EGU21-15528
https://doi.org/10.5194/egusphere-egu21-15528
EGU General Assembly 2021

The magnetospheric interactions of predicted ULF wave power

Sarah Bentley[1,2], Rhys Thompson[2], Clare Watt[1], Jennifer Stout[2], and Teo Bloch[2]
[1]University of Northumbria, Newcastle, UK
[2]University of Reading, Reading, UK

We present and analyse a freely-available model of the power found in ultra-low frequency waves (ULF, 1-15 mHz) throughout Earth's magnetosphere. Predictions can be used to test our understanding of magnetospheric dynamics, while accurate models of these waves are required to characterise the energisation and transport of radiation belt electrons in space weather.

This model is constructed using decision tree ensembles, which iteratively partition the given parameter space into variable size bins. Wave power is determined by physical driving parameters (e.g. solar wind properties) and spatial parameters of interest (magnetic local time MLT, magnetic latitude and frequency). As a parameterised model, there is no guarantee that individual physical processes can be extracted and analysed. However, by iteratively considering smaller scale driving processes, we identify predominant wave drivers and find that solar wind driving of ULF waves are moderated by internal magnetospheric conditions. Significant remaining uncertainty occurs with mild solar wind driving, suggesting that the internal state of the magnetosphere should be included in future.

Models such as this may be used to create global magnetospheric "maps" of predicted wave power which may then be used to create radial diffusion coefficients determining the effect of ULF waves on radiation belt electrons.