

Tentative set of issues and questions on the  
**PLASMASPHERE AND PLASMAPAUSE**  
to be addressed at the  
**Brussels brainstorm meeting**  
24-25 February, 2003

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## **1. Summary of what is known from an experimental point of view based on earlier experimental results**

Whistler observations  
LUNIK-1 & 2  
OGO-1, ELECTRON-2, IMP-2, OGO-5  
PROGNOZ, PROGNOZ-6, GEOS-1 & 2, ISEE-1,  
DE-1 & 2  
AKEBONO, ACTIVNY, APEX, INTERCOSMOS-24 & 25  
POLAR, CRRES, INTERBALL ... IMAGE

## **2. What the CLUSTER mission has/could contribute(d)**

### **'Plasmapause type' large scale density gradients: what can the 4 points add to what is already known?**

Orientation and motion of a large size planar structure, using the simple boundary 'delay' tool:

Potential problems : 'bad quality/shade' of tetrahedron, leading to limitations in the calculation.

Comparison with EFW/FGM and EDI/FGM drift estimations.

Comparison with IMAGE observations.

### **Density irregularities observed in vicinity of the plasmapause gradient**

#### ***Statistical properties:***

Position and occurrence conditions of the irregularities

#### ***Spatio-temporal analysis:***

The size of the density irregularities is smaller comparable to the size of the tetrahedron.

The simple boundary delay tool is thus not reliable in many cases. How is it possible to a) check its validity ; b) overcome the difficulty?

The example treated in the Advances paper (June 13th 01) provides resumptive evidence of Field aligned properties of irregularities.

Is it possible a) to check such a property ; b) to make use of field aligned assumption?

How to combine magnetic field measurements, respective SC positions, and density measurements?

Are there interesting specific constellation configurations? How to search for them?

### **Density profile along a flux tube**

Several multipoint density observations seem to indicate that there are occasions where, on a given flux tube, the high altitude density is higher than the low altitude one.

Is it real, or does that indicate that the 'on a given flux tube' assumption is not founded? How can we check the latter assumption?

This raises the question of how we could improve the magnetic field models by assimilation of DC magnetic field measurements.

Along those various lines, we could:

1° review considerations/questions based on introductory presentations

2° choose interesting events for further studies

## **3. Systematic review all Plasmasphere crossings at small separation and at all LT.**

## **4. Review physical mechanisms and models for**

*Field aligned plasma density distributions*

*Refilling of empty flux tubes and field aligned flow of plasma*

*Interchange motion*

*Weak double layers*

*Peeling-off and erosion of plasmasphere,*

*Formation of Light-Ion-Trough*

...