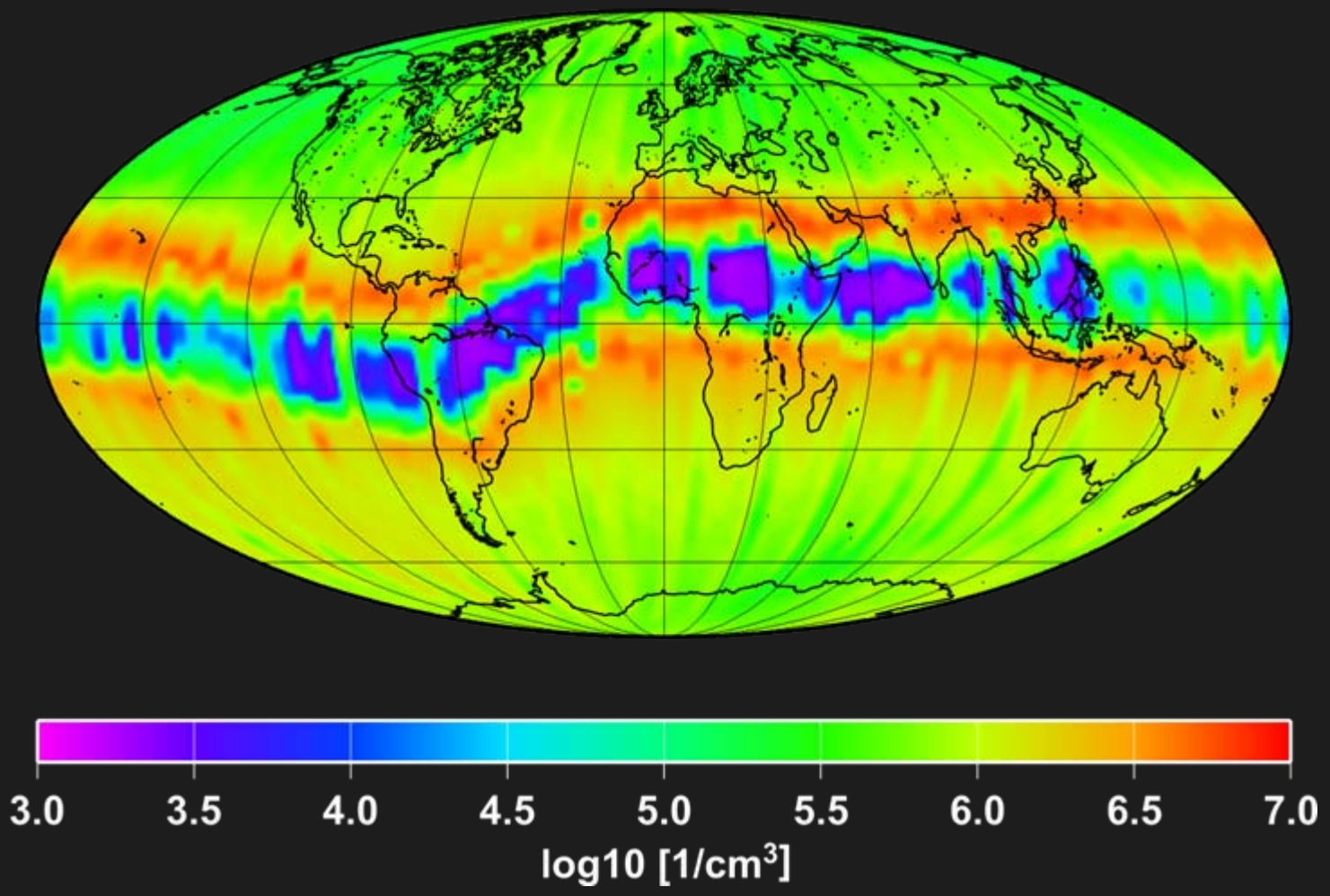


Balasis et al. CHAMP Mission Results II, 2005



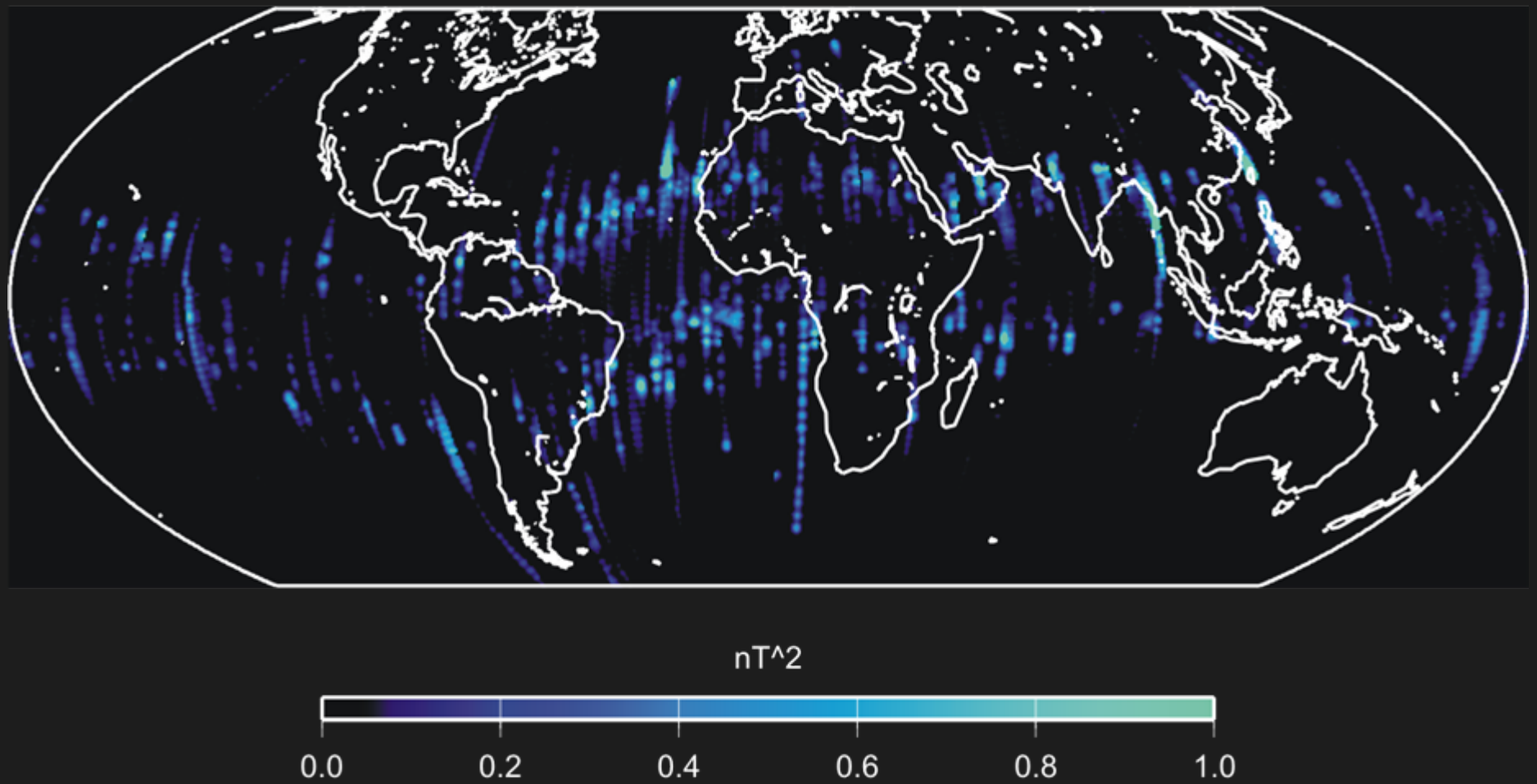
Balasis et al. CHAMP Mission Results II, 2005

CHAMP electron density, 21-23 Oct 2001, 20 LT



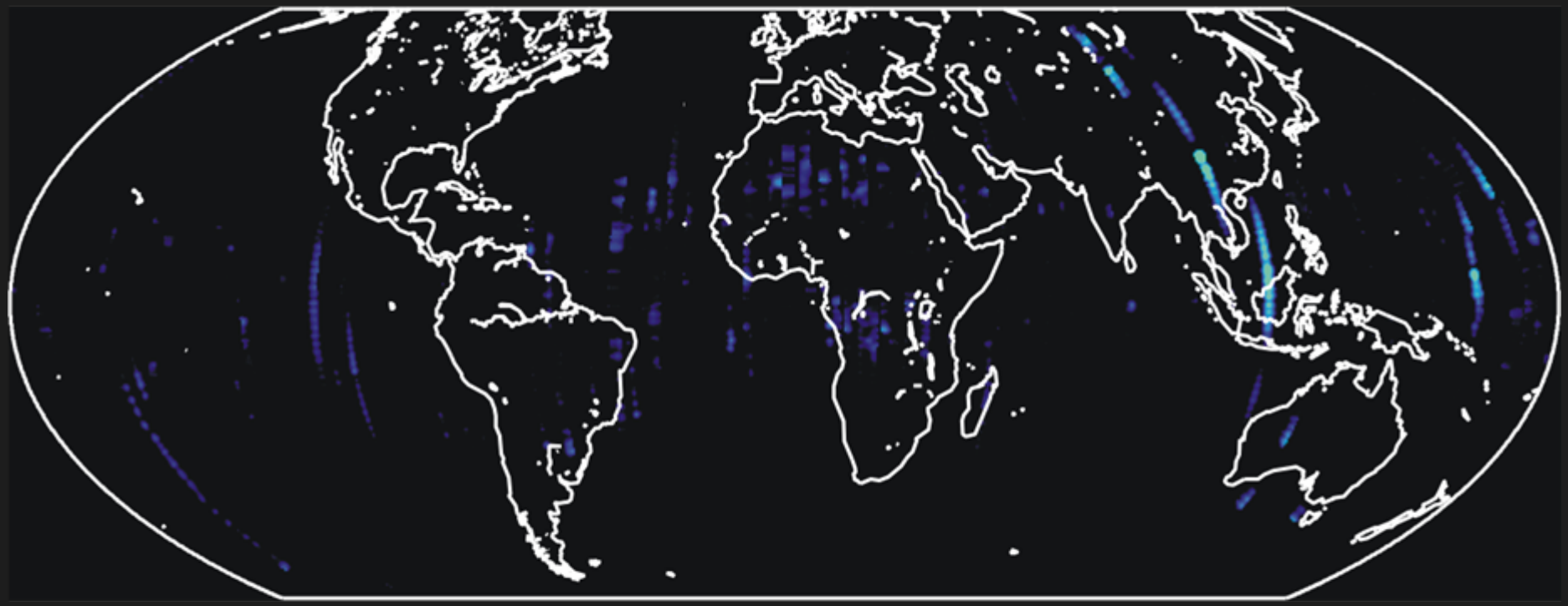
S. Maus *et al*, C/NOFS Workshop, 2005

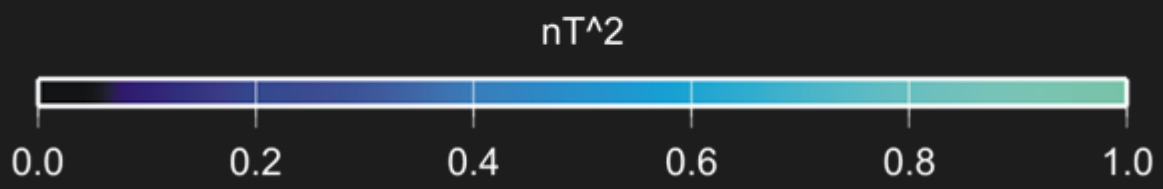
Scalar Residual 19:00-22:00 LT



S. Maus, C/NOFS Workshop, 2005

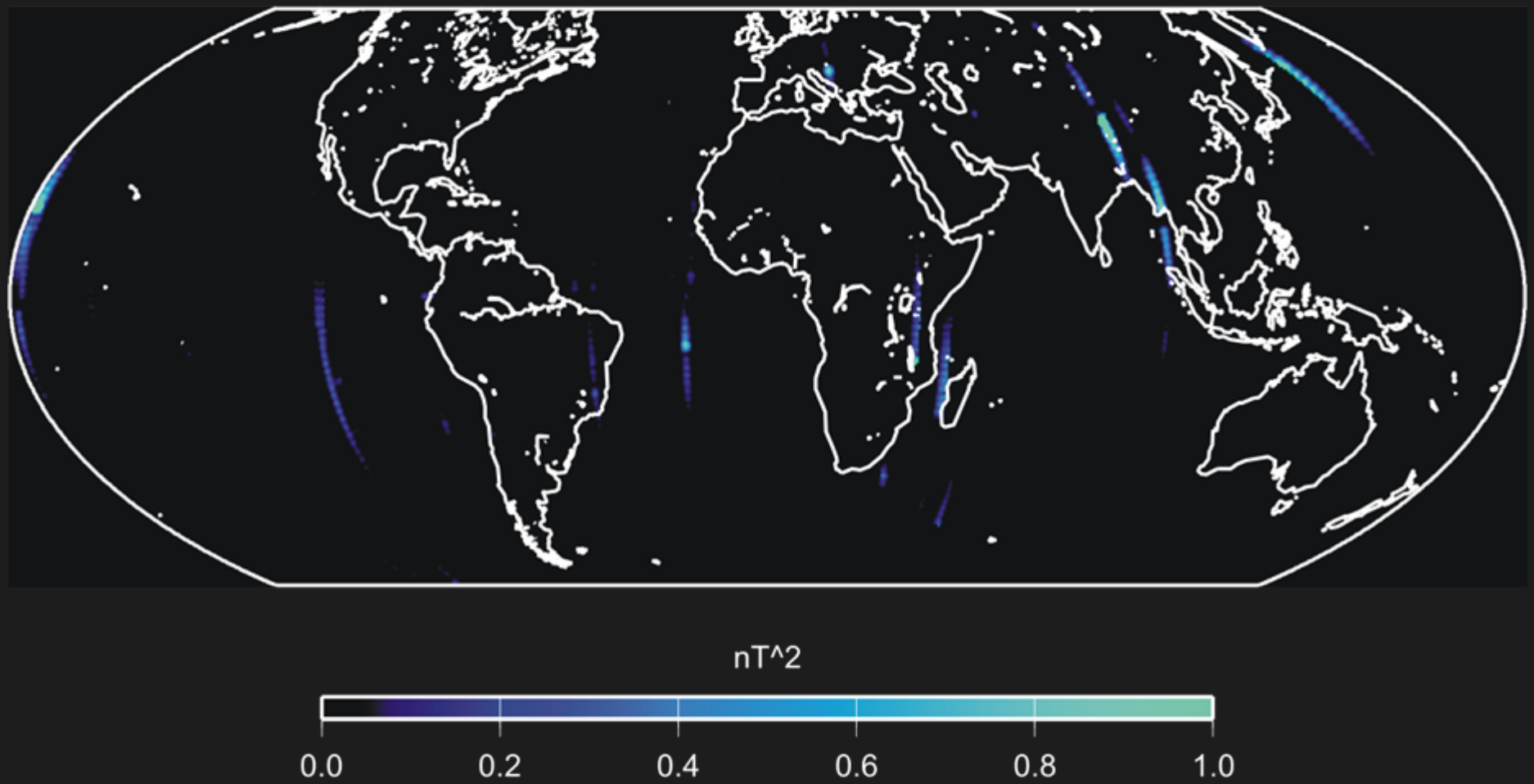
Scalar Residual 22:00-1:00 LT





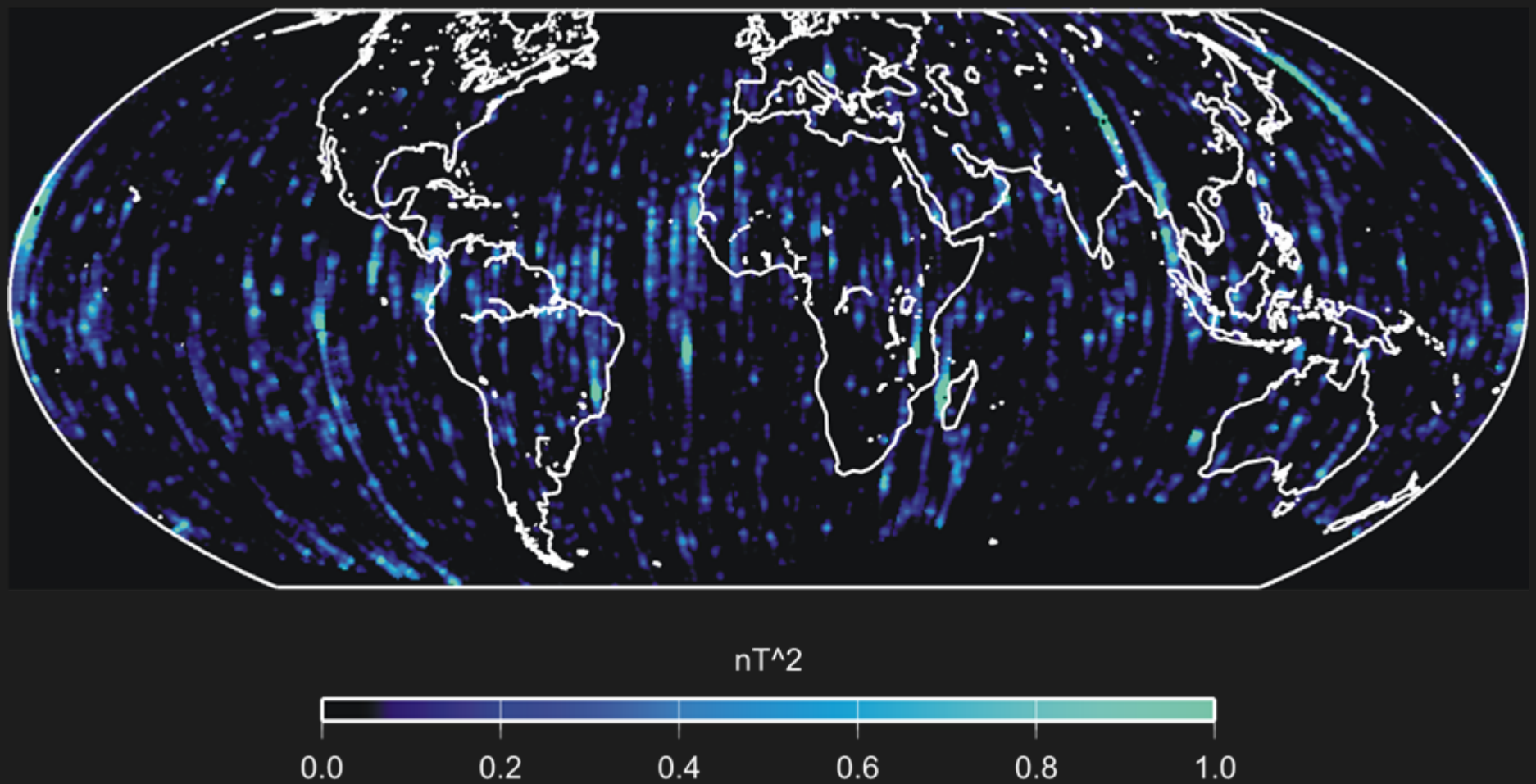
S. Maus, C/NOFS Workshop, 2005

Scalar Residual 1:00-4:00 LT



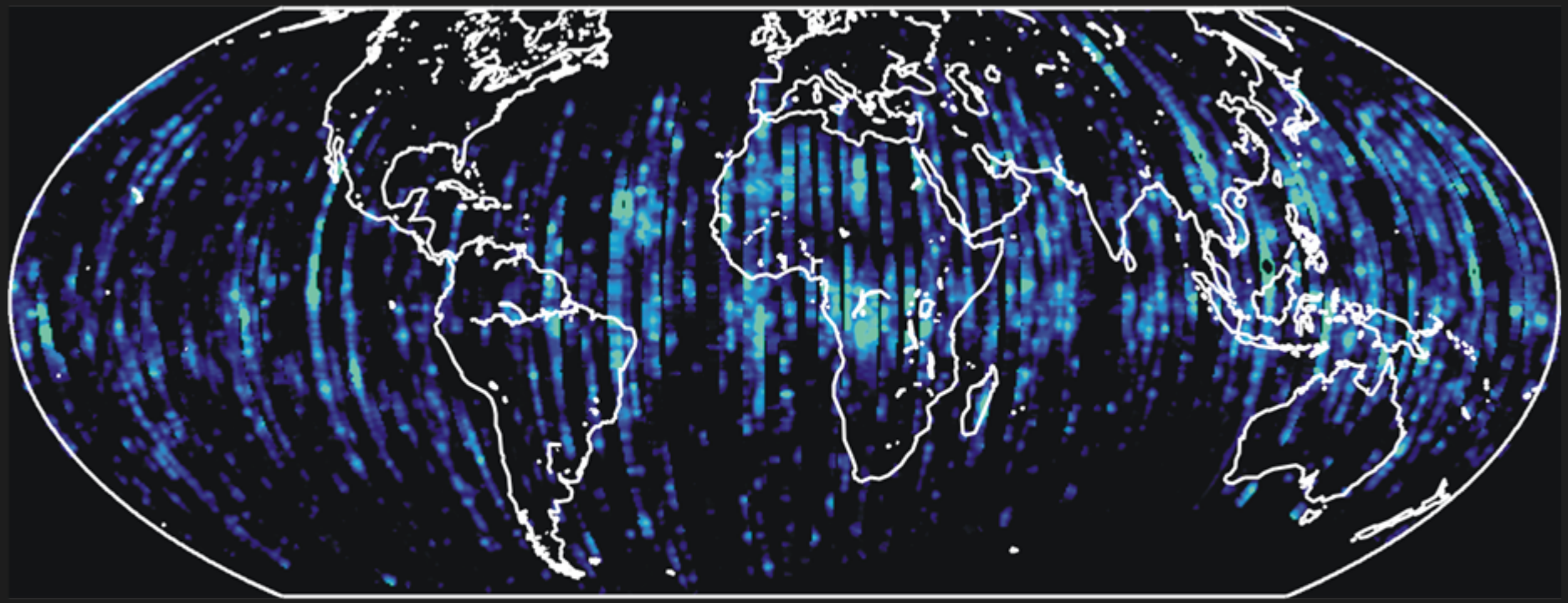
S. Maus, C/NOFS Workshop, 2005

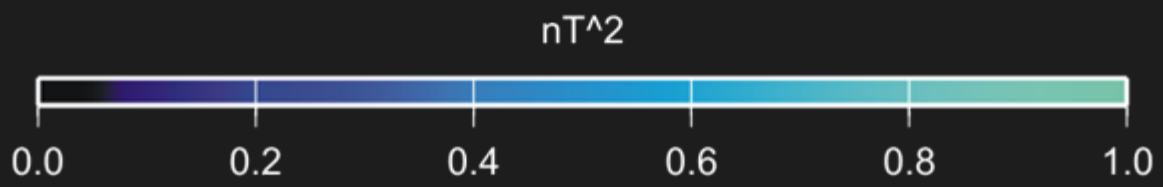
Vector Residual 1:00-4:00 LT



S. Maus, C/NOFS Workshop, 2005

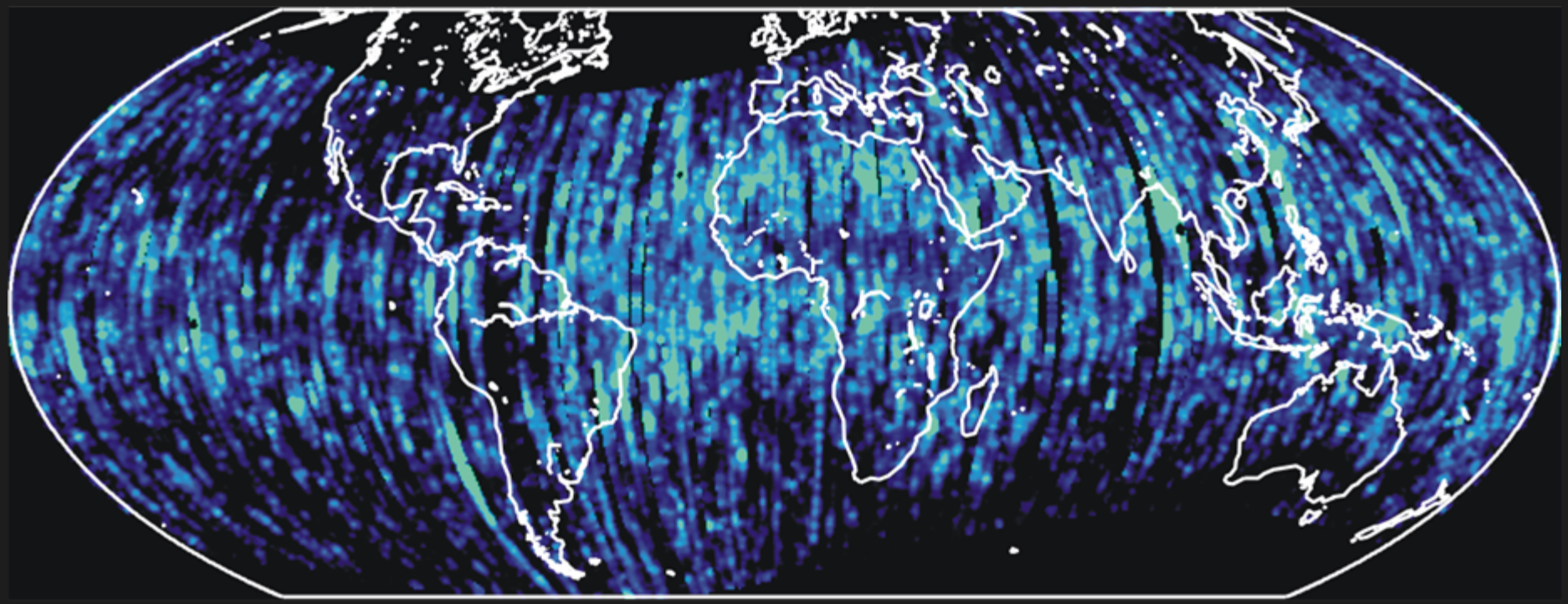
Vector Residual 22:00-1:00 LT

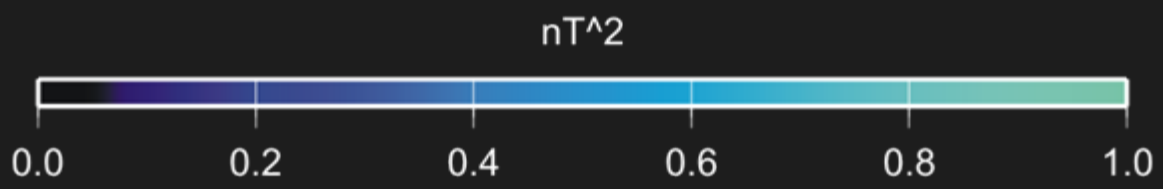




S. Maus, C/NOFS Workshop, 2005

Vector Residual 19:00-22:00 LT





S. Maus, C/NOFS Workshop, 2005

Summary

Observation

- Plasma irregularities clearly seen in CHAMP magnetic field readings
- Stronger in components ⊥ to B → FACs

Magnetic field opportunities

- C/NOFS flying East/West, CHAMP North/South
- CHAMP now at 370 km altitude, decreasing
- Sampled at 50 Hz = 150m
- Vector components → current geometries