ELECTRON SCATTERING BY ELECTROSTATIC ELECTRON CYCLOTRON HARMONIC WAVES DURING STORM-TIME

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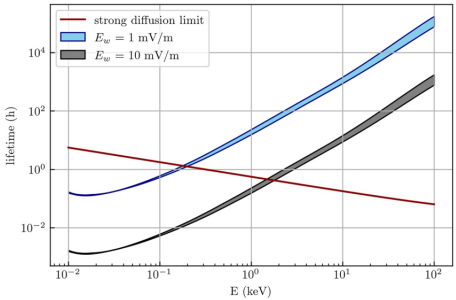
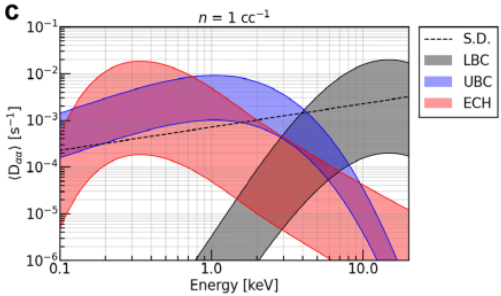
Motivation

- Haas et al. (2023): missing loss process in the electron ring current
- Are ECH waves responsible for (part of) the missing loss?

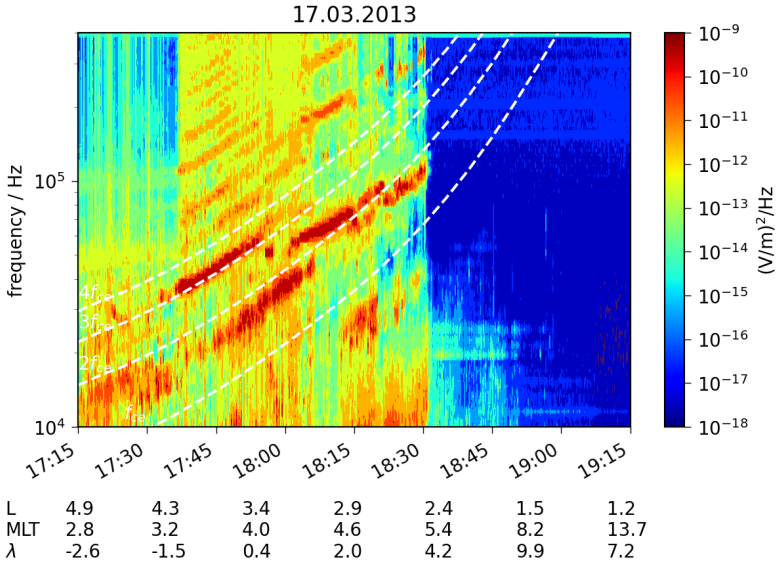


Stoll et al. (2023)



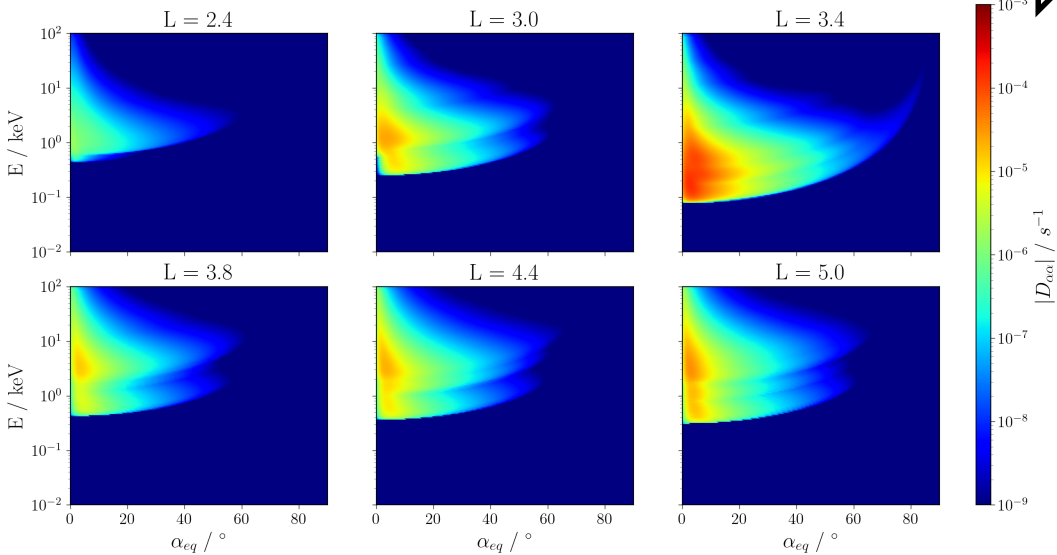
Fukizawa et al. (2022)

Electrostatic electron cyclotron harmonic waves

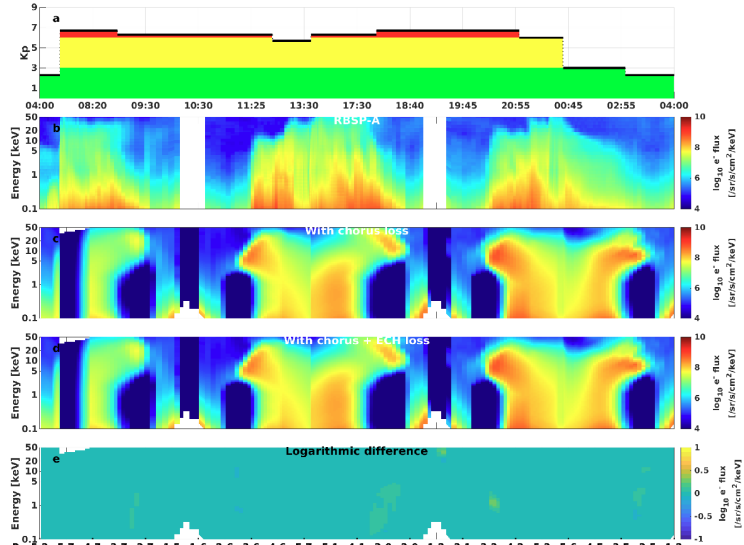


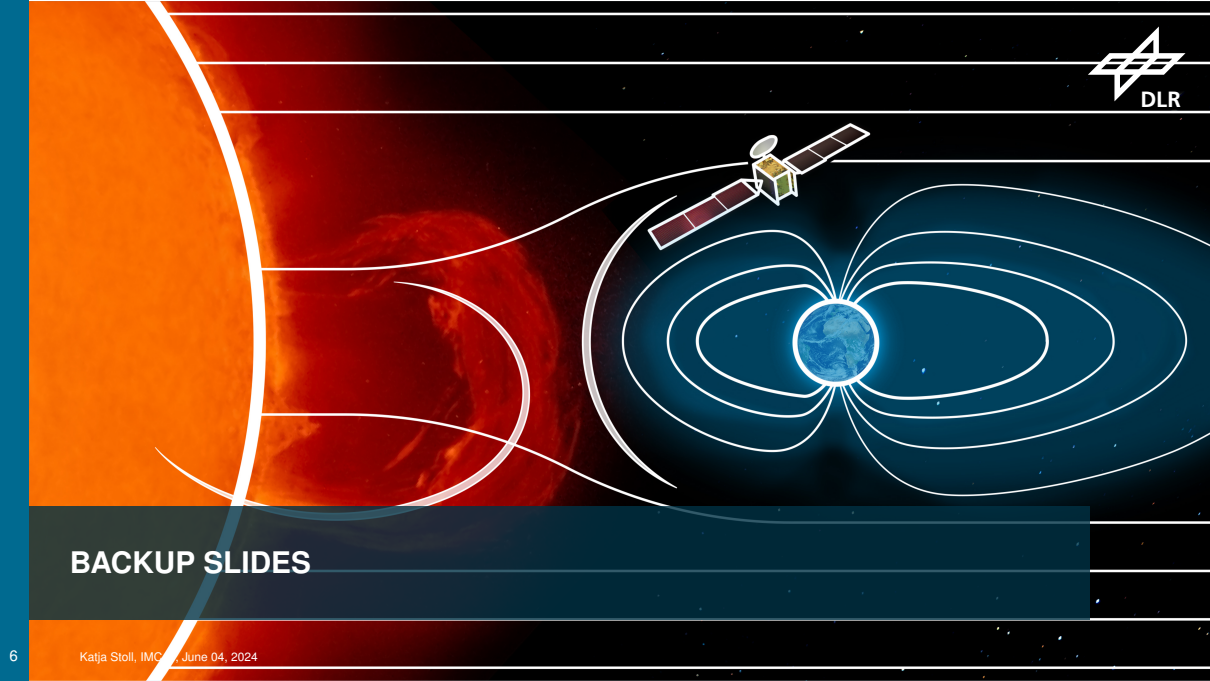
L	4.9	4.3	3.4	2.9	2.4	1.5	1.2
MLT	2.8	3.2	4.0	4.6	5.4	8.2	13.7
λ	-2.6	-1.5	0.4	2.0	4.2	9.9	7.2

ECH wave-induced diffusion coefficients



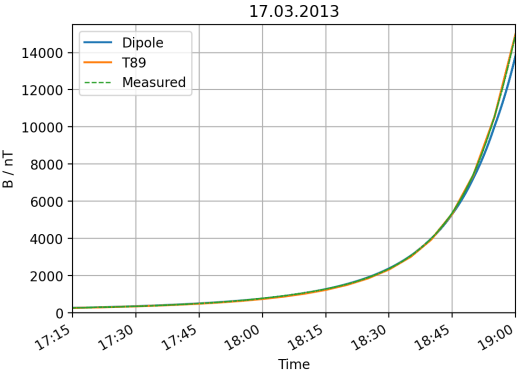
VERB-4D Simulations

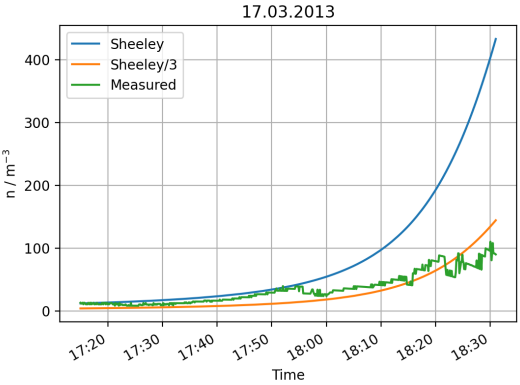




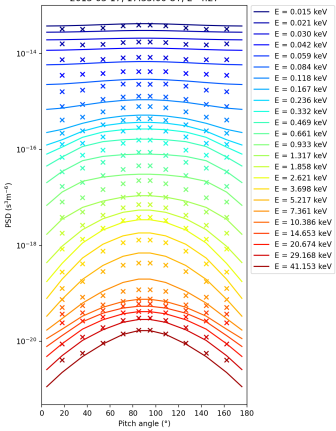
BACKUP SLIDES

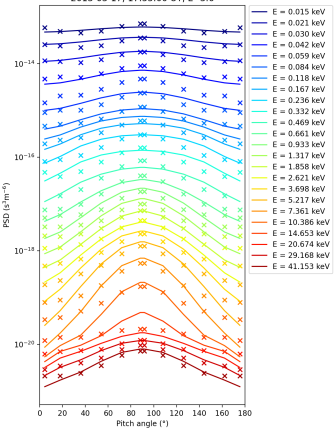
Magnetic field and plasma density

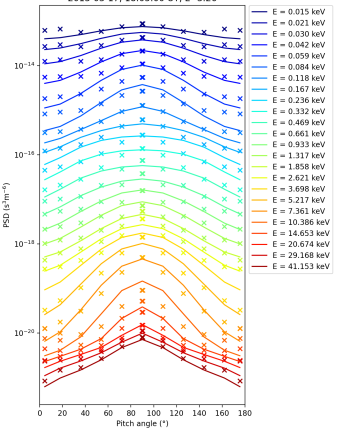




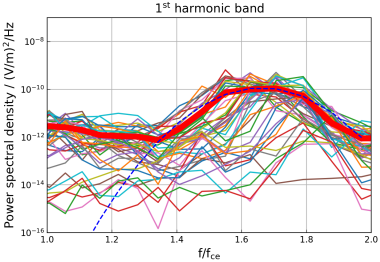
Fits to phase space density

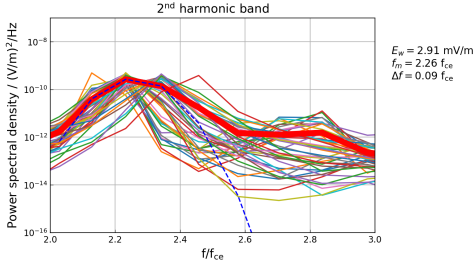


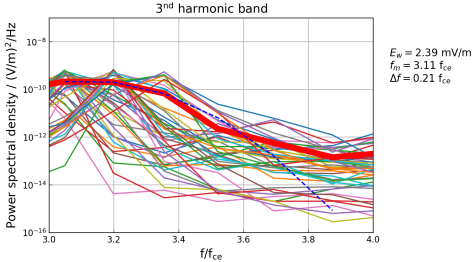




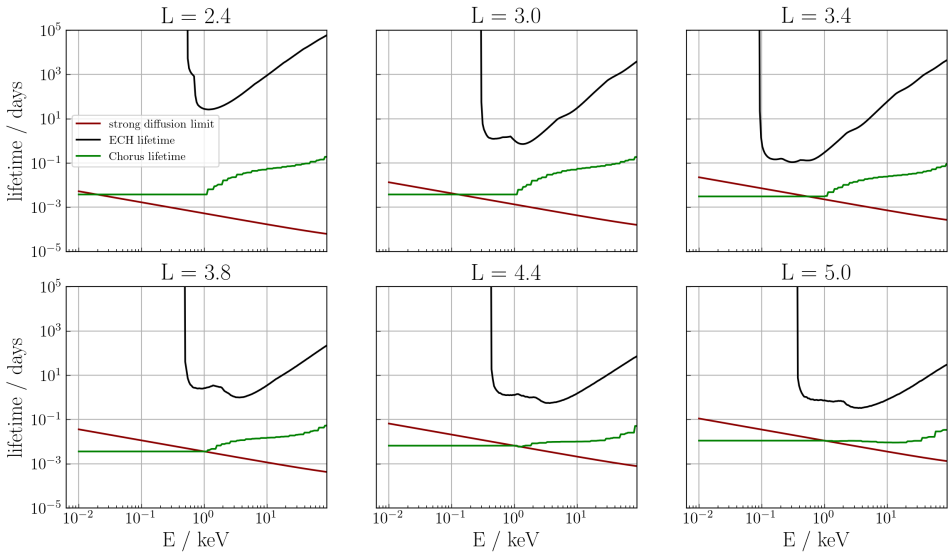
Wave amplitude



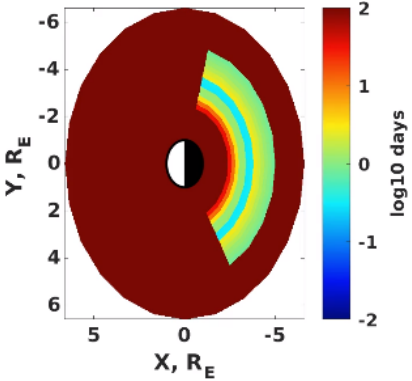




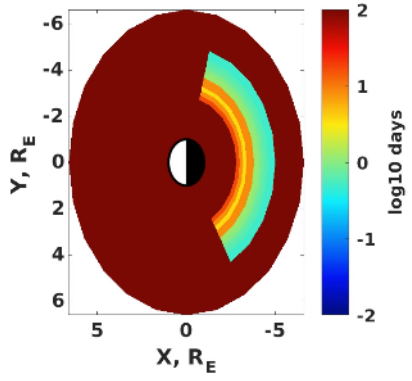
Lifetimes


L = 2.4
L = 3.0
L = 3.4
L = 3.8
L = 4.4
L = 5.0
lifetime / days
E / keV
strong diffusion limit
ECH lifetime
Chorus lifetime

Lifetimes in VERB-4D



(a) ECH lifetimes at $E = 1\,\mathrm{keV}$, $\alpha = 50\,^\circ$



(b) ECH lifetimes at $E = 5\,\mathrm{keV}$, $\alpha = 50\,^\circ$