A Study of the Morphology of the Ring Current Using Combined Magnetic Field Data Set from Polar, ISEE, and AMPTE/CCE Spacecraft

G. Le and C. T. Russell
IGPP/UCLA

K. Takahashi
JHU/APL

Introduction

- We use the magnetic field data in the magnetosphere observed by Polar, ISEE, and AMPTE/CCE spacecraft to construct a 3-D map of the average magnetic field and derive a map of the current density in the ring current region.

- The magnetic field data are sorted by local time and Dst*, the corrected Dst index by the solar wind dynamic pressure which represents the true ring current strength.

- The magnetic field residuals are calculated by subtracting the IGRF internal magnetic field from the data.

- For each local time and Dst* range, a map of magnetic field residual vectors is constructed in the local meridian plane by averaging all the data points in the range.

- Instrument gains of the three spacecraft are intercalibrated. Every data point represents the average from one orbit and is statistically independent from the others.

Data Sets

Mission	Polar	AMPTE/CCE	ISEE
Data Coverage	03/16/1996 - 08/31/1999	08/21/1984 - 01/09/1989	10/22/1977 - 09/26/1987
Mission Info			
Launch Date	02/24/1996	08/16/1984	10/22/1977
Status	Operational	Terminated 07/14/1989	Terminated 09/26/1987
Apogee	9 R_E	8.8 R_E	23 R_E
Perigee	1.8 R_E	1.17 R_E	1.04 R_E
Inclination	90°	4.8°	28.76°
Period	~ 18.5 Hrs	~ 15.6 Hrs	~ 57 Hrs

Conclusions

- Both an eastward inner ring current at ~ 2-4 R_E and a westward outer ring current at ~ 4-8 R_E are evident for all levels of magnetospheric disturbances.

- The quiet time ring current is largely symmetric in local time.

- When the Dst index decreases as the magnetospheric disturbances become stronger, the ring current density increases for all local times.

- The ring current shows a strong local time asymmetry, consistent with a partial ring current centered at ~ 2100 local time.