

Minutes of Continuum workshop, Orléans 6-7 April 2004-04-28

Attendance list:

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* part time

Tuesday (6 April) morning

General presentations.

Most of the talks presented during the workshop are placed (in pdf format) on this web page:
http://www.magnet.oma.be/Plasmasphere/PLS_Miscellaneous.html

- Observations of NTC from IMAGE/RPI, J. Green , S. Boardsen
Presents also observations from CREES, GEOTAIL, ...
Event analysis reveals the importance of density notches (long lasted, corotating)
- Observations of NTC from IMAGE: specific events, S. Boardsen, J. Green
Combined Geotail/IMAGE obs. shows latitudinal extent of emission cone
'Christmas Tree' structures observed near magnetic equator crossings (remark: very similar to Cluster observations)
- Overview of Whisper observations, P. Décréau
(3 files are placed on the site: overview, magnetosheath and solar wind)
Direction finding in magnetosheath indicates direction changes associated to variations in local density- interpretation to be done. Separation distance yet not large enough for triangulation of plasmopause sources from large distances
- Whisper examples, P. Canu
Emphasizes the link between NTC radiation frequency values (and their variation in time) and the Bernstein frequency pattern observed nearby
- Observation of Continuum enhancements events, M.P. Gough
See notes included in the file placed on the site

Tuesday afternoon

Presentations, more focused on theories and models

- Direction finding (DF) with Whisper : Some work done at Sussex, Tobia Carozzi
Indicates limitations (polarisation measurement) and prospectives (high res DF)
- The linear window theory; test on a case event (26 september 2003), Sandrine Grimald
Jone's approach is neither confirmed nor refuted: at a given time, the visibility constraints applied on each SC point to different source location.
Note that ray tracing presented in the 2nd part of the talk are done with an oversimplified density model and are now revisited.
- Non linear approach: A short presentation, V. Krasnoselskihk _ in particular conditions for NTC radiation via wave-wave interactions are recalled.
- Cluster observations near sources, P. Décréau
STAFF observations (plots worked out by Michel Parrot) show a one to one correlation of saturating levels in HF ES waves(Whisper spectrograms) with the presence of < LHR waves in STAFF instrument (not saturated)

Wednesday (7 April) morning

a) Review of orbitographies, geomagnetic conditions, presence of NTC

Websites have been presented:

<http://www.whisper.cnrs-orleans.fr/>
<http://www.magnet.oma.be/cluster/>
<http://www.magnet.oma.be/plasmasphere/>
<http://image.gsfs.nasa.gov/>
<http://euv.lpl.arizona.edu/euv/>
<http://image.gsfc.nasa.gov/rpi/>

b) Presentations continued:

- Geomagnetic storm events observed by Whisper, S. Benck

See file on site. Note that quasi-harmonic structures (views at the end of the file) are due to saturation of the Whisper amplifier, consecutive to out of range ES signals (possible NTC sources)

- Mid-latitude hiss in a notch shell?, A. Masson

c) Question list (draft lists written 'on the white board') see also notes in Scott Boardsen presentation:

I Draft list (Pierrette)

- 1) What are the scenarii (source extent, location, dynamics) supporting various typical behaviours. Example 1 in outer plasmasphere region: banded 'smooth' emissions (several kHz width) with central frequency decreasing as spacecraft approaches plasmasphere
Example 2 in outer plasmasphere region: narrow band emissions elements (<1kHz width), with central frequency varying in time(/space) in a similar way (periodicity, amplitude) than plasma frequency is observed to vary in nearby plasmopause region.
Example 3: as above, but elements stable in frequency
- 2) Can we get information about latitudinal beam extension, from similarities in instantaneous observations on several SC separated in latitude (need the same feature recognisable on several spacecraft) ?
- 3) Refraction at magnetopause boundary: can we compare observations to density models? What can we get from comparisons of observations - on both(/same) sides of magnetopause?

II Draft list (Jim)

- 1) IMAGE/CLUSTER
Size/Extent of NTC
Location of Source – once established at PP, does source corotate or stay at same LT?
What are the (similarities/)differences between KC and NTC?
What is the angular distribution of NTC according to its frequency (angle of beam with magnetic equator)?
- 2) Observation/Theory
What is the conversion (ES to EM) efficiency?
What is the electron distribution function (possible in situ from POLAR)? How different for KC or NTC?

III Draft list (Paul)

Continuum enhancement

- 1) What drives ECHWaves in source? What energy electrons?
- 2) How does electron source of free energy convect/drift/move relative to injection boundary ? What drives the sudden turn on? Role of $V_{\text{perp}} / V_{\text{par}}$ (Low altitude SC)?
- 3) Does continuum enhancement source follow (large scale) morphology of strongest ECHW observed (e.g. GEOS morphology 00 → 1300LT, magnetic equator confined)? Role of pancakes?
- 4) Do continuum enhancement events evolve eventually into slot related events at later local times?
- 5) What is the ECHW → conversion process (Linear versus non-linear wave-wave f_{UH} , f_{LH})? What is the efficiency (a few %?)

Instrumental

- 1) Direction finding and polarization assumptions / limitations?
- 2) Optimum sampling cyclogramme / time resolution?

Patrick: Notch study in itself

Wednesday afternoon

First look at more events, toward choices

Event of 30/12/03 presented:

http://www.magnet.oma.be/Plasmasphere/PLS_Miscellaneous.html

Indicates clearly that the observed features (like frequencies of the highest signal intensity) vary according to the perspective offered from the 4 positions (SC1 is leading, SC3 and 2 follow, SC4 is trailing). Such a case should help to decipher the beaming properties. On the other hand, it indicates that the measured directivity angles are a result of the superposition of 'beamlets' at various angles, and should be interpreted with caution.

Thursday (Goddard and LPCE teams)

Further look at events.

Promising ones:

March 30, 2002, 7 UT (GEOTAIL, IMAGE, CLUSTER)

August 16 2003, 16 UT (IMAGE, CLUSTER)

Nov 2 2001 20UT (IMAGE, CLUSTER)

July 9, 2001, 4UT, . (GEOTAIL, IMAGE, CLUSTER)...

First look at (15/08/03; 11/09/01; 30/05/03; 14/10/03)

Actions:

Whisper 4 SC 6 hours plots to be placed on a site (Gilles Le Rouzic) – done-

Combined Whisper/IMAGE plots to be prepared (Scott Boardsen)

Examples are ready – placed at: <http://www.whisper.cnrs-orleans.fr/>

Gallagher model (IDL software) to be sent to LPCE (Scott Boardsen)

COSPAR talk: events to be chosen