Magnetic field signatures of irregularities observed by CHAMP

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

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Magnetic Satellites

Oersted (since 1999)
- 600 – 800 km altitude
- Drifts slowly in local time

CHAMP (since 2000)
- 450 km altitude, descending
- Drifts rapidly in local time

SAC-C (since 2000)
- 700 km altitude
- Sun-sync noon-midnight orbit

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

S. Maus et al, C/NOFS Workshop, 2005
Examples of genuine magnetic disturbances

- **Pulsation**
- **F-region current**
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
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 $\perp$ to $B \Rightarrow$ 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 $\Rightarrow$ current geometries