PNST 2022

Ubiquitous Jupiter fast drifting radio bursts reveal Alfvenic electron acceleration

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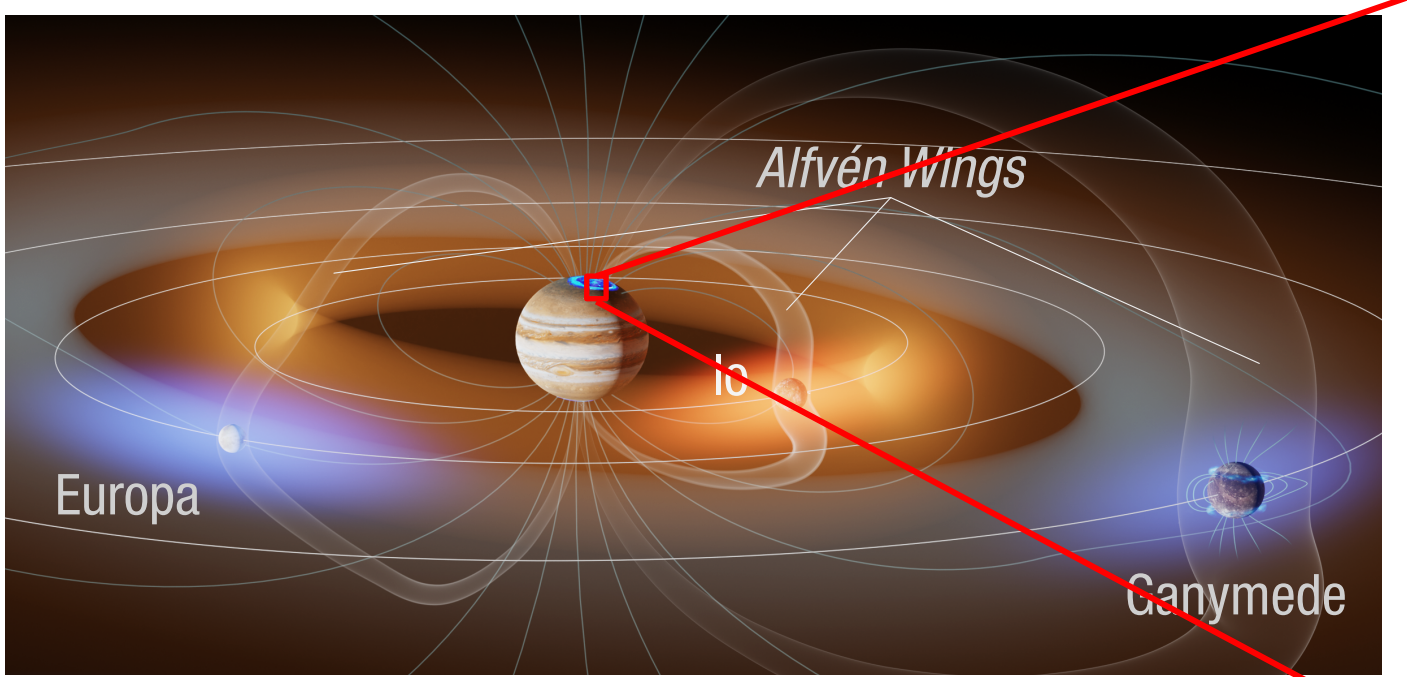
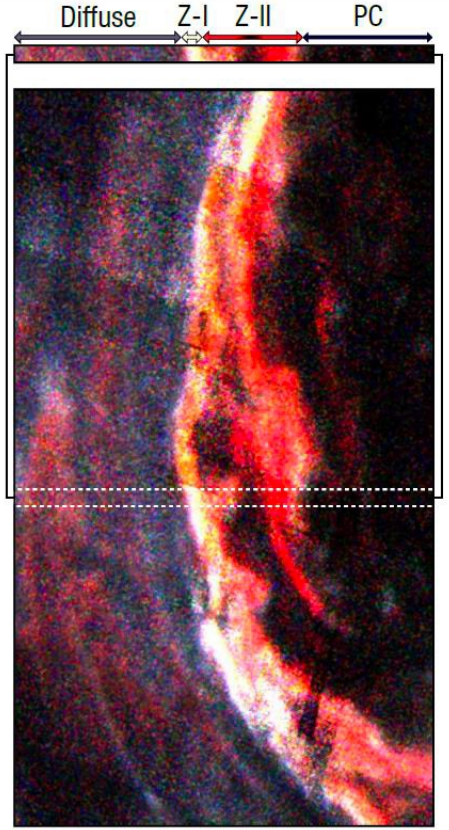
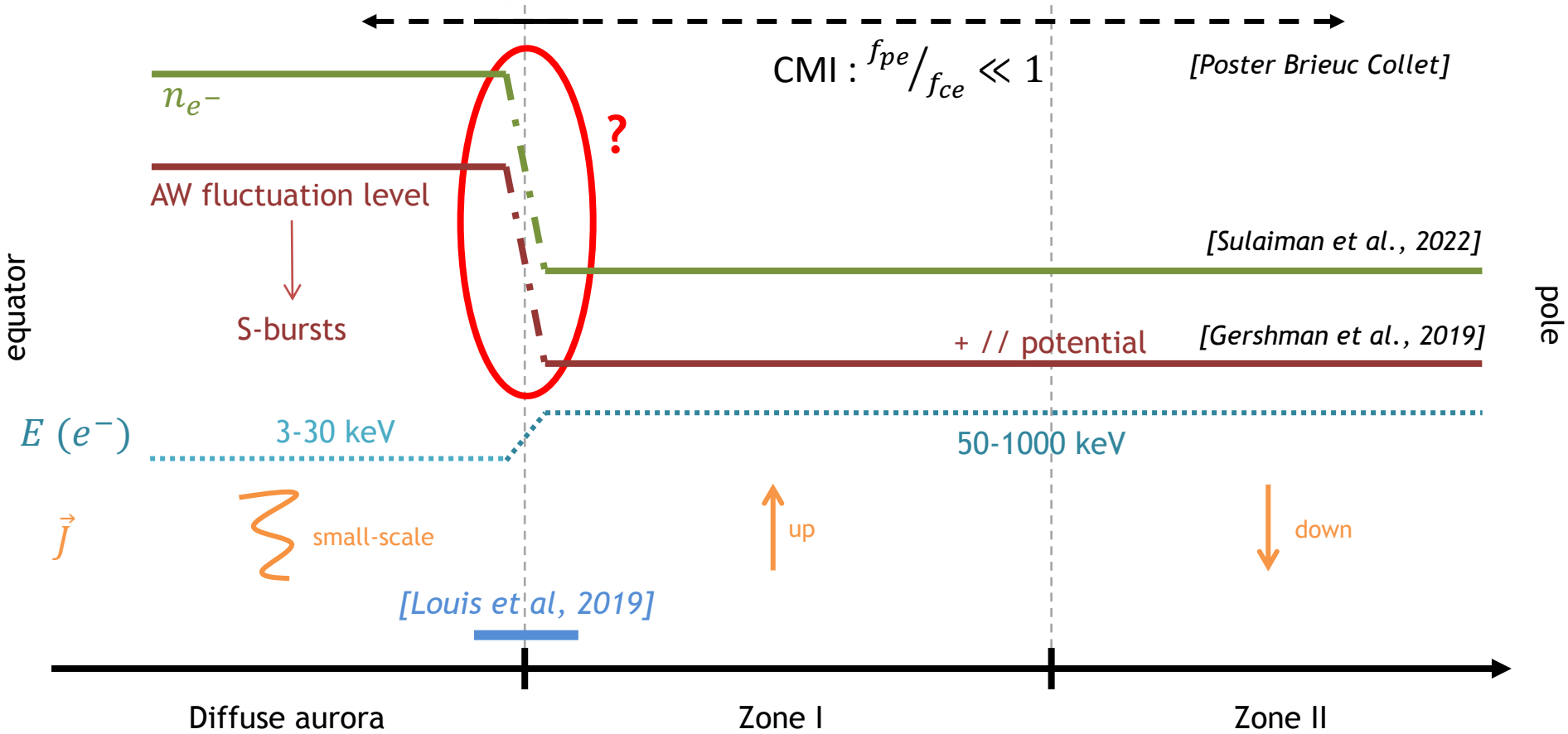
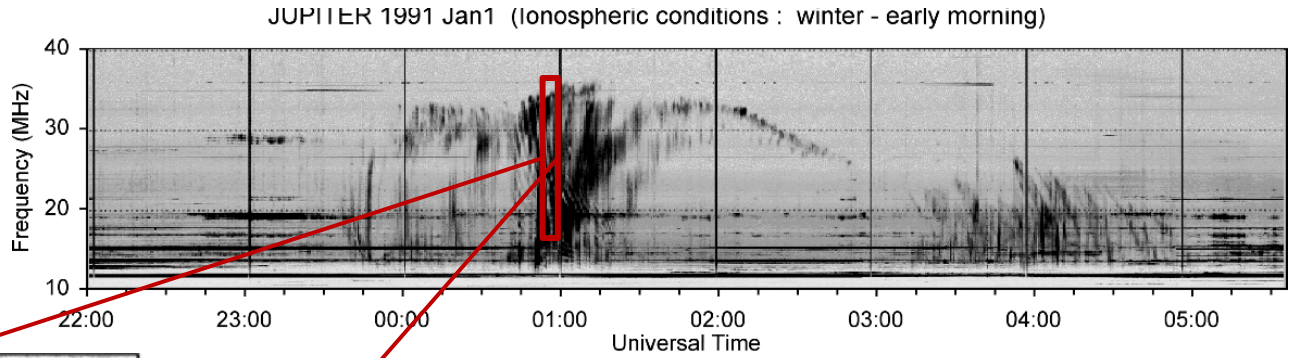


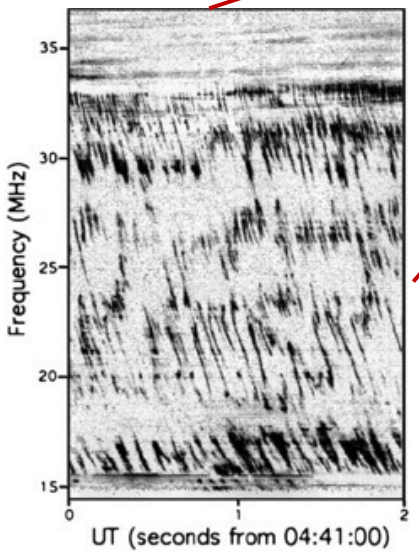
[Szalay et al., 2022]



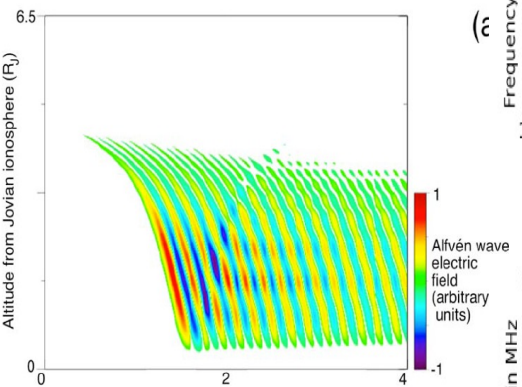
[Sulaiman et al., 2022]

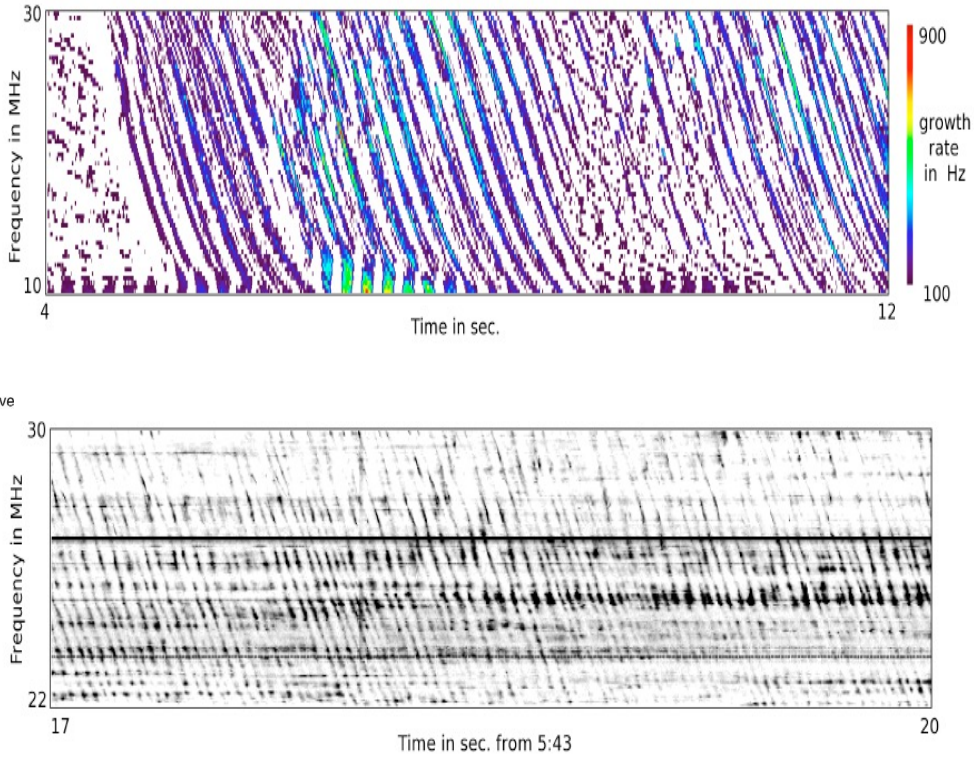

CMI : $f_{pe}/f_{ce} \ll 1$
[Poster Brieuc Collet]
n_{e^-}
?
AW fluctuation level
S-bursts
[Sulaiman et al., 2022]
+ // potential
[Gershman et al., 2019]
equator
pole
$E\ (e^-)$
3-30 keV
50-1000 keV
$\vec{J}$
small-scale
up
down
[Louis et al, 2019]
Diffuse aurora
Zone I
Zone II

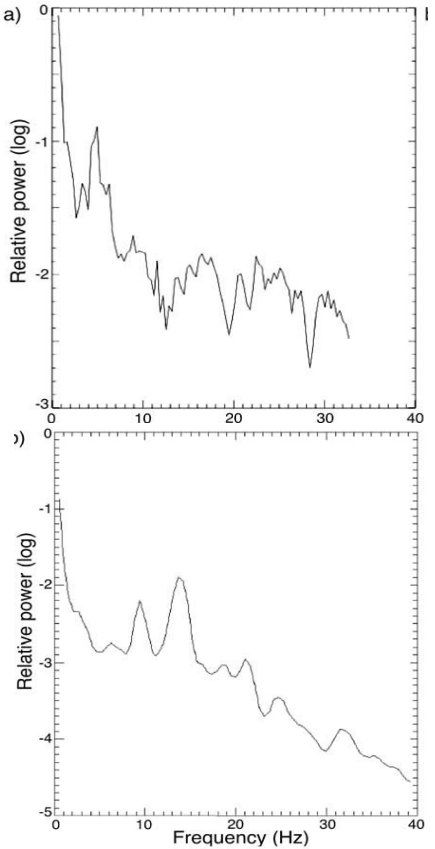




- Discrete signals
- Quasi-periodic ~5-10 Hz
- Drift $\sim -20\ MHz.s^{-1}$

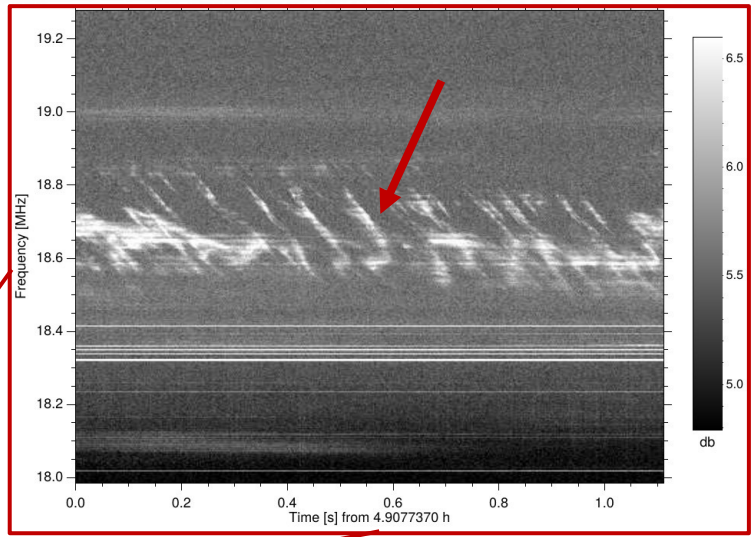


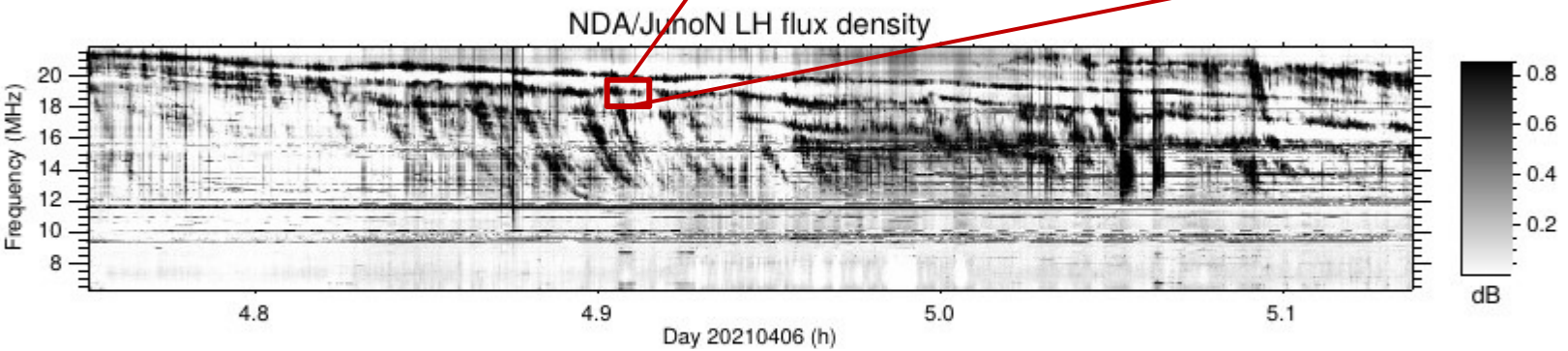


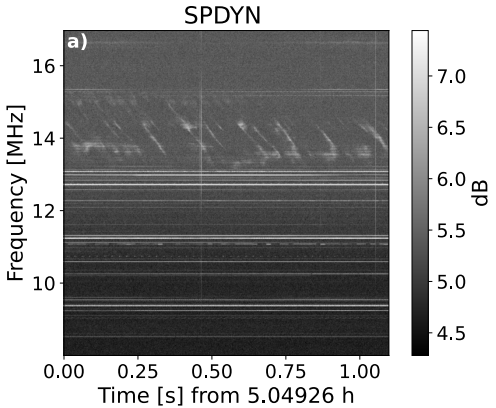


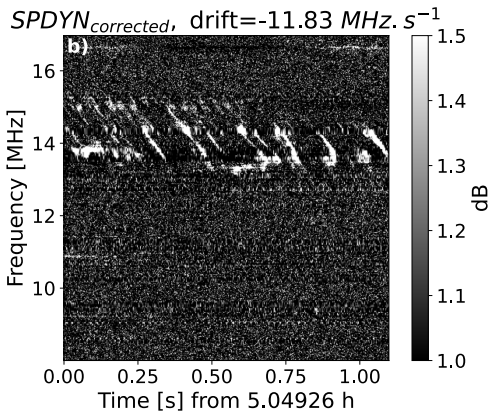
[Hess et al., 2007 & 2009]

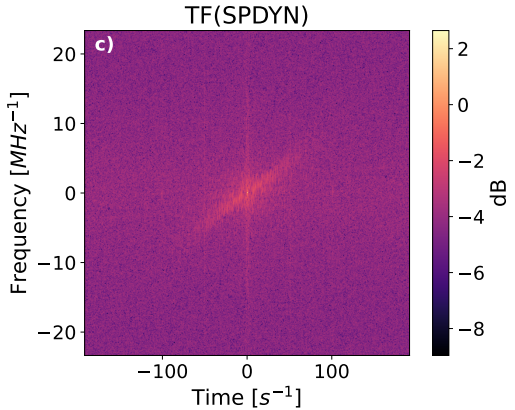
Nancay Decameter Array : $2.6ms \times 3.05\ kHz$

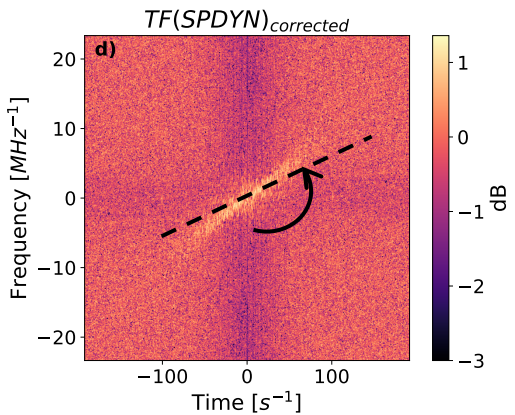


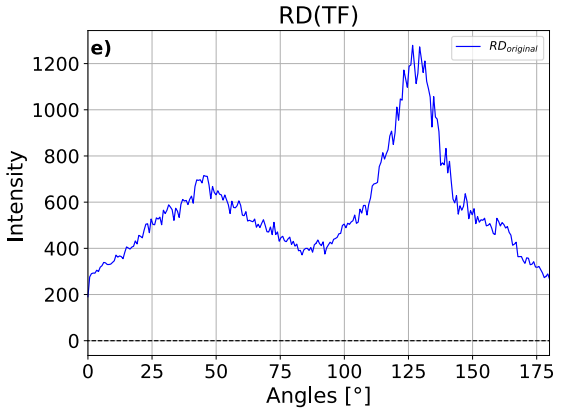


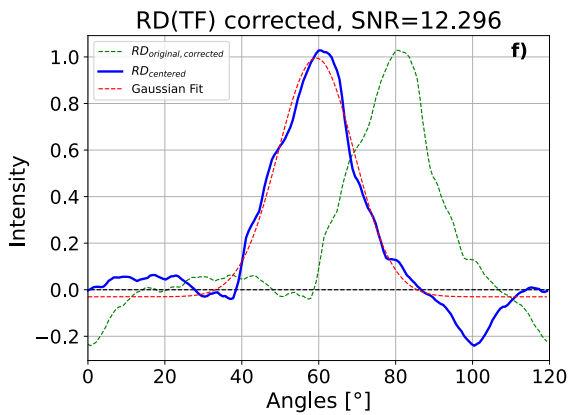

SPDYN
a)
Frequency [MHz]
Time [s] from 5.04926 h
dB


SPDYN_corrected, drift=-11.83 MHz.s^-1
b)
Frequency [MHz]
Time [s] from 5.04926 h
dB

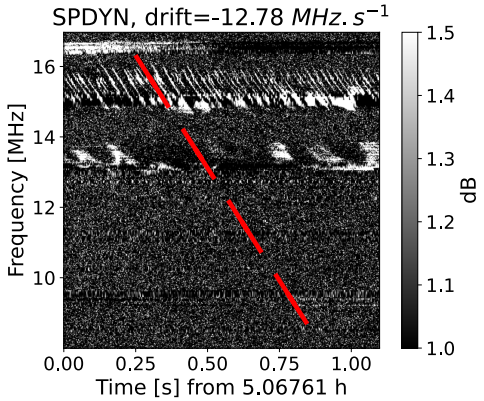

TF(SPDYN)
c)
Frequency [MHz^-1]
Time [s^-1]
dB

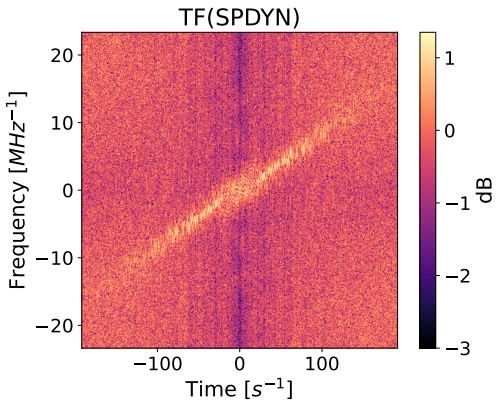

TF(SPDYN)_corrected
d)
Frequency [MHz^-1]
Time [s^-1]
dB

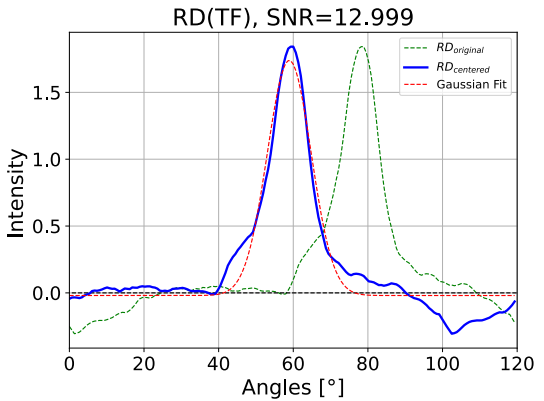

RD(TF)
e)
RD_original
Intensity
Angles [°]

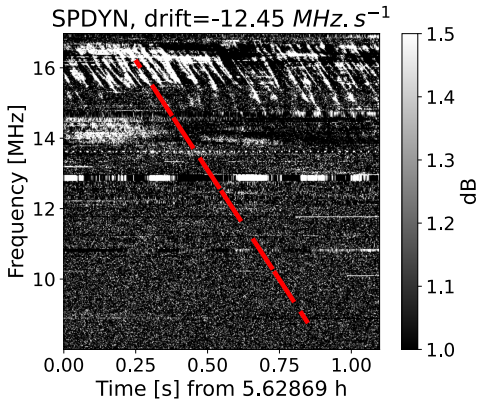

RD(TF) corrected, SNR=12.296
f)
RD_original, corrected
RD_centered
Gaussian Fit
Intensity
Angles [°]

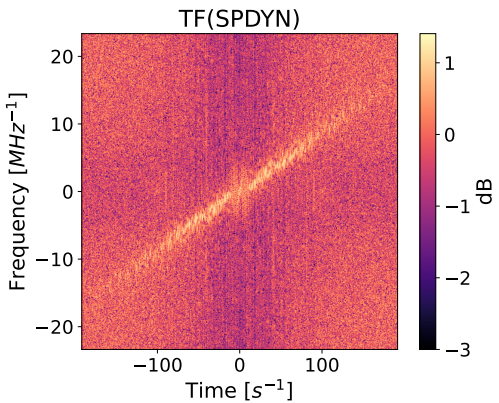
Io related emissions :

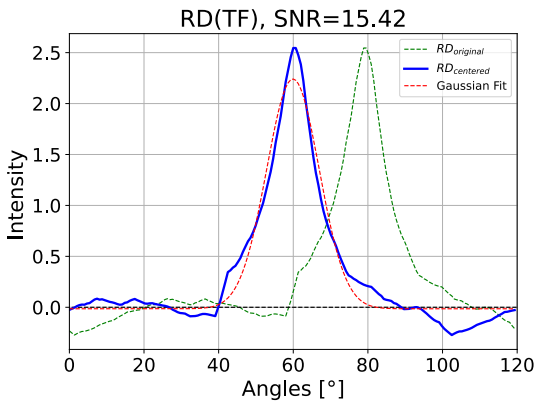






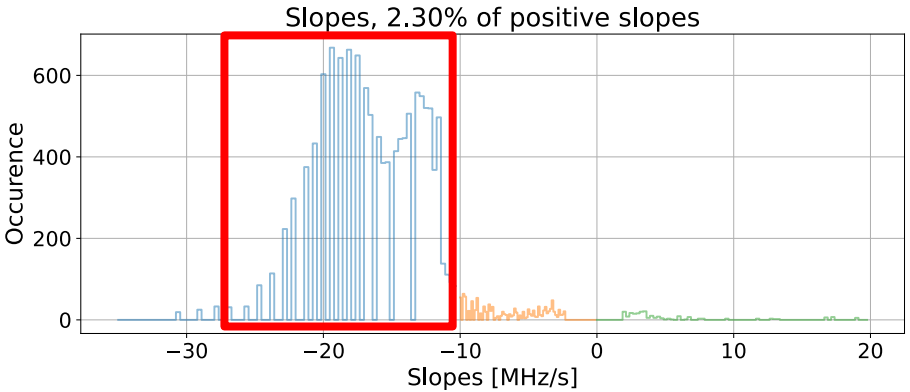




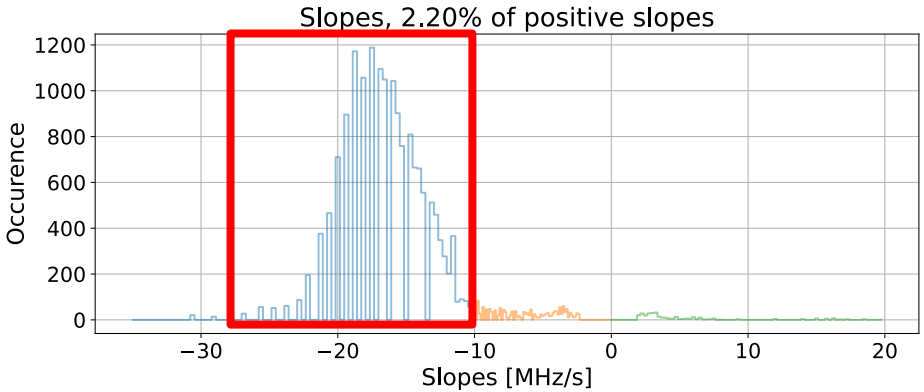


Io related emissions:

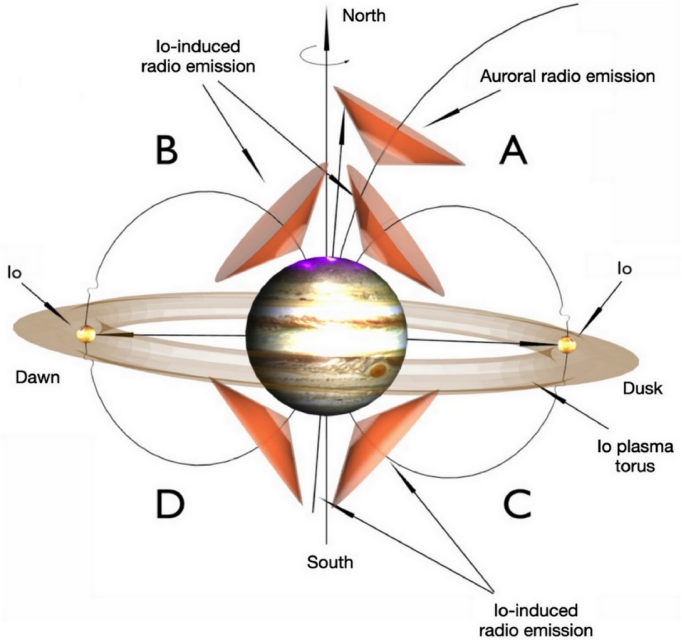
LH



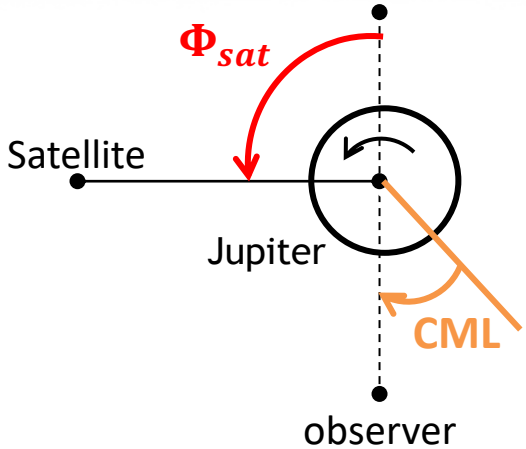
RH



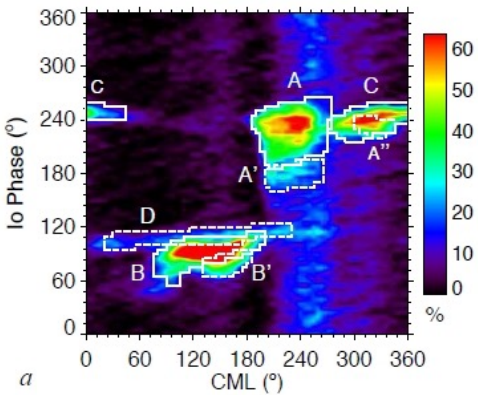
$$v_{//} = 2.10^7\ m.s^{-1} \qquad E_{//} \sim 1.1\ keV \qquad E_{tot} \sim 5\ keV$$

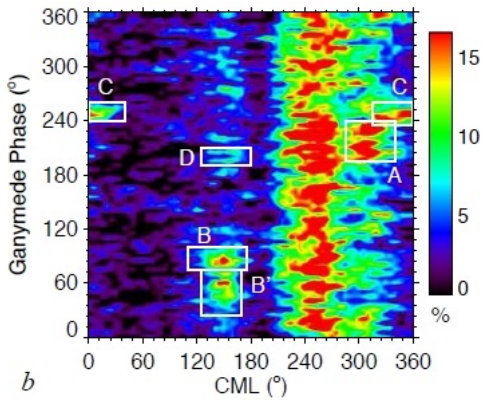


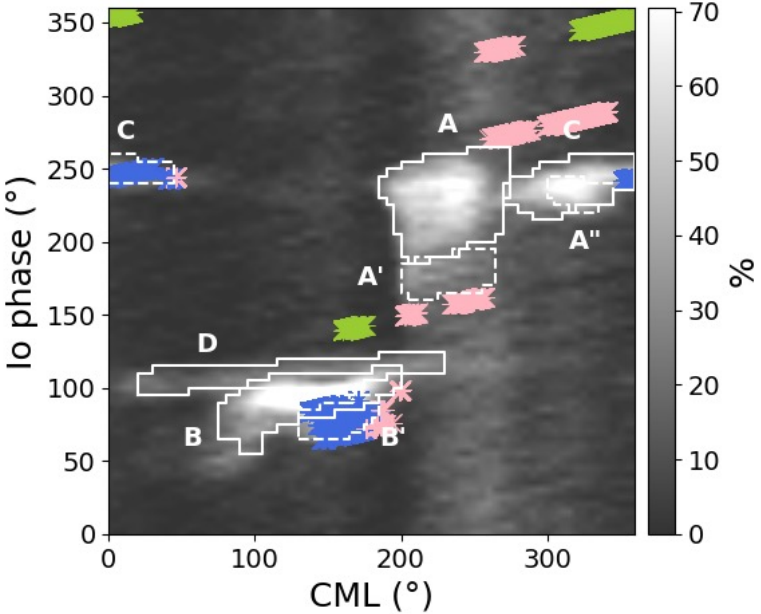
[Zarka et al., 2018]

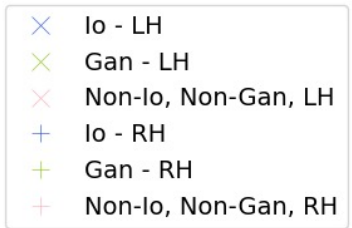


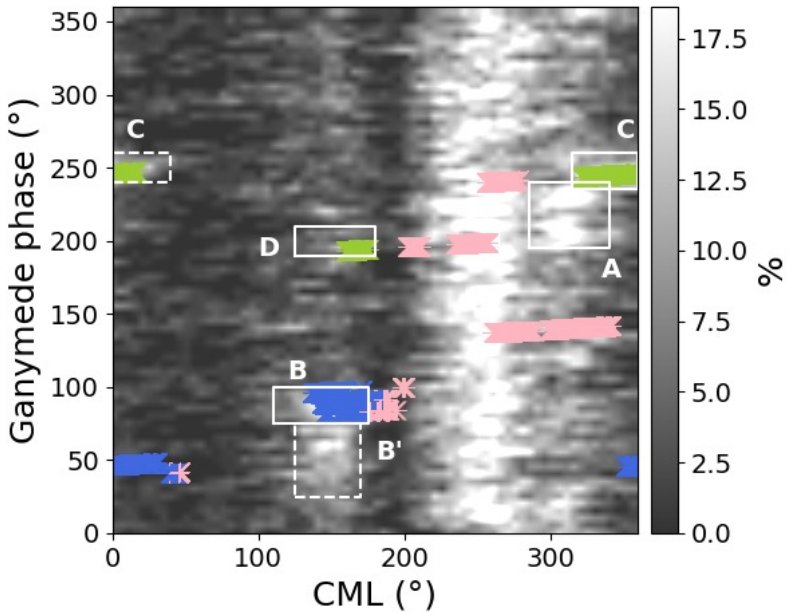
Φ_{sat} : satellite phase
CML : observer's longitude





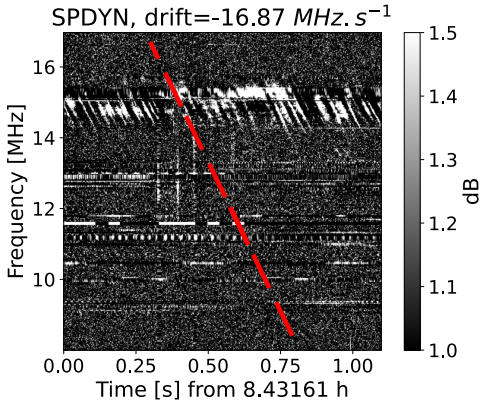


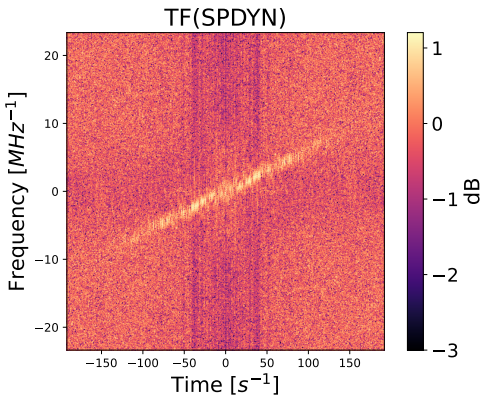


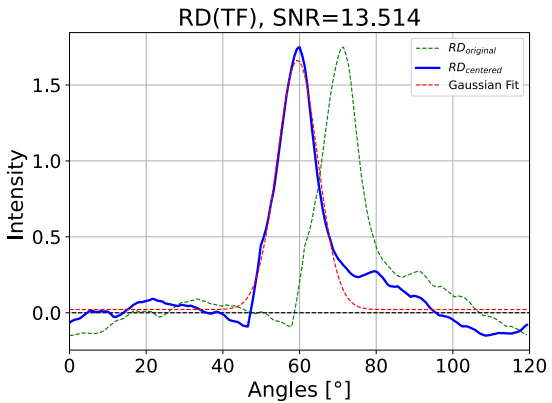


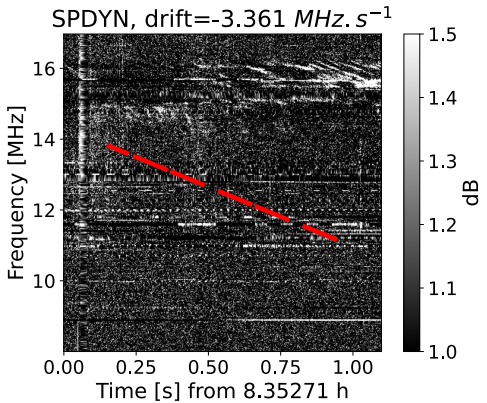
Analysis over April 2021

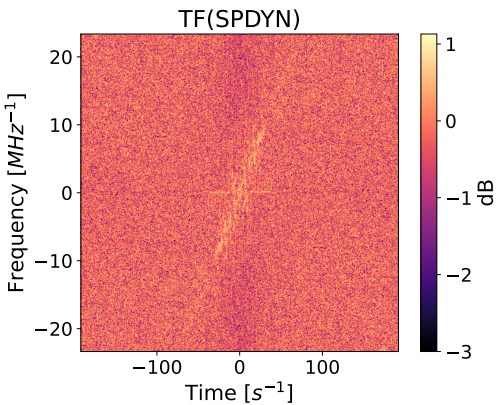
Ganymede related emissions :

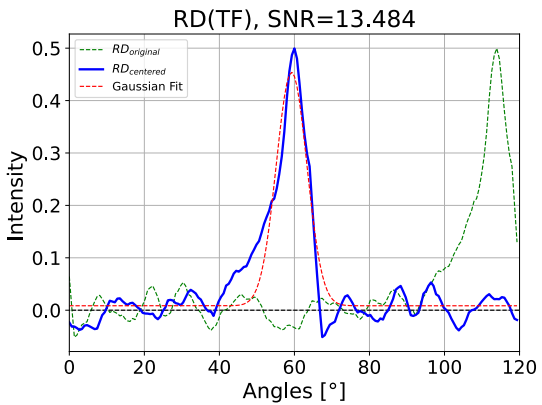






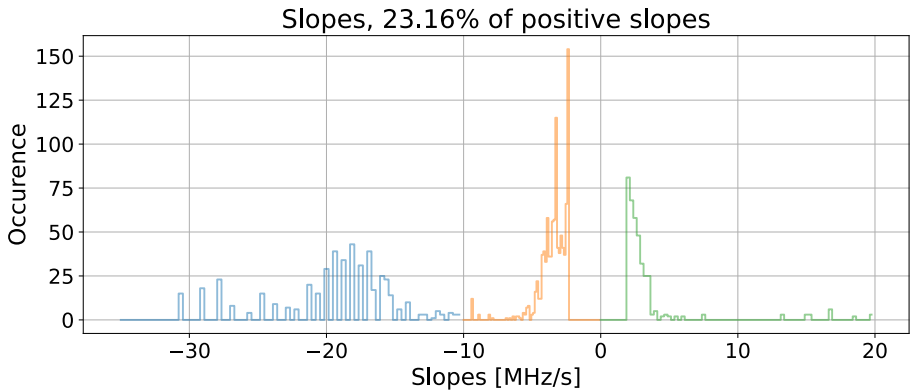




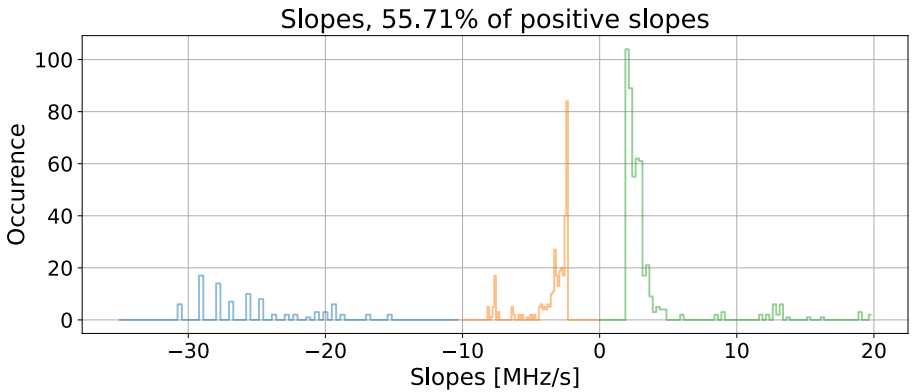


Ganymede related emissions:

LH

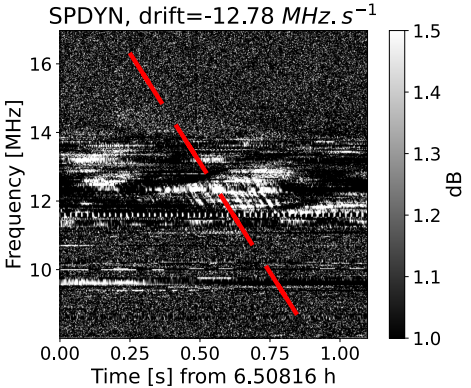


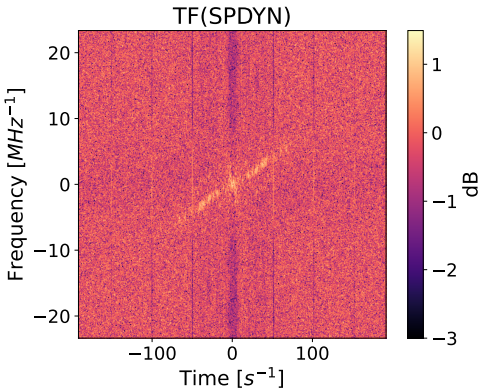
RH

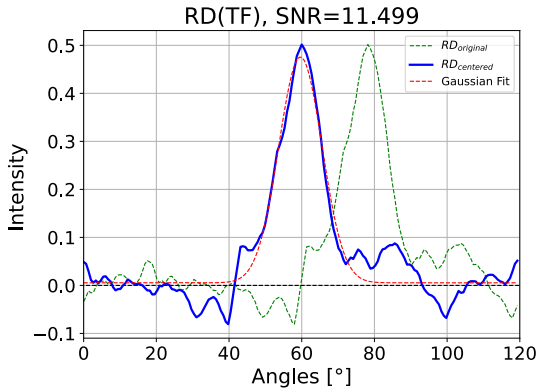


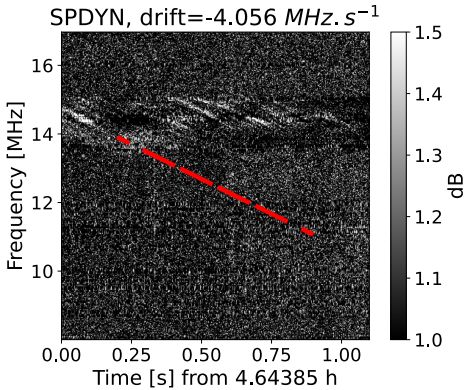
$v_{//} = 4.10^6\ m.s^{-1}$ $E_{//} \sim 40\ eV$ $E_{tot} \sim 0.2\ keV$

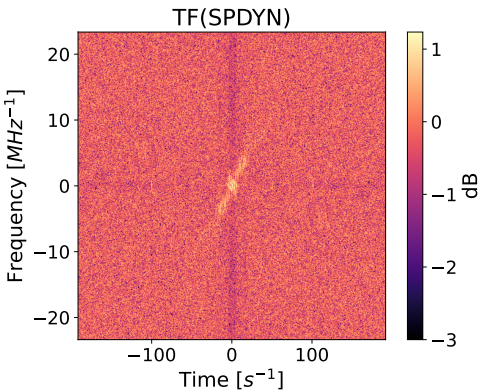
Diffuse aurora related emissions :

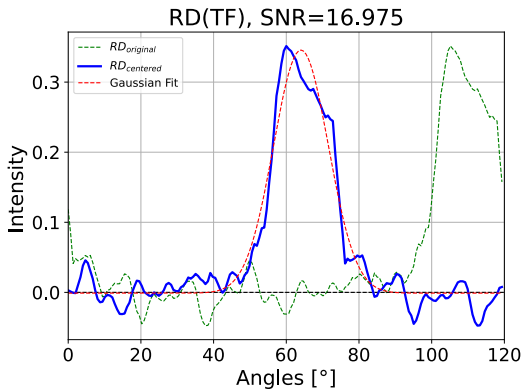






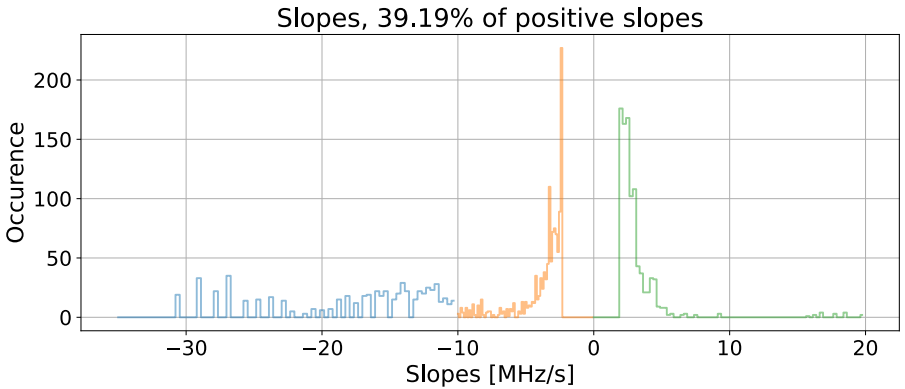




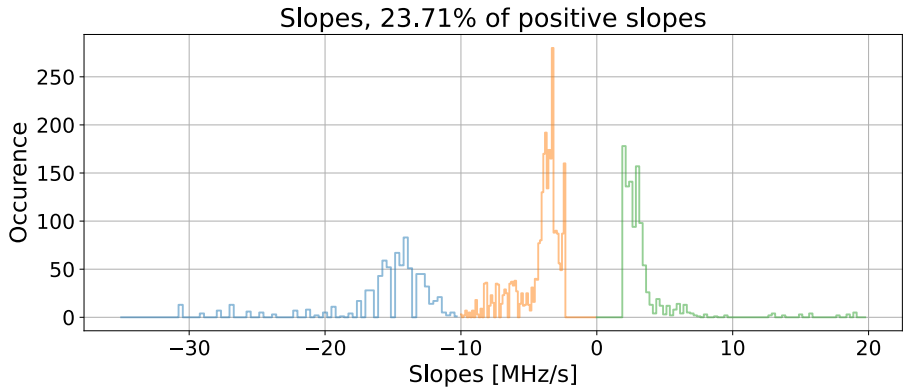


Diffuse aurora related emissions:

LH



RH



$$v_{//} = 4.10^6\ m.s^{-1} \qquad E_{//} \sim 40\ eV \qquad E_{tot} \sim 0.2\ keV$$

Main conclusions :

- Robust method for automatic detection
- First detection of millisecond bursts related to Ganymede and the diffuse aurora
- Two populations of time-frequency drifts
- Mauduit et al., to be submitted

Perspectives :

- Process all data available : $\sim 100\ Tb$ since 2017
- Statistical study of drifts distribution, frequencies of the emissions, etc..
- Explain the origin of the two populations of drifts

Thank you for your attention !