Reconstructing the coronal magnetic field

A model comparison

Anthony Yeates

with

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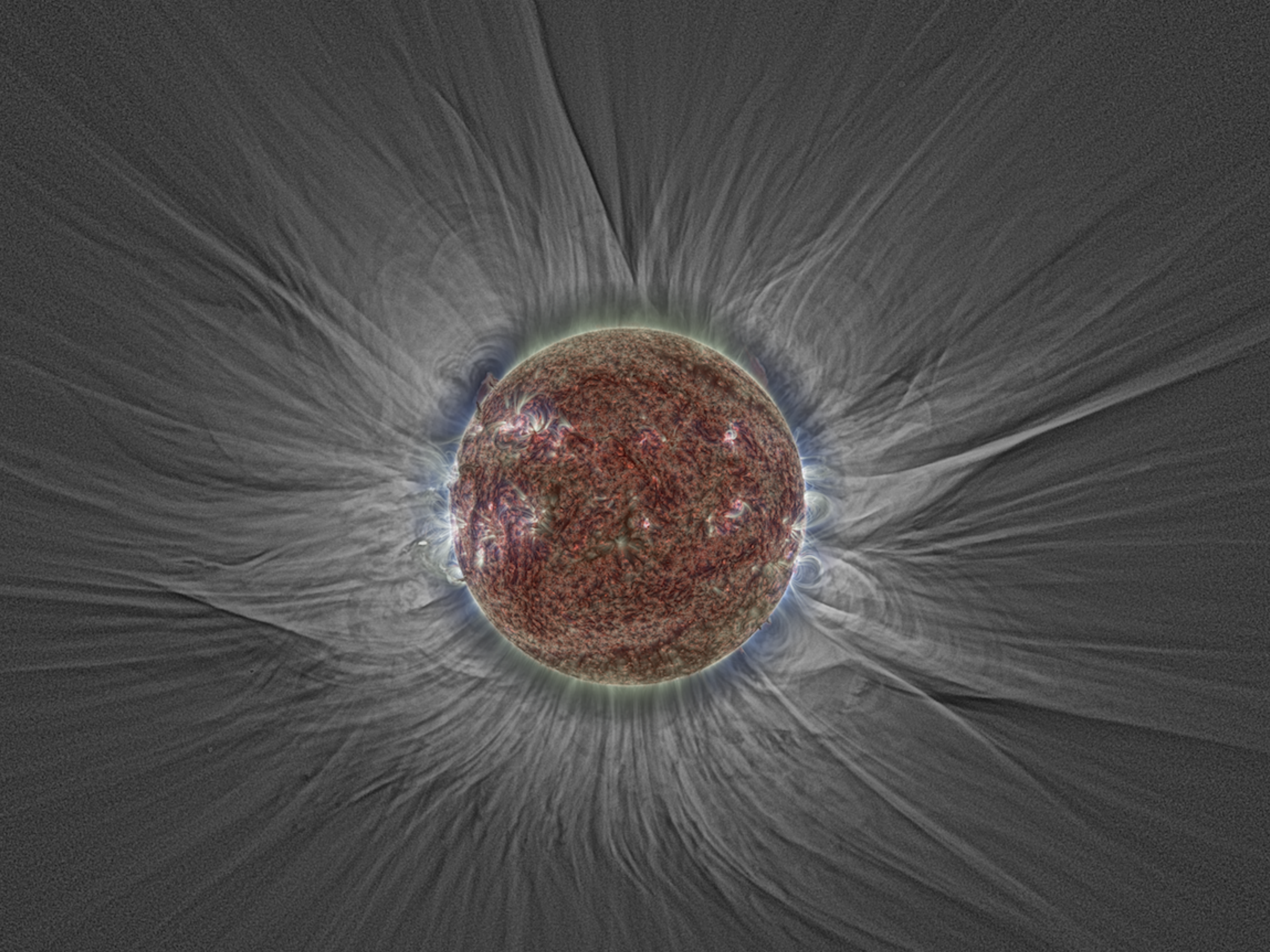
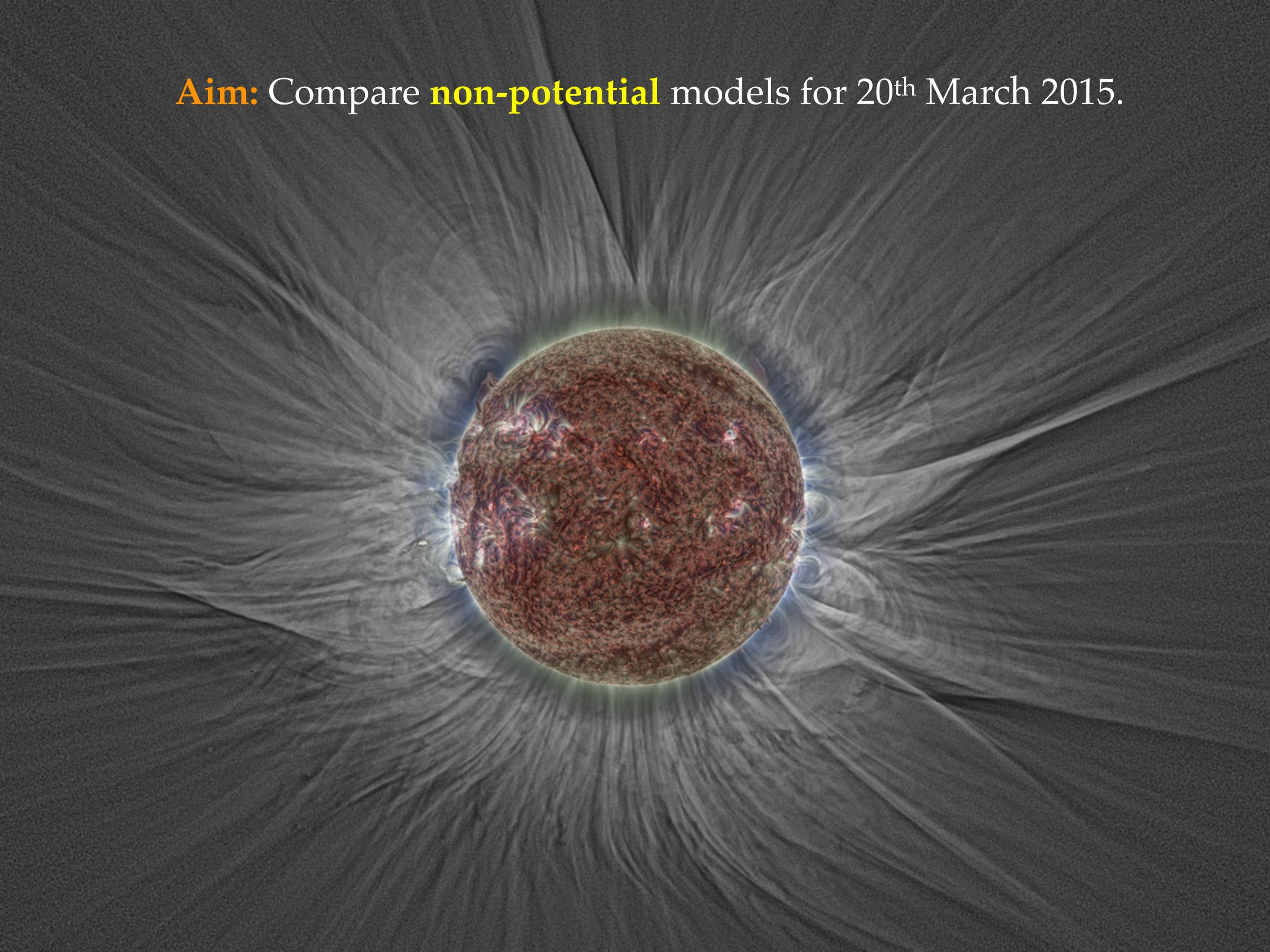
RAS Discussion Mtg on Solar Orbiter, 10-Nov-2017

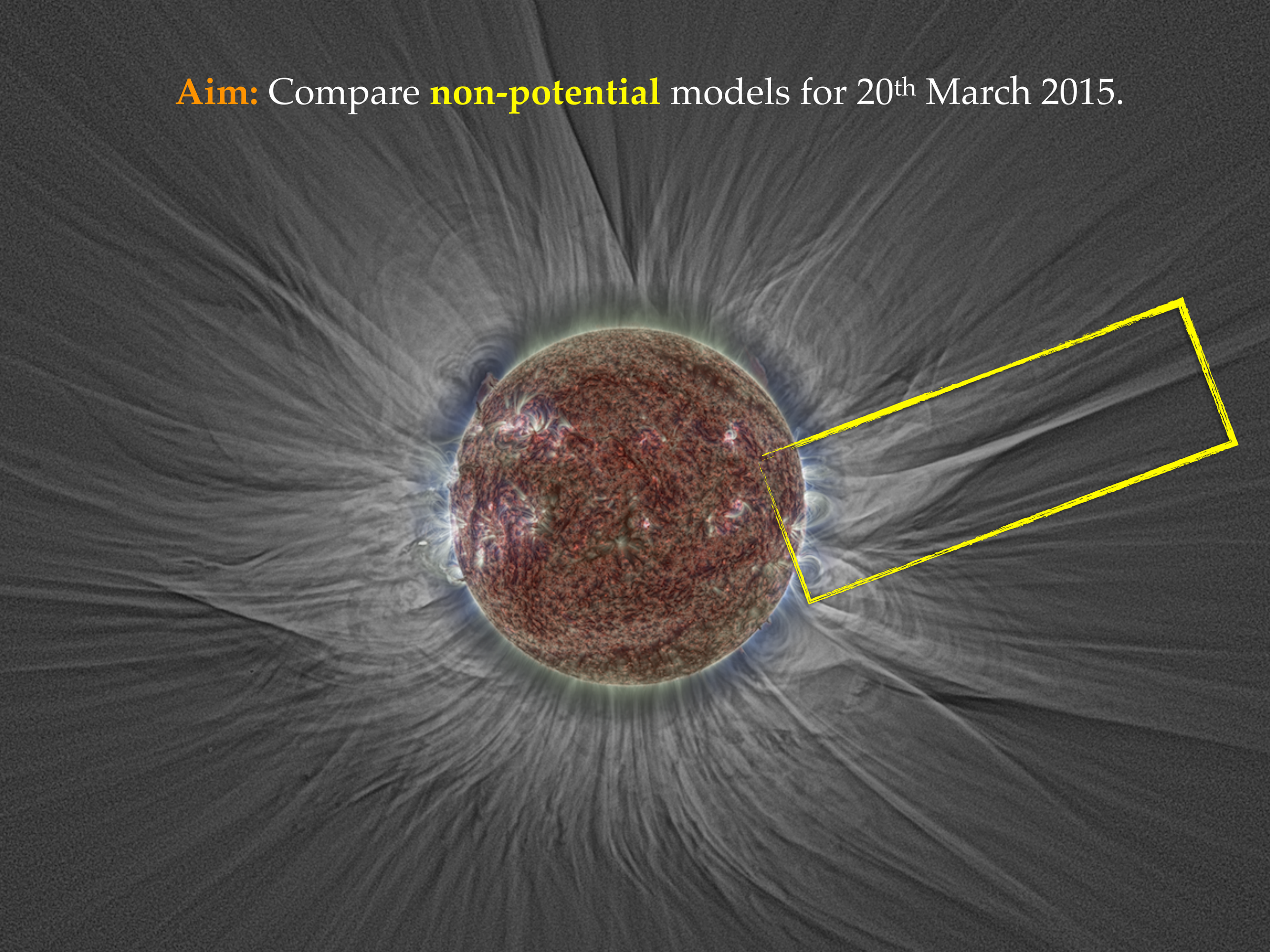


Aim: Compare models for 20th March 2015.

Aim: Compare **non-potential** models for 20th March 2015.



Aim: Compare **non-potential** models for 20th March 2015.



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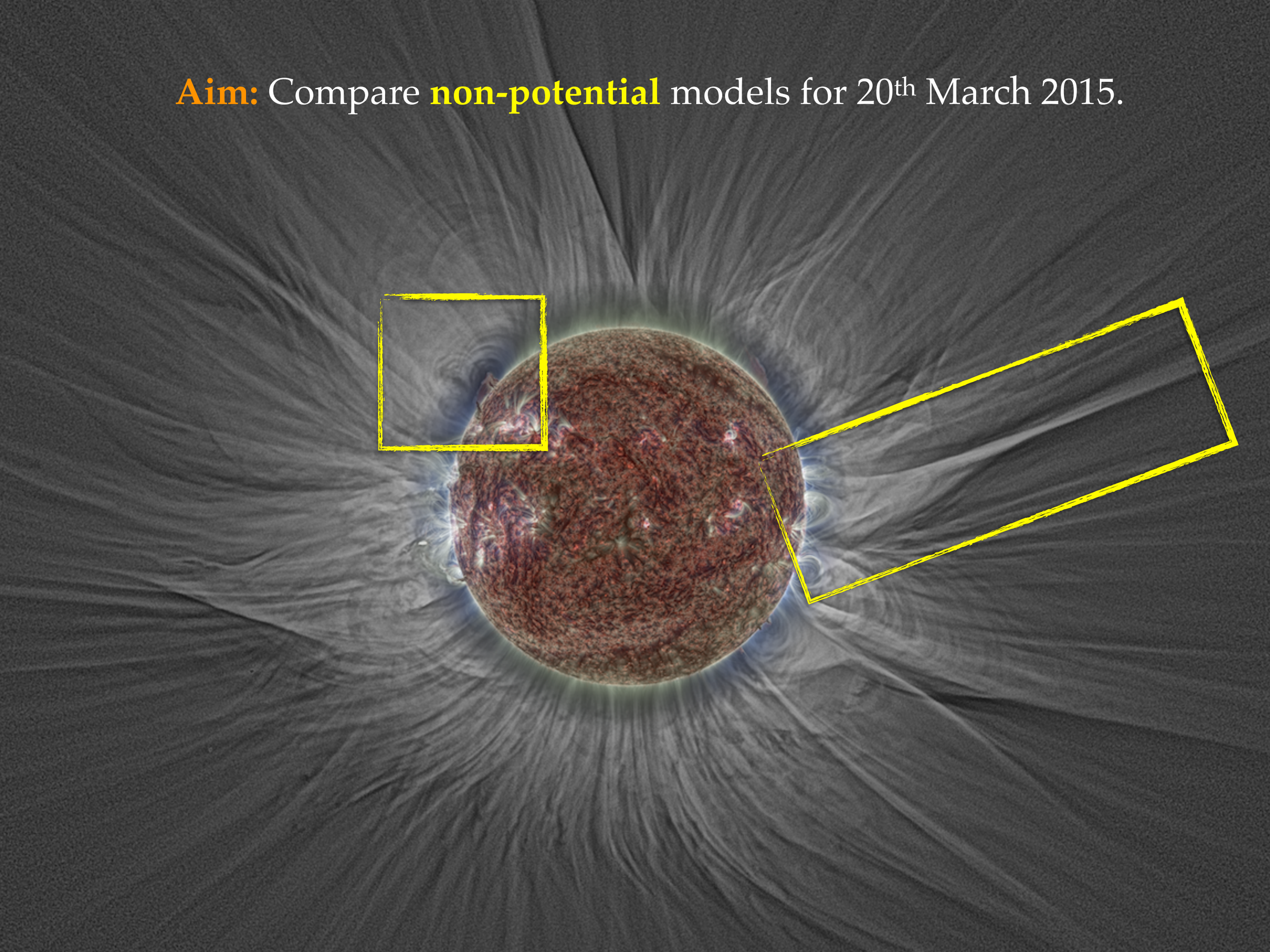
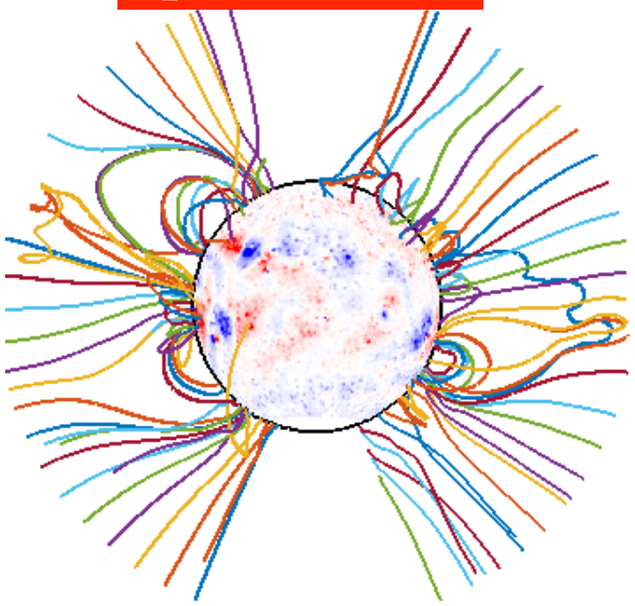
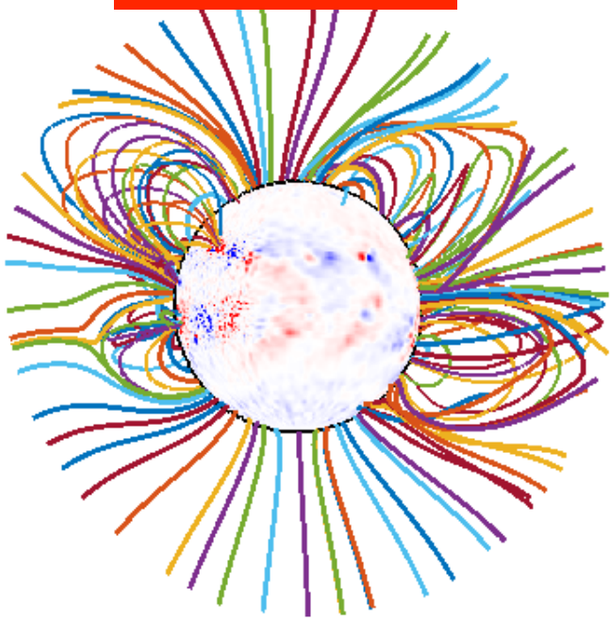


Models

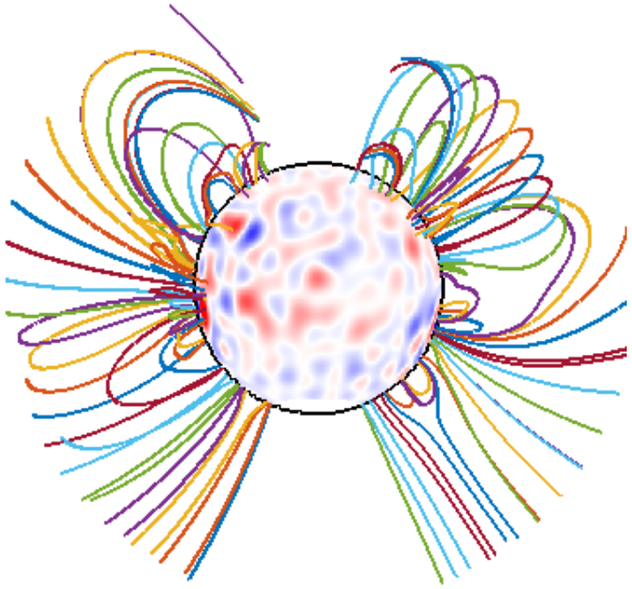
NLFFF optimization



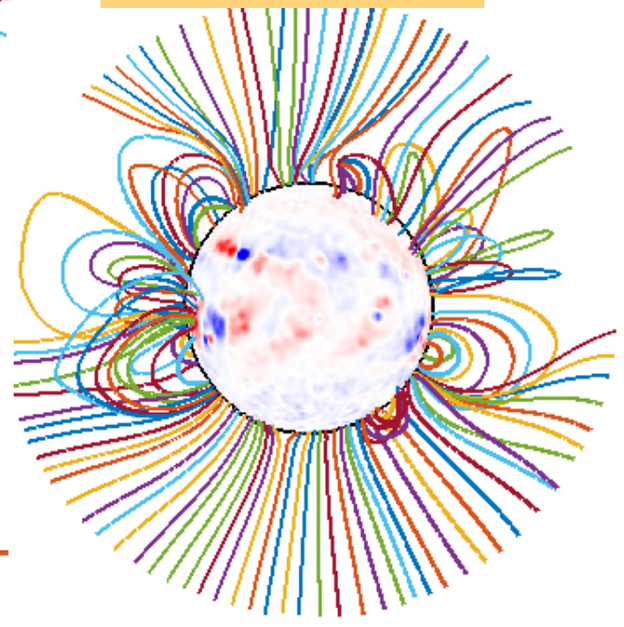
NLFFF Grad-Rubin



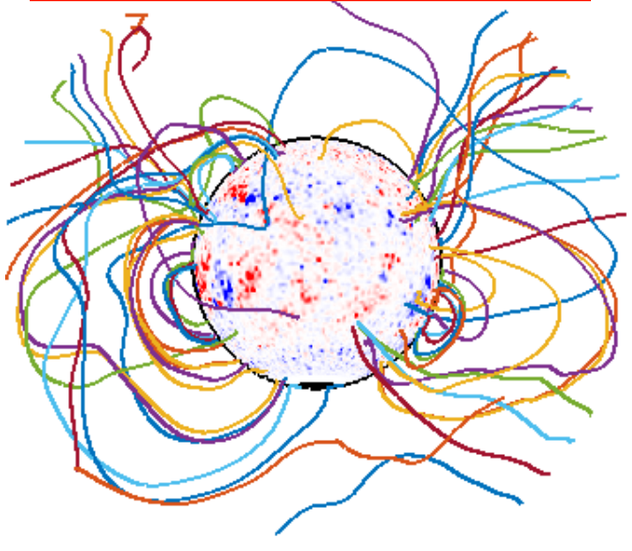
MHS Bogdan-Low



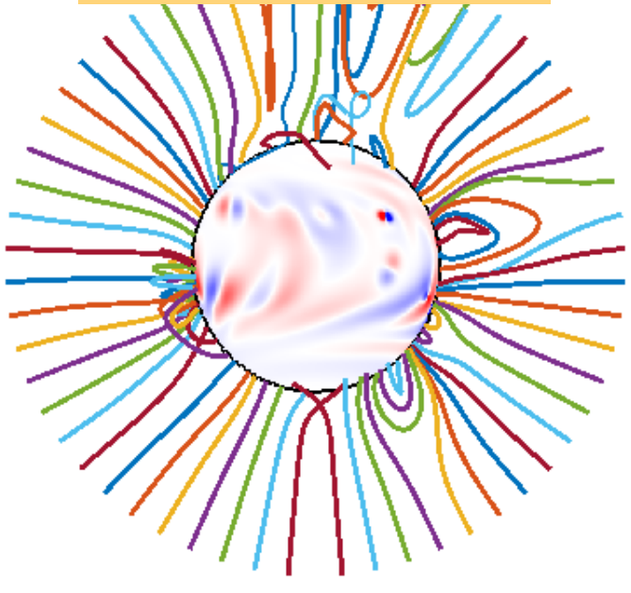
Zero-β MHD



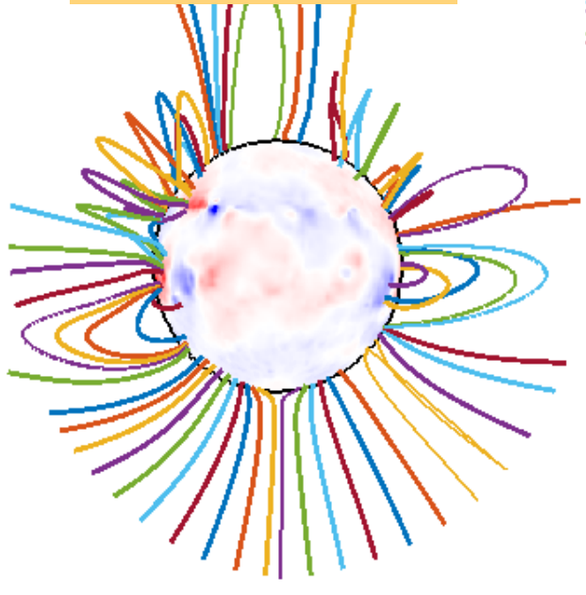
FF Electrodynamics



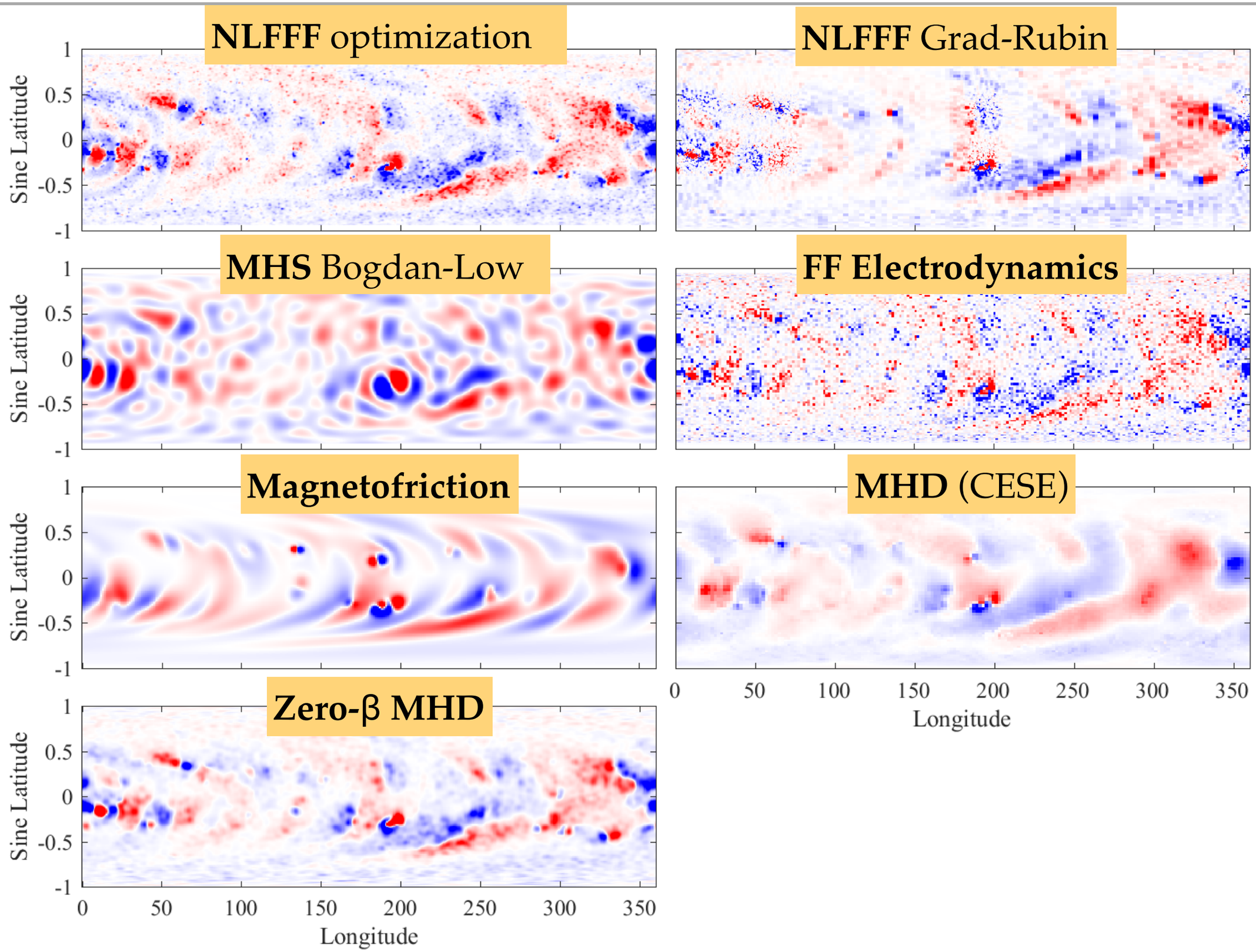
Magnetofriction



MHD (CESE)



Different input data



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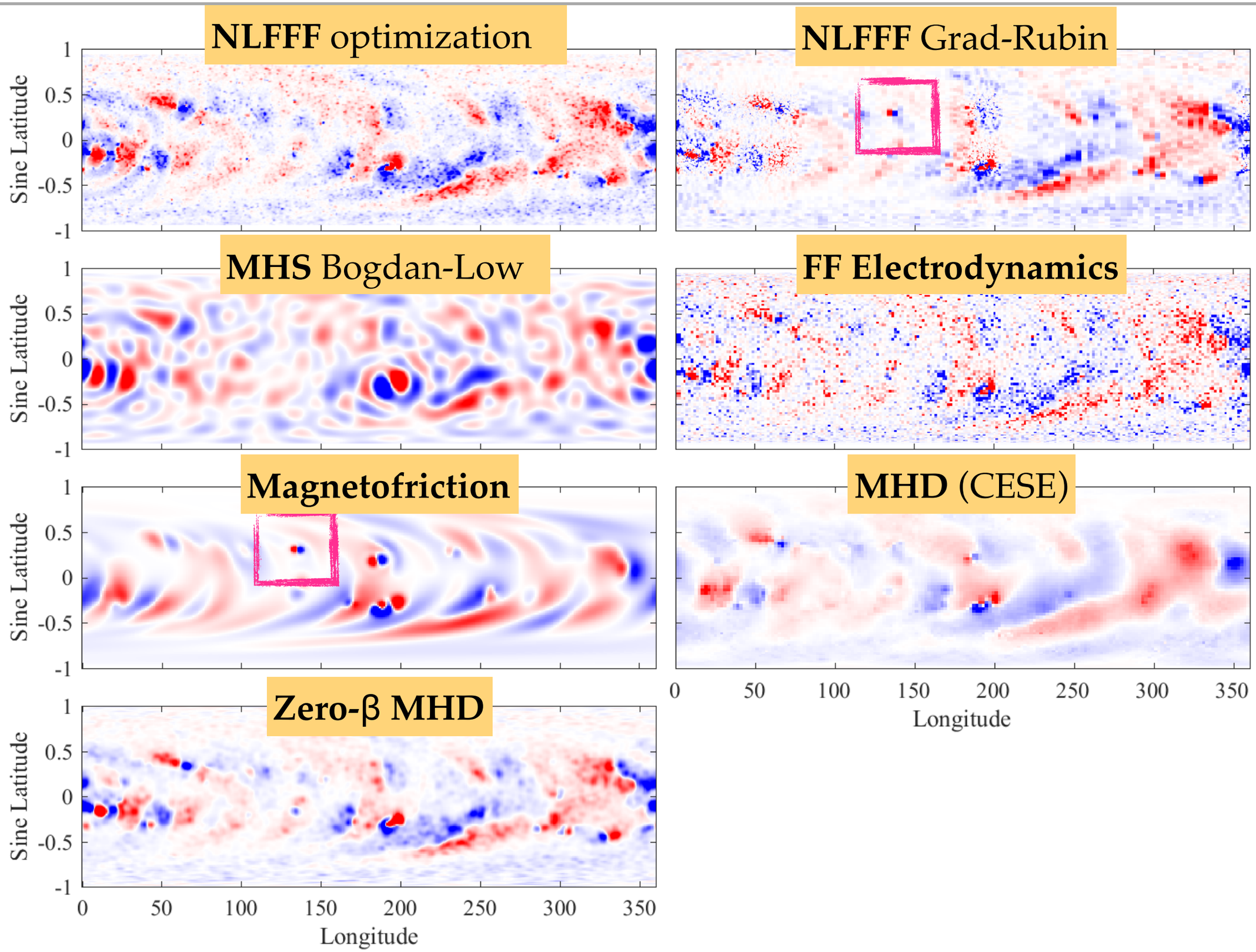

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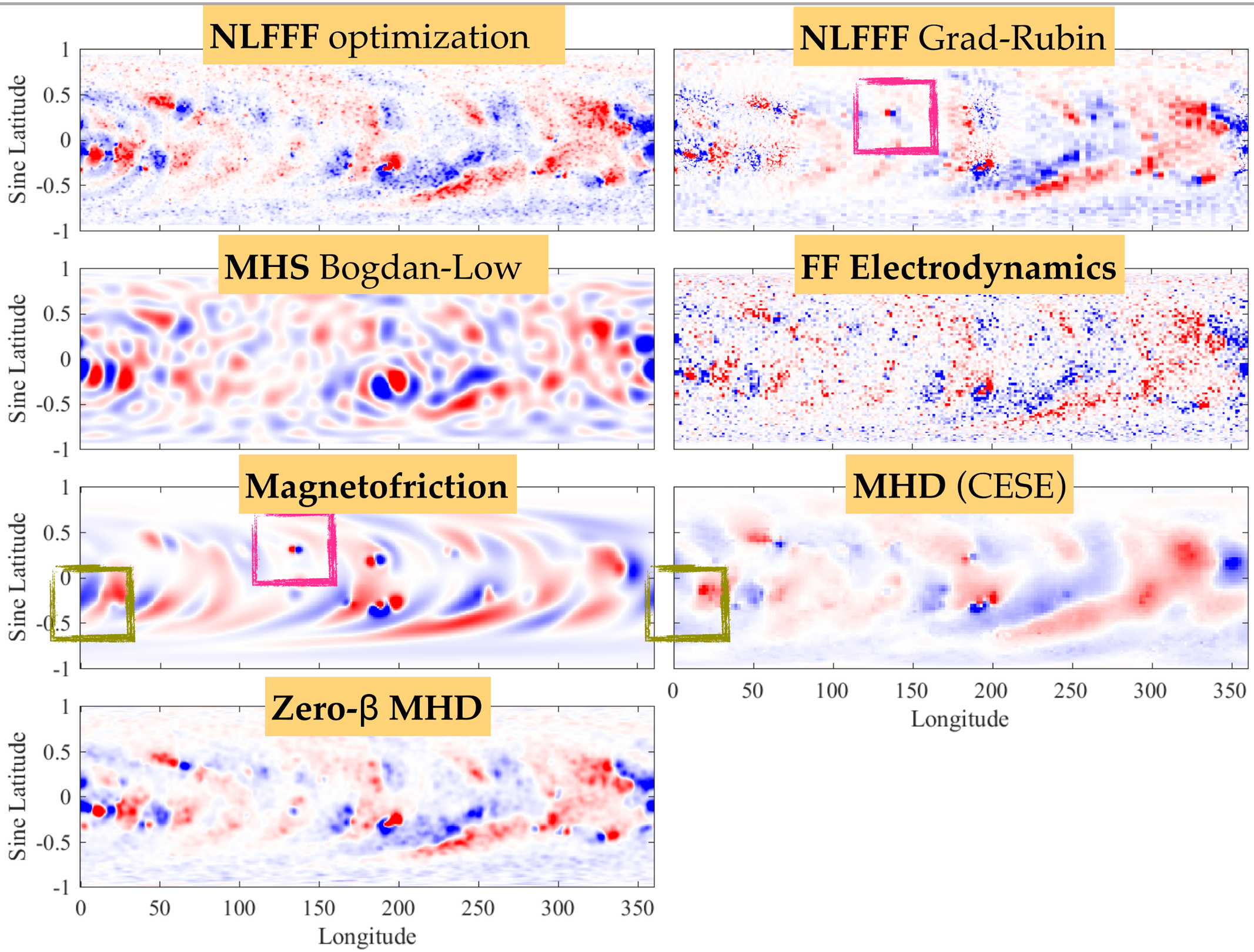
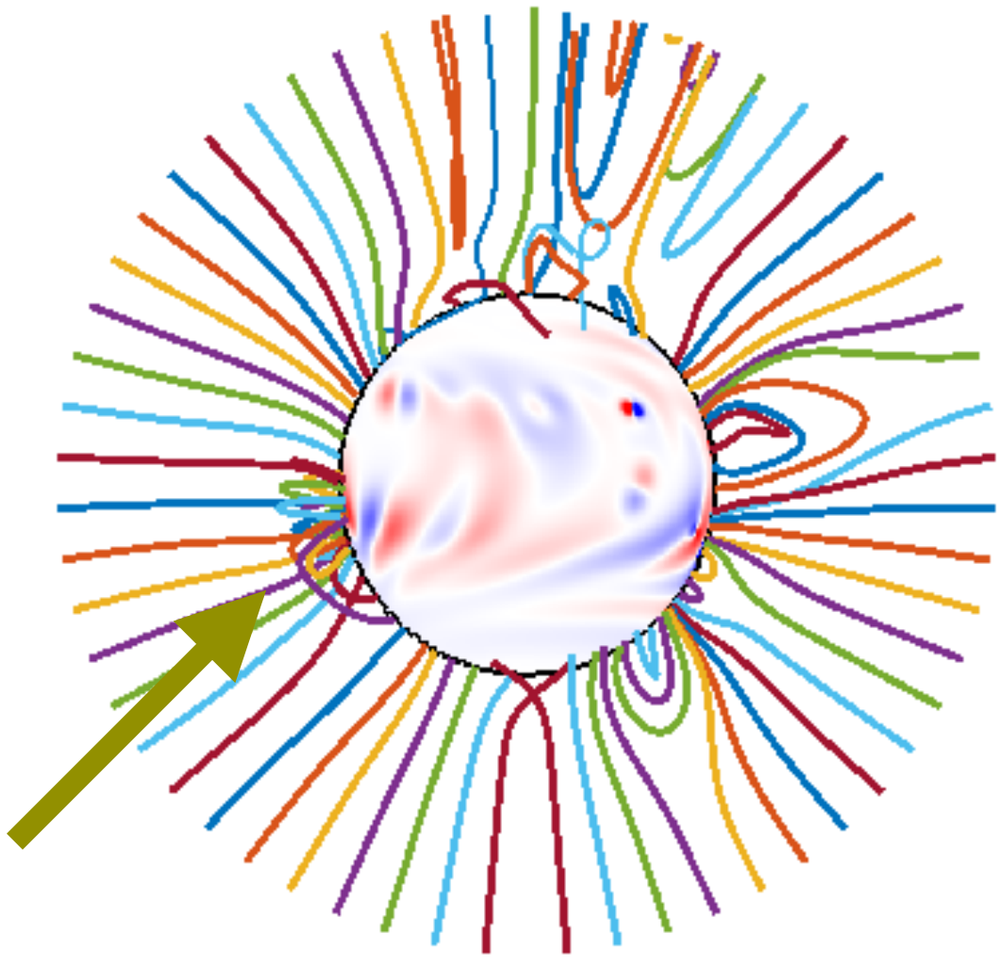
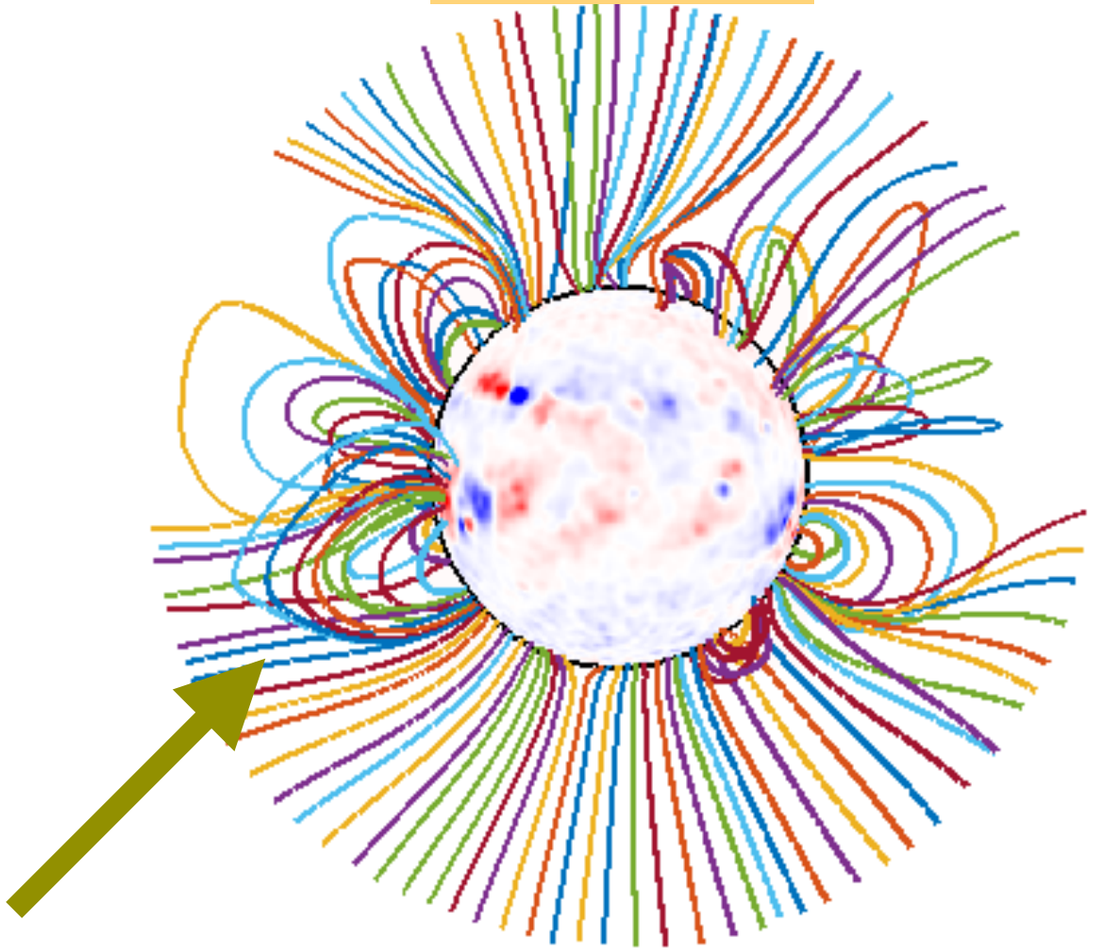


Effect of a missing region

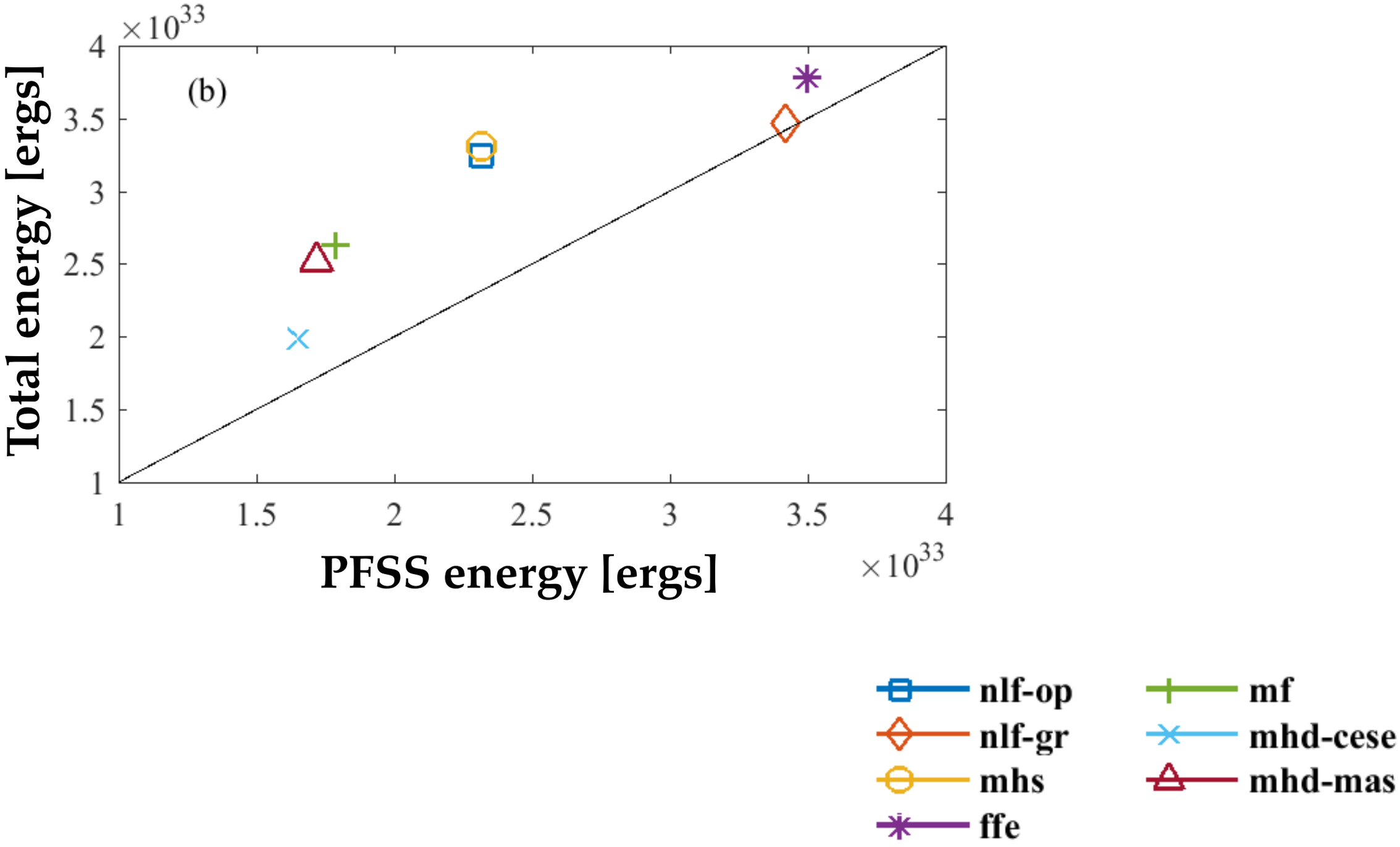
Magnetofriction



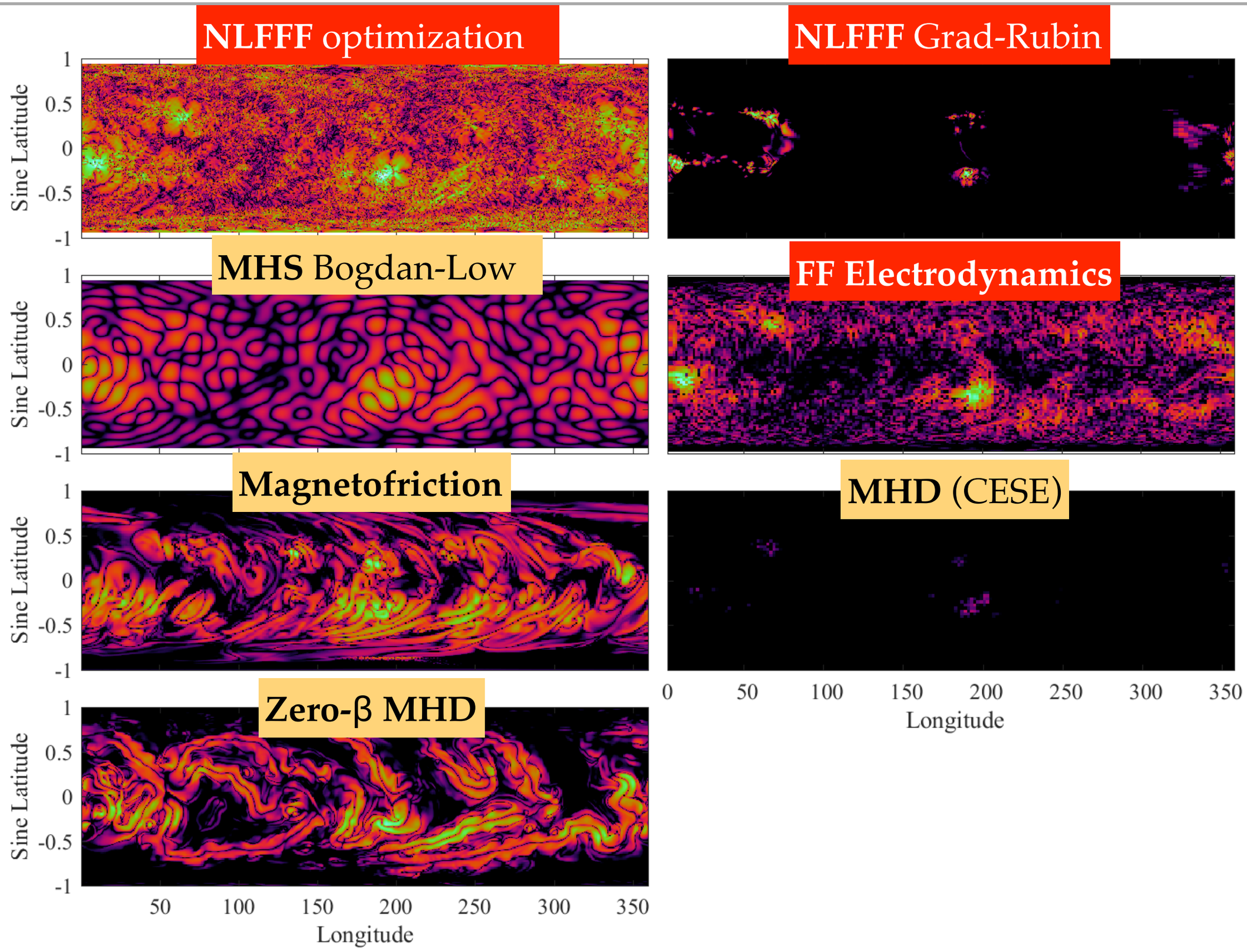
Zero-β MHD



Magnetic energy

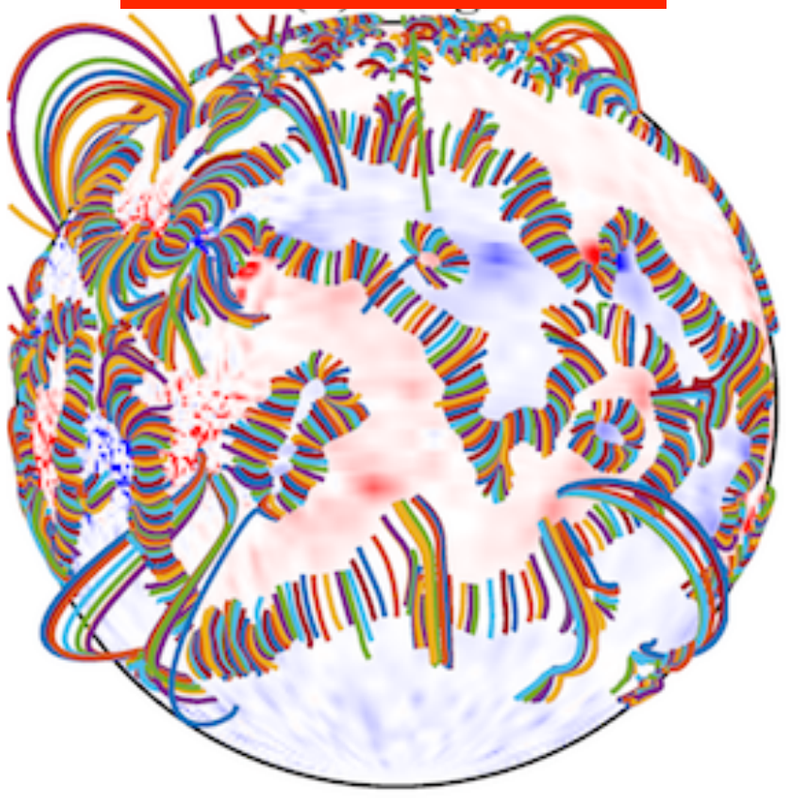


Electric current density $|j_r|$ in low corona



Filament channels - example

NLFFF Grad-Rubin



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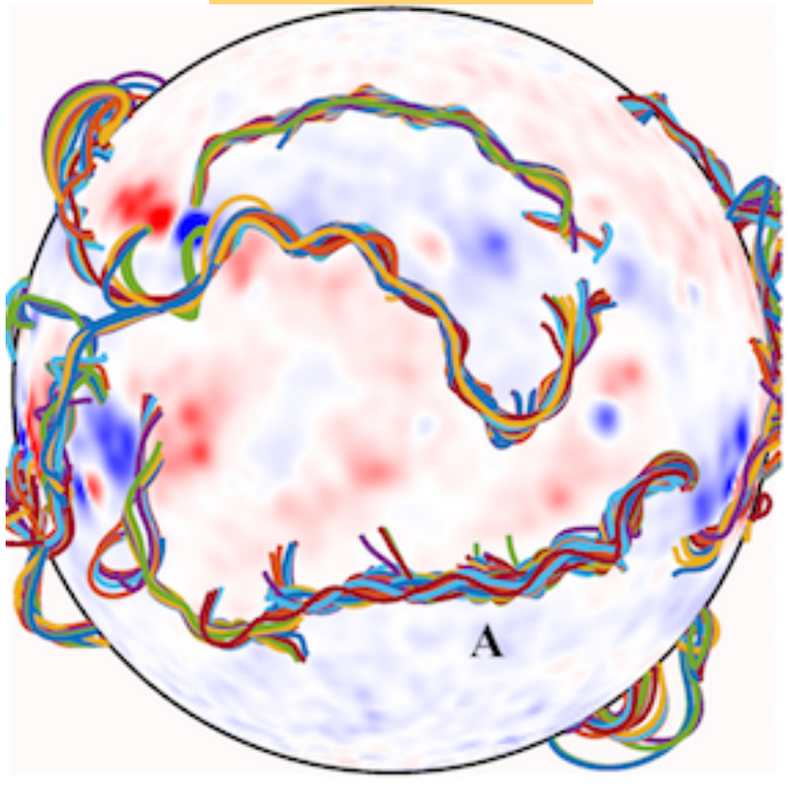
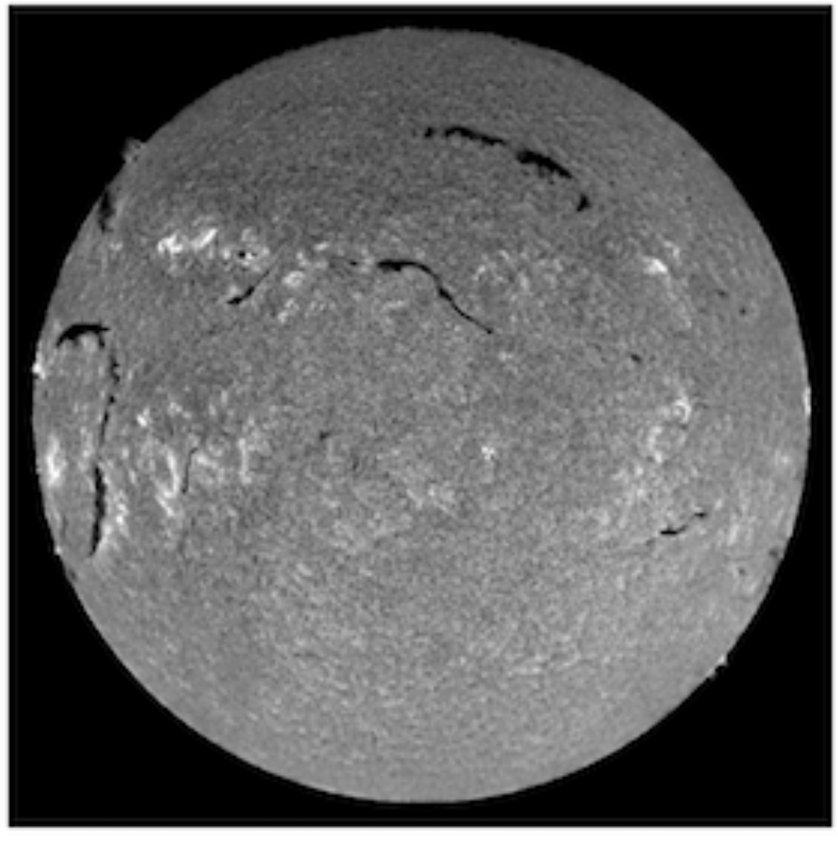
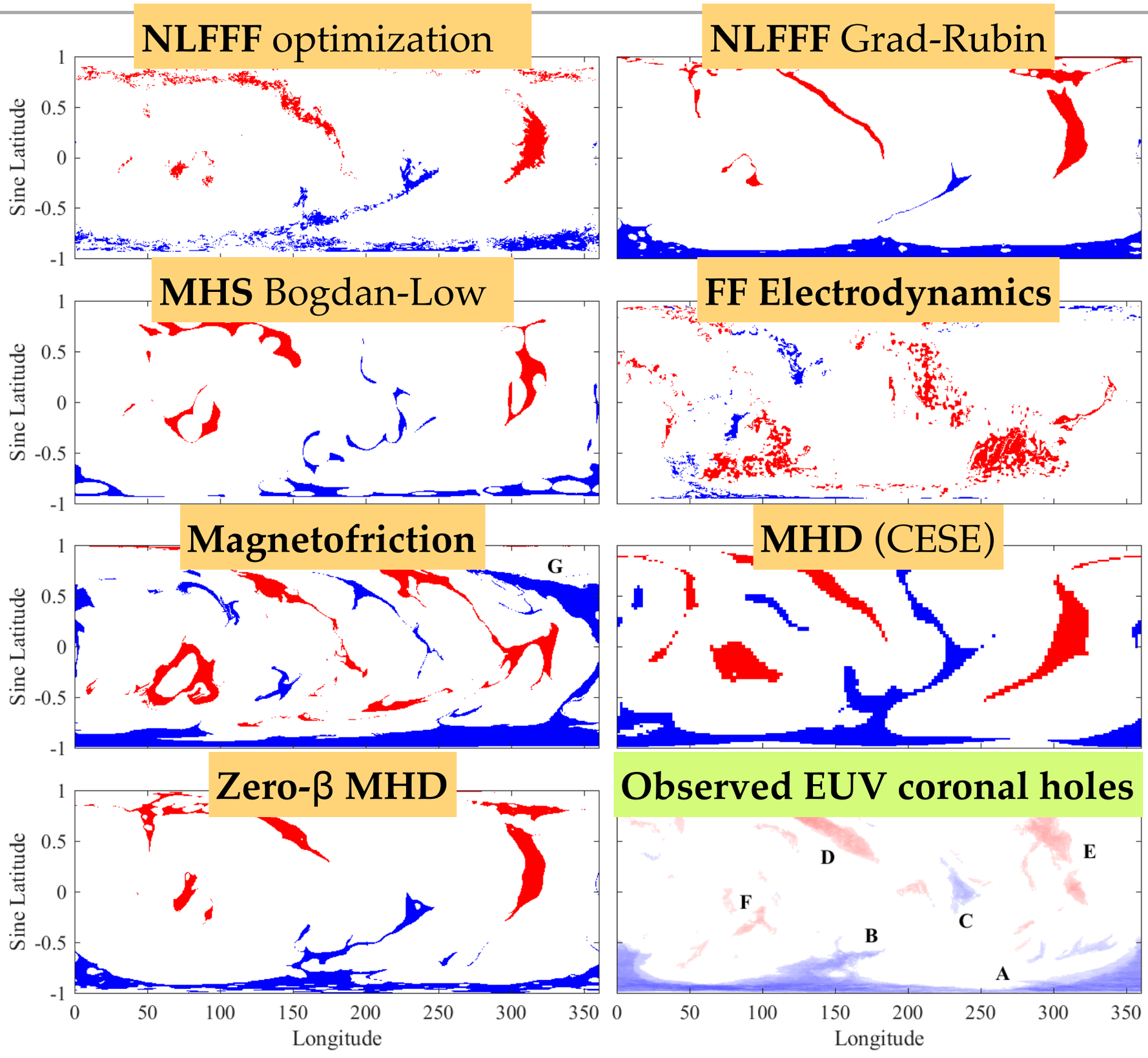


BBSO Hα



Open field regions



More details?

- Full details will be in our upcoming paper:
  Yeates et al., 2017 (under review)

- For reviews of non-potential modelling techniques, see:
  Mackay & Yeates, *Living Rev. Solar Phys.* **9**, 6 (2012)
  Wiegelmann, Petrie & Riley, *Space Sci. Rev.* **210**, 249 (2017)

Conclusion.
Direct extrapolations from existing (vector) magnetograms cannot capture currents in both active regions and quiet corona, but we can do better by using other available data.

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