Observations and comparisons of SED over European and American longitude sectors

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Outline

- Examples of N. European and N. American sector SED plumes.
  - October 2, 2001
  - April 18, 2002
- Magnetic conjugacy
- Longitude sector comparisons
  - TEC values
  - Latitude Location of the base of the SED plumes
- Comparison with SuperDarn convection cell patterns.
Storm Enhanced Density Background

- **SED initially identified in the early 1990’s using observations from the Millstone Hill incoherent scatter (IS) radar.**
  - Characterized by high TEC values (>50 TEC units), strong gradients, and high ion flux values.
  - Observed between 17:00 – 23:00 UT over East Coast of US during moderate to severe geomagnetic storms.
  - Correlated with plasmaspheric drainage plume observed by the IMAGE Spacecraft.

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**Map of GPS TEC**

**Millstone Hill ION Flux Measurements**

**Plasmaspheric Drainage Plume**
Magnetic Activity

October 1-3, 2001

April 18, 2002
October 2, 2001
20:00 – 21:00 UT
October 2, 2001
07:00 – 08:00 UT
Conjugacy Example
• TEC values at the base of the SED plume over N. America are greater than over N. Europe.
TEC Longitude Sector Comparison

Maximum TEC Value at the SED Plume Base

- April 18, 2002
- October 1, 2001
- October 2, 2001

N. European Sector  N. American Sector
Geographic Latitude

SED Plume Base Comparison

Latitude Location of SED Plume Base

N. European Sector  N. American Sector
Northern Europe and American Sector SED Plumes

October 2, 2001

Northern Europe
07:00-08:00 UT

North America
20:00-21:00 UT
Summary

- SED plumes observed over N. European and N. American longitude sectors.
- SED plumes are magnetically conjugate.
- TEC values at the base of the SED plumes are stronger in the N. American sector.
- For similar magnetic activity level, the latitude location of the plume base is consistent over solar cycle and possibly predictable. Excellent agreement with Foster [1993] statistical study using Millstone Hill ISR data.