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Neural Network Approaches To Find Evidences Of EMIC Waves And Their Contribution To Pitch Angle Distribution Reconfiguration In The Earth's Outer Van Allen Radiation Belts

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Medeiros, C.; **Souza, V.**; **Vieira, L.**; **Sibeck, D. G.**; **Da Silva, L. A.**; **Alves, L. R.**; **Marchezi, J.**; **Jauer, P. R.**; **Rockenbach, M.**; **Dal Lago, A.**; **Kanekal, S. G.**; **Baker, D. N.**; **Kletzing, C.**

The evidences for ElectroMagnetic Ion Cyclotron (EMIC) waves as responsible to reconfigure electron pitch angle distribution (PAD) shapes in the outer Van Allen Radiation Belts were recently endorsed in a case study reported by Medeiros et al. (2019). It was shown that EMIC waves were contributing to further enhance the reduction of the measured flux of relativistic electrons at higher (>135º and < 45º) equatorial pitch angles, which in turn has been claimed as the cause for a rearrangement of the previously measured electron PAD shape into a peculiar butterfly-shaped PAD . Several studies have been confirming the relevance of this wave-particle interaction. The purpose of this study is try to find evidences that corroborates with the Medeiros et al., (2019) analysis by considering a longer time interval during the Van Allen Probes era. To obtain such results a neural network-based routine was developed to automatically (and successfully) find EMIC waves in Van Allen Probes' magnetometer data. The EMIC waves occurrence pattern, as obtained by this neural network technique, will then be used as input for another neural network-based approach proposed by Souza et al. (2016) in order to correlate the reconfiguration of electron PAD shapes with EMIC waves occurrence.

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