Session MP60S-1

Mardi 17 mai 2022 de 12h00 à 12h30

Poster 1 à Poster 18

POSTER 1

Automatic Detection of Martian bow shock crossings using data of the Mars Express mission : A Deep Learning Approach

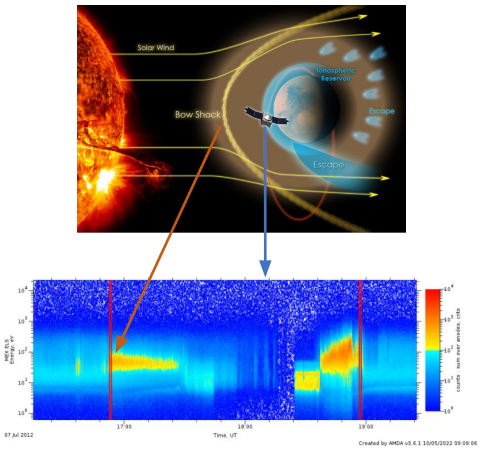
Menouar AZIB

Automatic Detection of Martian bow shock crossings using data of the Mars Express mission: A Deep Learning Approach

Menouar AZIB et al.

Context

The interaction of the Mars magnetosphere with the solar wind is characterized by parameters such as particle densities (electrons, protons, or heavy ions). These parameters are measured by the spacecraft.



Objective

Use a Multilayer Perceptron Neural Network to automatically detect the Martian bow shock crossings using t he data of the Mars Express Mission (electrons density).

Challenge

Unbalanced data, our dataset presents unequal distribution of classes: shocks and no shocks.

Classification of unbalanced data: few shocks to learn from

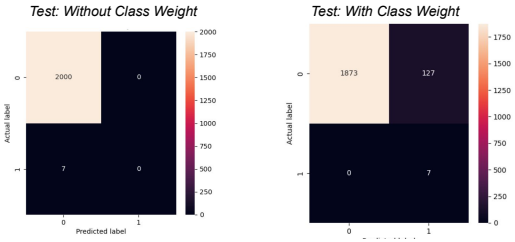
Data: 1-7/07/2012

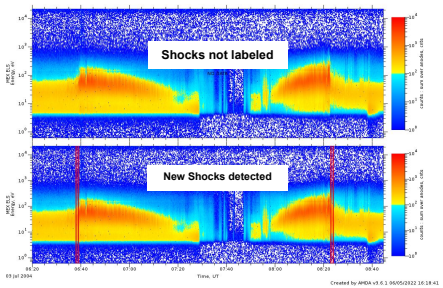
```
Nb shocks:  33
Class imbalanced:
    Total: 10032
    Positive: 32 (0.32% of total)
```

Solution

Penalize the misclassification made by the minority class by setting a higher class weight and at the same time reducing weight for the majority class.

Classification





- **Detects all shocks present in the test set**
- **Generates many false positives => valid shocks**
- **Enhances the Hall's catalog**

Perspectives

Test other sophisticated network architectures (CNN, LSTM).

POSTER 2

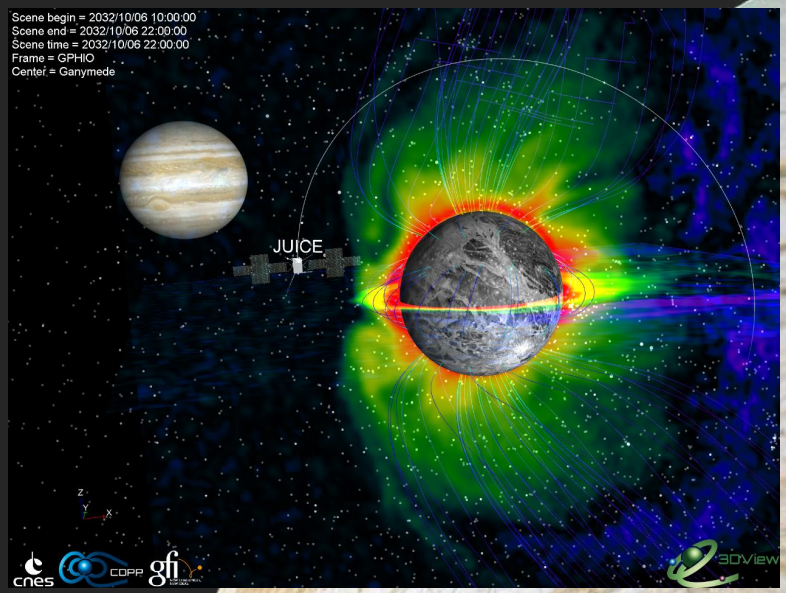
Europa's interaction with the Jovian plasma from hybrid simulation

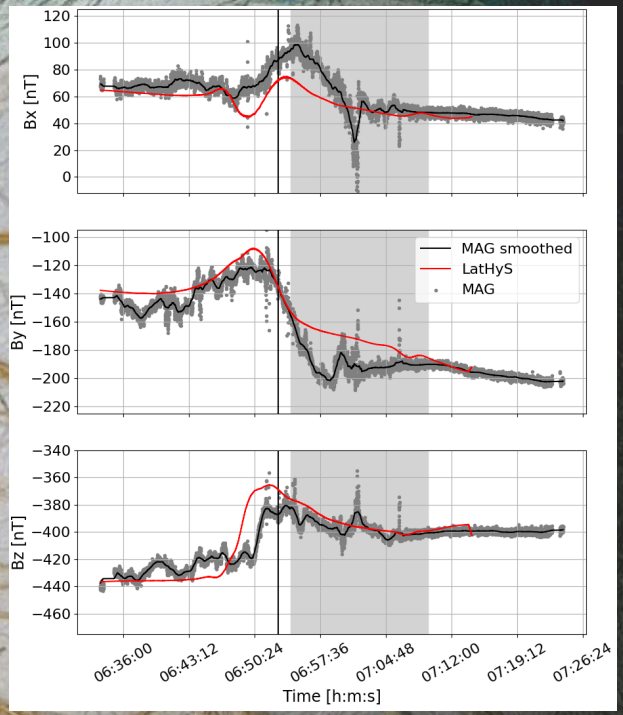
Claire BASKEVITCH

Europa-jovian plasma interactions in preparation of JUICE

n°2

C. Baskevitch, R. Modolo, B. Cecconi





PNST 2022

POSTER 3

Simulation de l'interaction entre un vent solaire turbulent et un obstacle

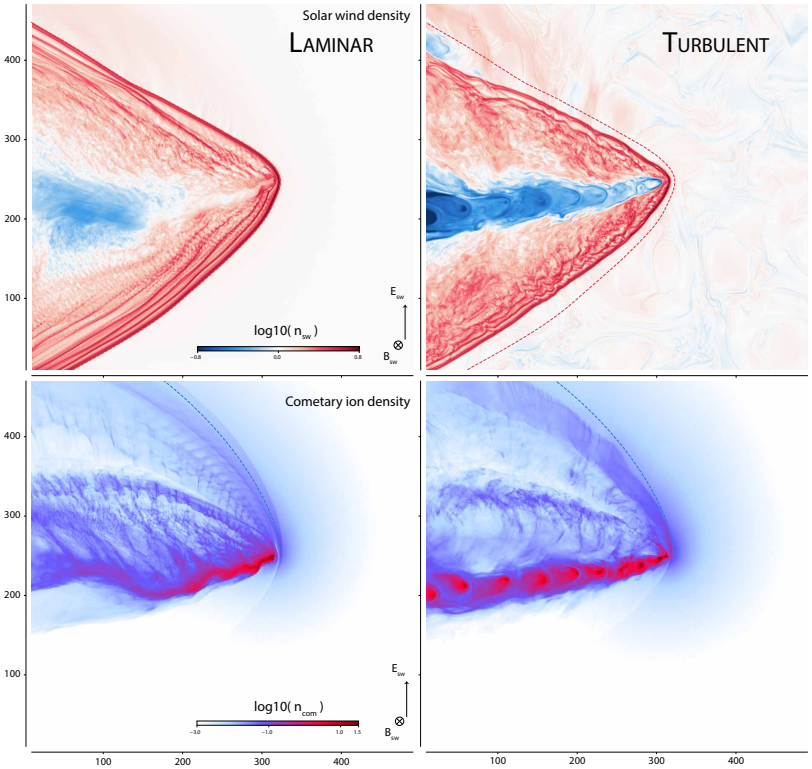
Etienne BEHAR

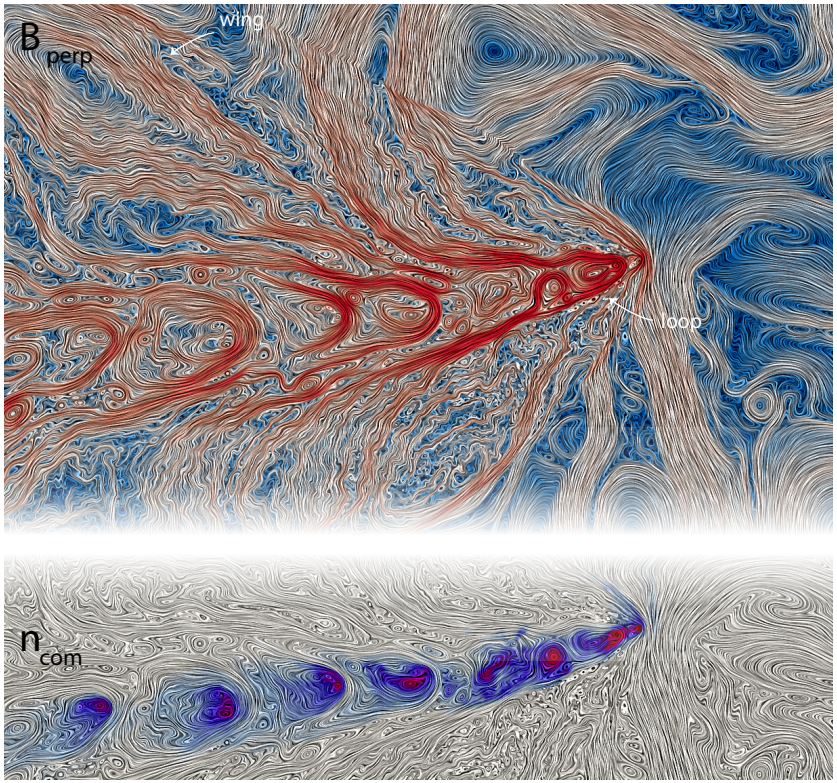
Intéraction entre un vent solaire turbulent et un obstacle: une comète

Etienne Behar, Pierre Henri

code: Menura

Poster 3



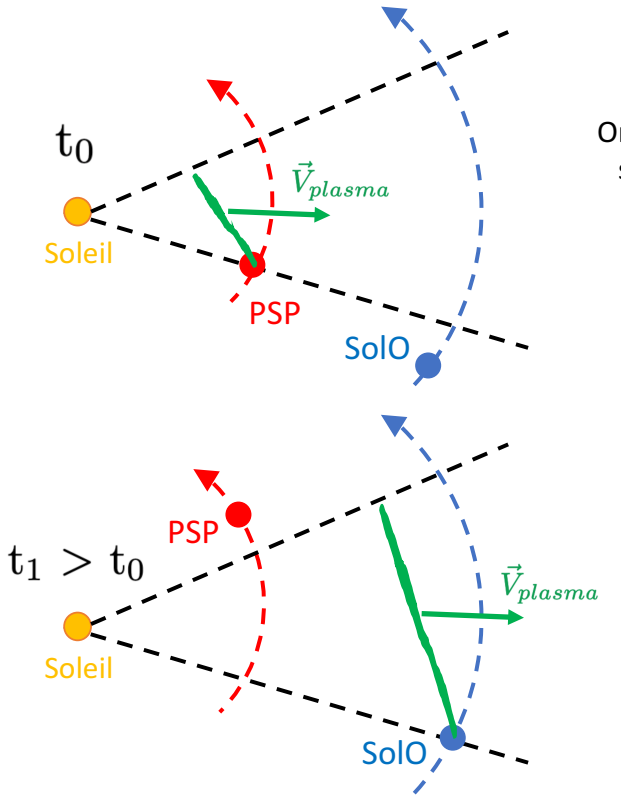


POSTER 4

Radial evolution of the solar wind

Etienne BERRIOT

Solar wind radial evolution with Parker Solar Probe and Solar Orbiter

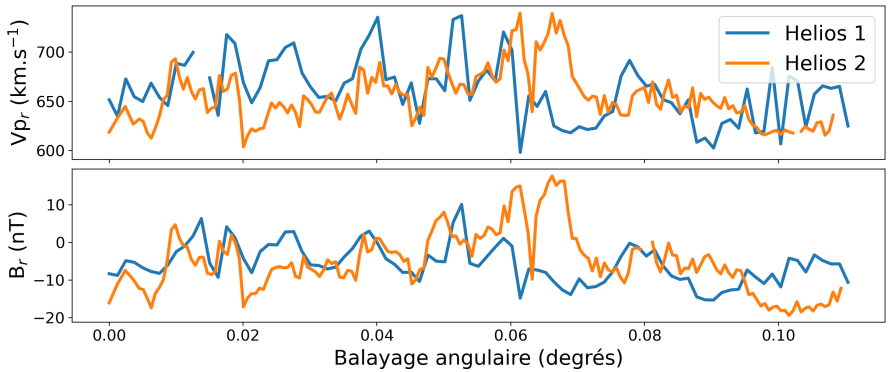


On cherche à repérer la même parcelle de vent solaire entre deux sondes pour étudier son évolution

On modélise d'abord la propagation du plasma à la sonde interne, pour prédire son arrivée à la sonde externe en prenant plusieurs paramètres en compte :

- Les positions et vitesses des deux sondes
- La vitesse du plasma
- L'expansion radiale du vent solaire

On compare ensuite les similarités entre les paramètres physiques des deux plasmas, d'abord à l'aide de cross-corrélation puis à l'œil nu :



POSTER 5

Modélisation numérique des émissions plasma joviennnes

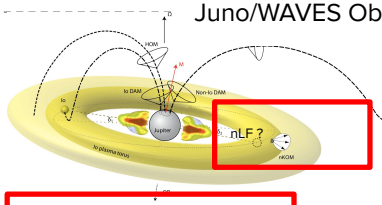
Adam BOUDOUMA

[**Poster n°5**] Numerical modeling of jovian plasma emissions

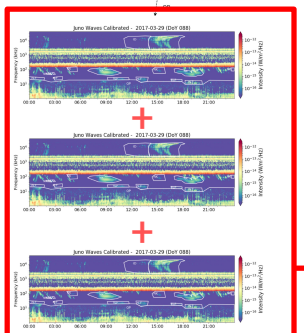
A. Boudouma, P. Zarka, C. K. Louis, C. Briand, M. Imai

LESIA l'Observatoire de Paris | PSL
Laboratoire d'Études Spatiales et d'Instrumentation en Astrophysique
cnes
SORBONNE UNIVERSITÉ CRÉATEURS DE FUTURS DEPUIS 1257
cnrs

Juno/WAVES Observations

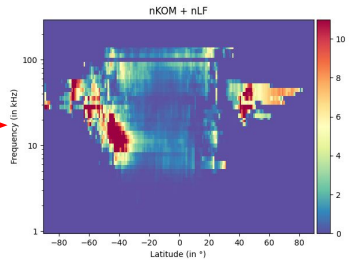


Plasma Emissions

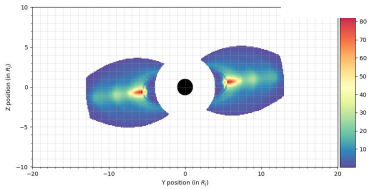


3 years of calibrated + cataloged Juno/WAVES observations (2016-2019)

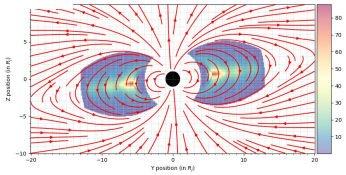
latitude & frequency plasma emissions distribution



Numericals Models



Io torus plasma density

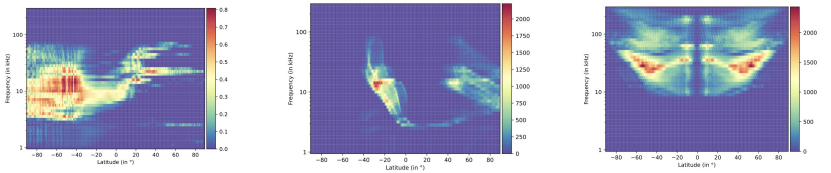


Jupiter magnetic field

+

Theoretical frameworks

Numerical latitude & frequency distributions



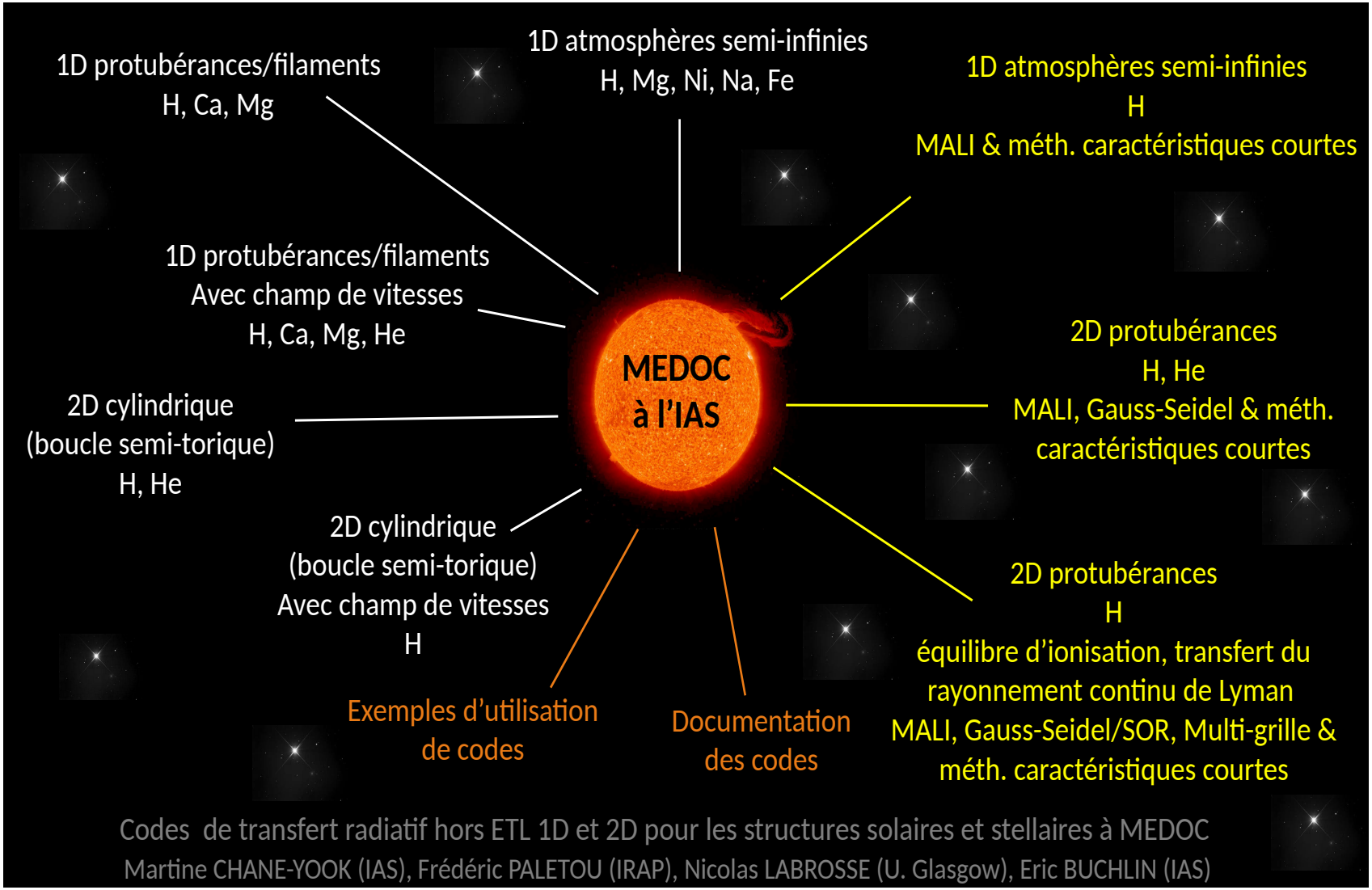
Aim : Reproduce numerically the plasma emission latitude & frequency distribution

POSTER 6

Codes de transfert radiatif hors ETL 1D et 2D pour les structures solaires et stellaires

Martine CHANE-YOOK

PNST
Programme National Soleil-Terre



Codes de transfert radiatif hors ETL 1D et 2D pour les structures solaires et stellaires à MEDOC

Martine CHANE-YOOK (IAS), Frédéric PALETOU (IRAP), Nicolas LABROSSE (U. Glasgow), Eric BUCHLIN (IAS)

POSTER 7

Modélisation du deutérium atomique dans la haute atmosphère de Mars

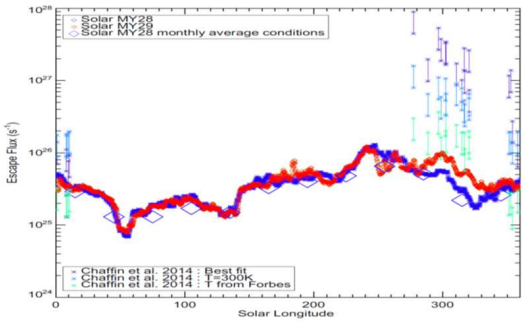
Jean-Yves CHAUFRAY

Modélisation du deutérium atomique dans la haute atmosphère de Mars

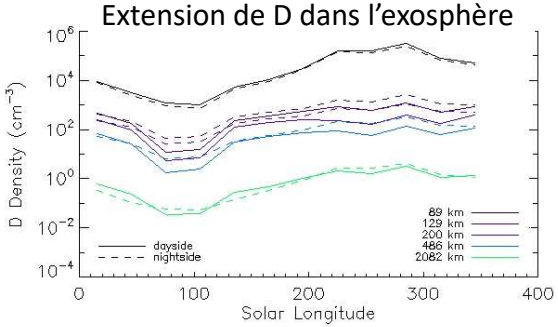
Chaufray, J-Y[1], F. Gonzalez-Galindo[2], F. Leblanc[1], R. Modolo[1], F. Montmessin[1], M.Vals[1], L. Rossi[1], F. Lefèvre[1], F. Forget[3], M. Lopez-Valverde[2]

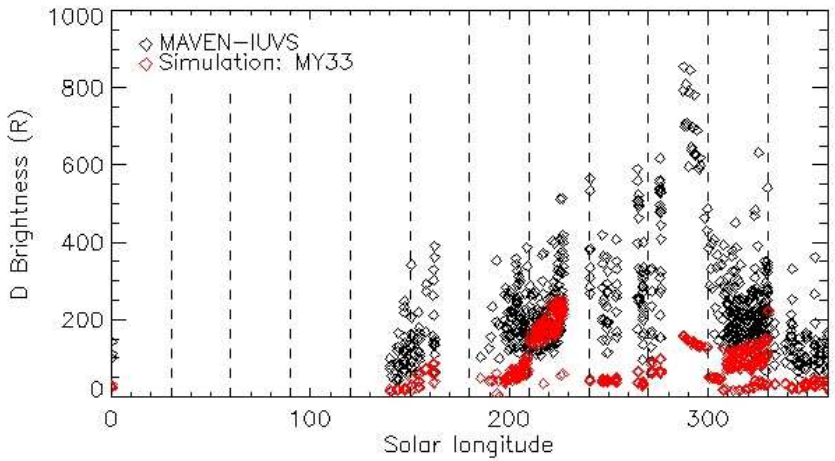
Objectif : comprendre la disparition de l'eau sur Mars et en particulier les processus d'échappement atmosphérique

Modèle de Circulation générale de Mars (GCM-LMD) : cycle complet (4D) de D (HDO, HD, D, …) entre 0 et ~ 250 km (exobase) + échappement de Jeans des espèces légères (H, D, H2, …) et ionosphère.



Extension de D dans l'exosphère





Piste en cours d'étude pour améliorer le modèle (réaction ions/neutre)
Début d'étude de l'échappement non-thermique de D

POSTER 8

The angular dependence of spectroscopic solar radio measurements using multi-spacecraft observations

Nicolina CHRYSAPHI

nicolina.chrysaphi@obspm.fr

The angular dependence of spectroscopic solar radio measurements using multi-spacecraft observations

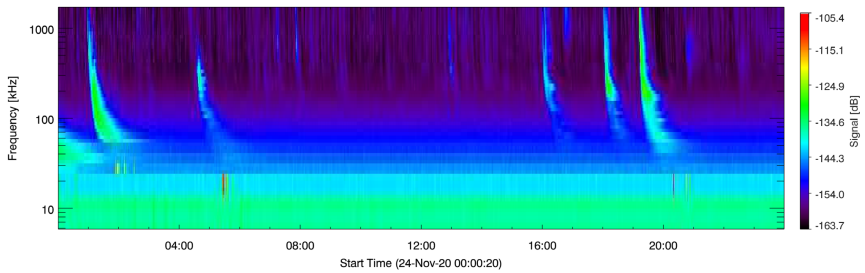
ORCID.org

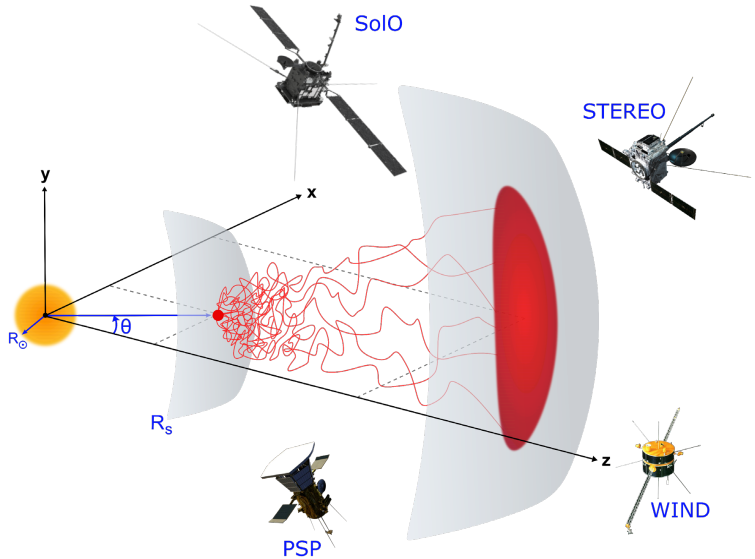
Nicolina Chrysaphi

[1]LESIA, Observatoire de Paris, Meudon, France; [2]University of Glasgow, UK

Poster #8

- Scattering of photons in the heliosphere affects the observed properties of radio emissions
- **Question: What is the effect of the observer's position on spectroscopic measurements?**





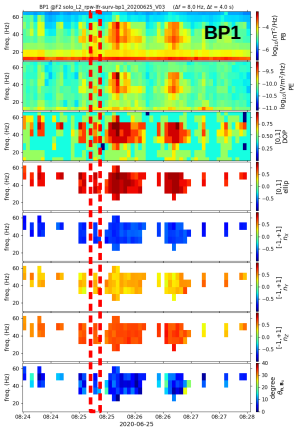
POSTER 9

Le récepteur basse fréquence LFR du consortium instrumental RPW de la misson Solar Orbiter : Performances en vol et observations d'ondes sur le mode sifflement

Thomas CHUST

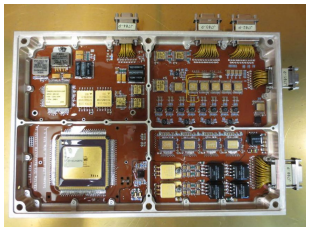
PNST
Programme National Soleil-Terre

Poster n°9



Le récepteur basse fréquence LFR du consortium instrumental RPW de la mission Solar Orbiter :

Performances en vol et observations d'ondes sur le mode sifflement



Modèle de vol de LFR

Thomas Chust, les équipes LFR et RPW

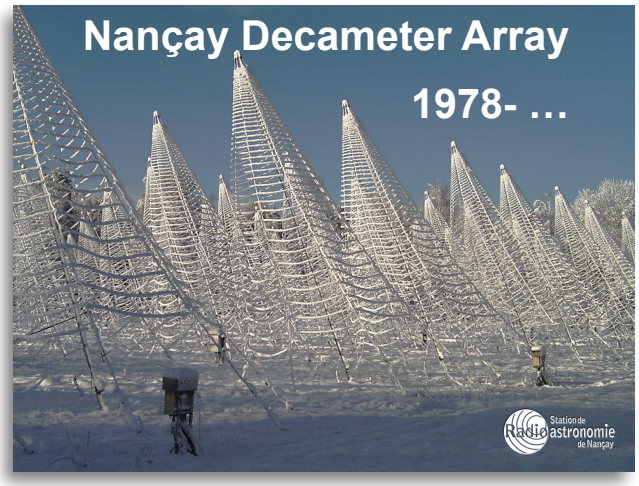
POSTER 27

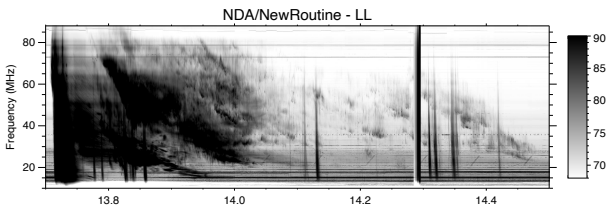
Observations décamétriques du système solaire à Nançay : point d'étape, soutien sol et résultats récents

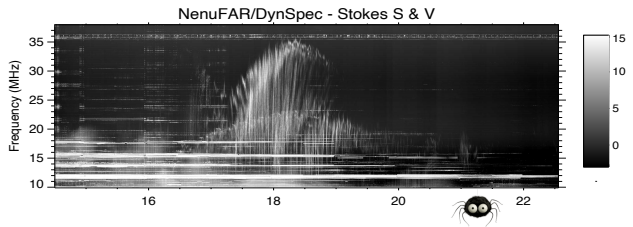
Laurent LAMY

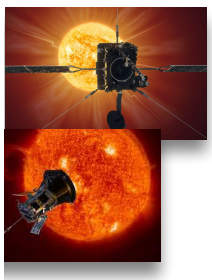
Observations décamétriques du système solaire à Nançay

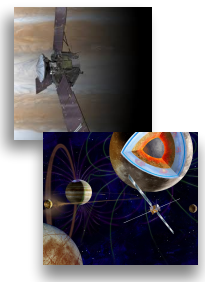
L. Lamy[1,2,3] , P. Zarka[1,2], G. Kenfack[2], C. Viou[2], C. Louis[4], B. Cecconi[1,2], A. Loh[1,2], A. Duchêne[3], L. Debisschop[1], S. Aicardi[5], E. Mauduit[1,2], C. Briand[1,2], N. Vilmer[1,2], S. Masson[6,2], S. Musset[7], E. Carley[4], S. Yerin[8], J. Girard[1,2], J.-M. Griessmeier[9,2] and the NDA/NenuFAR teams











POSTER 11

Prototypage d'un outil d alerte précoce pour la météo spatiale depuis le soleil vers les ceintures de radiation dans le cadre du projet H2020 SafeSpace

Nour DAHMEN

PNST
Programme National Soleil-Terre

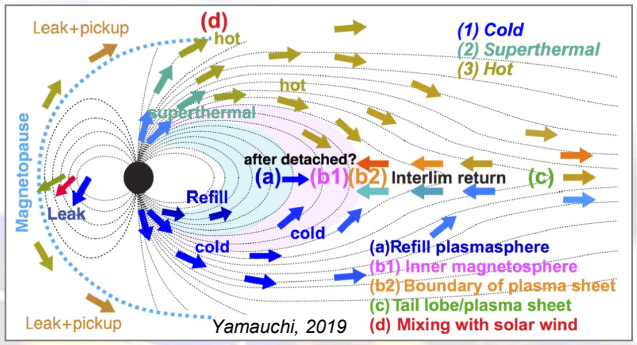
POSTER 12

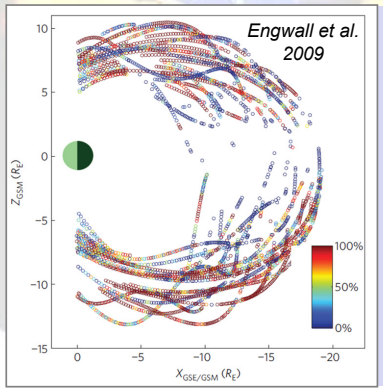
20 Years of Cluster Observations of Heavy Ion Outflow, Circulation in the Magnetosphere and Escape: Advances and Open Questions

Iannis DANDOURAS

20 Years of Cluster Observations of Heavy Ion Outflow, Circulation in the Magnetosphere and Escape: Advances and Open Questions

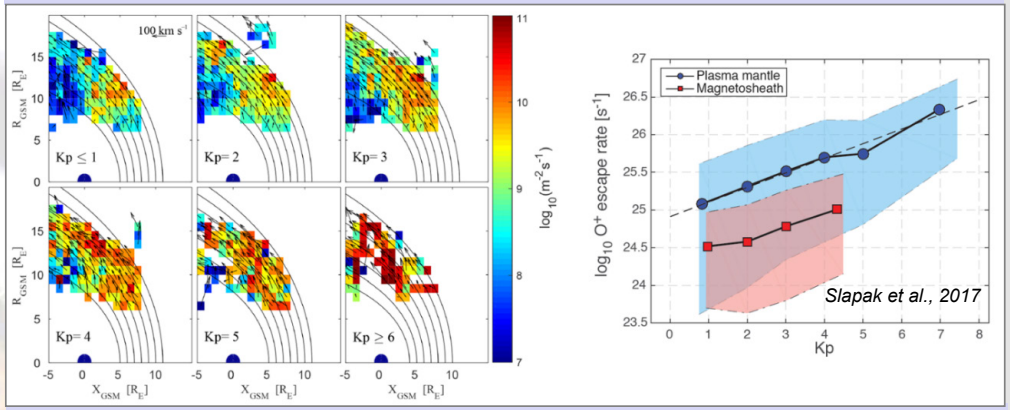
Iannis Dandouras (IRAP, Toulouse)





Cold plasma outflows, originating from the polar caps, dominate the magnetotail, constituting a previously "hidden" population

The dependence of the heavy ion polar outflow on the geomagnetic activity level has been evaluated and a logarithmic law established



The heavy ion loss, when integrated over the past four billion years and considering the much more active young Sun, suggests a total O^+ loss comparable to the oxygen amount contained today in the atmosphere

- Cluster has greatly advanced our understanding of how the atmosphere slowly escapes to space, and of its dependence on the activity level.
- However, several questions remain open: *Come to see poster # 12 !*

POSTER 13

Automatic derivation of the electron density from the WHISPER instrument onboard CLUSTER

Emmanuel DE LEON

Automatic detection of the electron density from the WHISPER instrument onboard CLUSTER

E. De Leon [(1)], N. Gilet [(1)] , X. Vallières [(1)], L. Bucciantini [(1)] , P. Henri [(1)(2)] , J.L. Rauch [(1)]
[(1)] CNRS-LPC2E, Orléans, France [(2)] Laboratoire Lagrange, OCA, UCA, CNRS, Nice, France

Goal: operational solution for the automatic determination of plasma density from WHISPER instrument (relaxation sounder) on CLUSTER s/c.

Method:

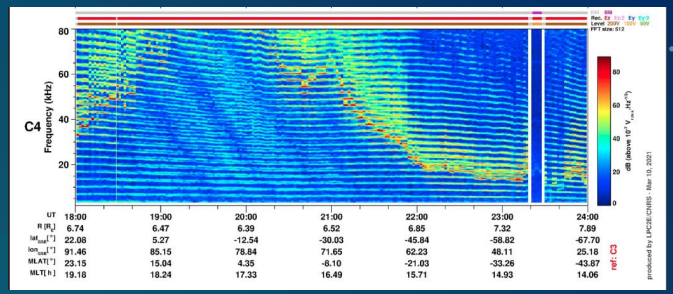
- Automatic detection made in two steps :
  1) Classify the region (« Plasma regime »)
  2) Determine the Plasma Frequency

The Classification is made by Neuronal Networks:

- Input: WHISPER electric spectra
- Output: Density (from plasma frequency)

Results:

- Implementation of the operational pipeline JeDAI : « **J**udging **E**lectron **D**ensity by **A**rtificial **I**ntelligence »
- Visualize and validate the outputs.
- Reducing human intervention up to 10 times
- Already 1+ Year of Data delivered to ESA Cluster Science Archive



Article :
Automatic Detection of the Thermal Electron Density From the WHISPER Experiment Onboard CLUSTER-II Mission With Neural Networks N. Gilet et al.
https://doi.org/10.1029/2020JA028901

Cluster Science Archive :
https://www.cosmos.esa.int/web/csa

POSTER 14

Langmuir-Slow Extraordinary Mode Magnetic Signature Observations with Parker Solar Probe

Thierry DUDOK DE WIT

Poster 14 **Andrea Larosa et al.**

First observation of the magnetic signature of the Langumir slow-extraordinatory mode with Parker Solar Probe

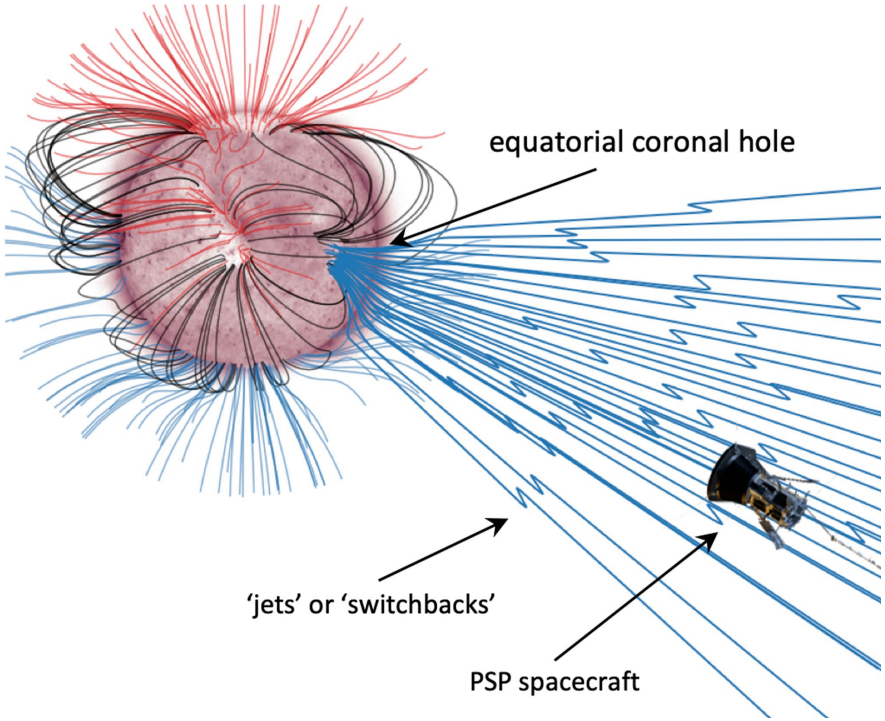
POSTER 15

Switchbacks dans le vent solaire : quelles contraintes sur leur origine?

Thierry DUDOK DE WIT

Poster 15 T. Dudok de Wit et al.

Switchbacks dans le vent solaire, quelles contraintes sur leur origine ?



Bale et al. (2020)

POSTER 16

RB-FAN : « Radiation Belt Forecast And Nowcast », un nouvel environnement basé sur le code d'assimilation de données Salammbô

Antoine FERLIN

RB-FAN : « Radiation Belt Forecast And Nowcast », un nouvel environnement basé sur le code d'assimilation de données Salammbô

A. Ferlin (ONERA), V. Maget (ONERA), S. Bourdarie (ONERA), D. Lazaro (ONERA), A. Brunet (ONERA), S. Poedts (KU Leuven), A. Kochanov (A. Kochanov), C. Papadimitriou (SPARC), I. Sandberg (SPARC), Z. Iqbal (SPARC), E. Botek (BIRA-IASB), V. Pierrard (BIRA-IASB), E. De Donder (BIRA-IASB), L. Zychova (BIRA-IASB), M. Dierckxsens (BIRA-IASB), N. Ganushkina (FMI), S. Dubyagin (FMI)

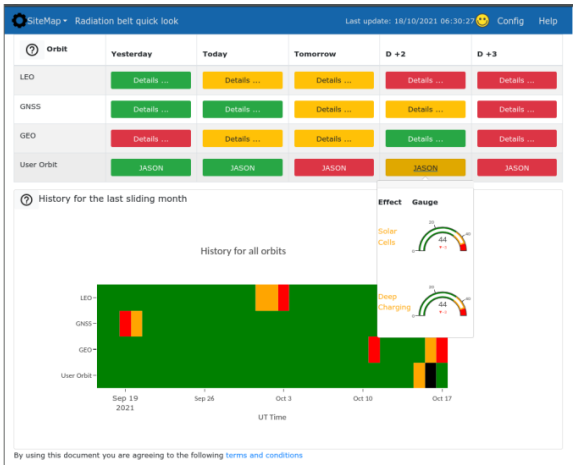
A.Glover (ESA/ESOC – Space Weather Office (OPS-SW)),

R. Keil (Rhea System GmbH for ESA/ESOC/OPS-SW),

H. Evans (ESA/ESTEC – TEC/EPS)

Remerciements:

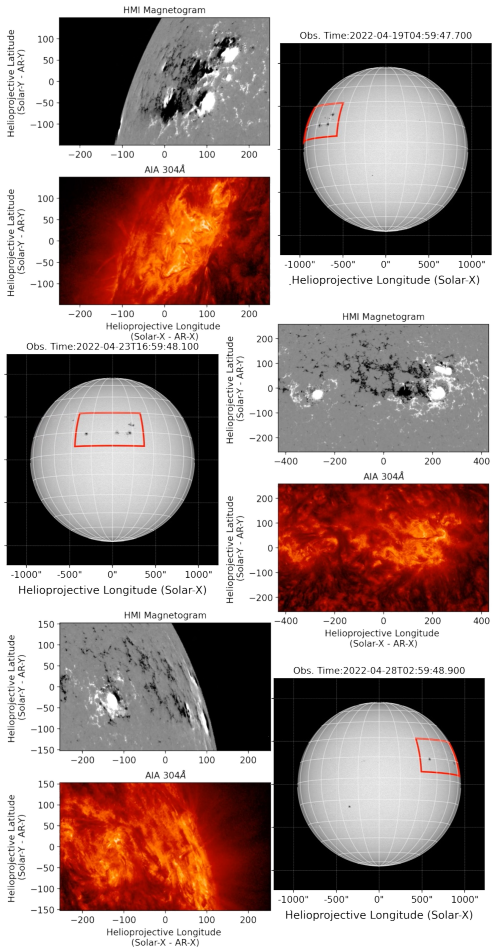
Ce travail est soutenu par le programme ESA Space Situational Awareness (Period3) sous l'activité 'P3-SWE-X' RB-FAN via le contrat numéro 4000131381/20/D/CT.



POSTER 17

LDE3 Weekly Flare Bulletin

Adam FINLEY



LDE3 Weekly Flare Bulletin

Adam J. Finley*, Rui Pinto, Barbara Perri, Antoine Strugarek, Sacha Brun, and Chung Pui Hung

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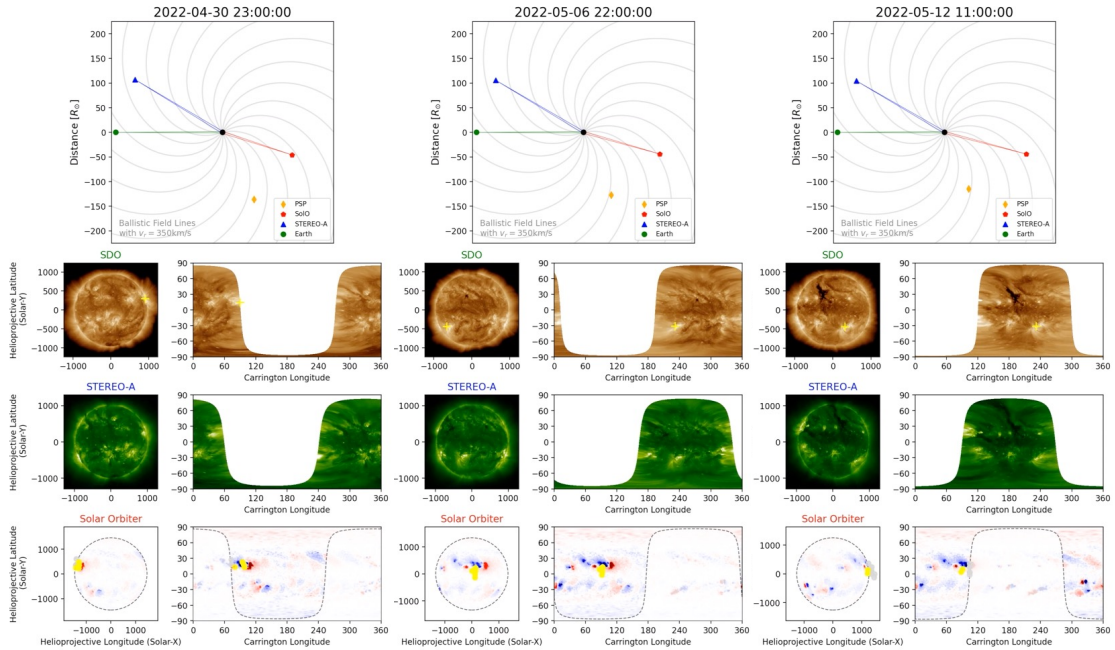

POSTER 18

Survey of whistlers waves parameters in the pristine solar wind from the first PSP orbit : wave amplitude, polarization, and collocation with magnetic dips

Clara FROMENT

PNST
Programme National Soleil-Terre

Survey of whistlers waves parameters in the pristine solar wind from the first PSP orbit: wave amplitude, polarization, and collocation with magnetic dips

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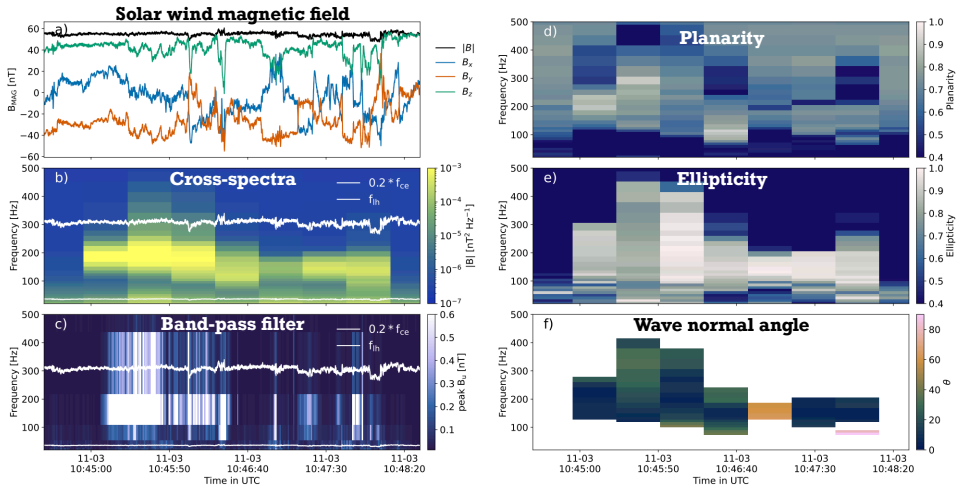

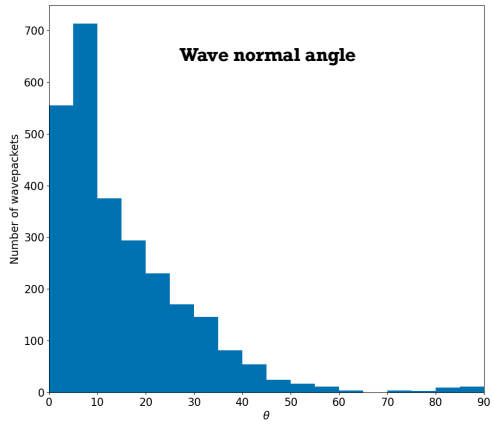

➡ We analysed the observations of whistler waves by the Search-Coil Magnetometer during the first encounter of Parker Solar Probe with the Sun
➡ The results based on the spectral matrices data were validated with the waveforms (burst and survey)
➡ We find mostly quasi-parallel waves but a significant part (3 %) of the waves are obliques (> 45°) (which is important for the scattering of strahl electrons)
➡ 52 % of the whistler wave bins in the spectral matrices are associated with magnetic dips, soon to be compared with simulation results