Project Title:
Modeling geospace plasma mass density based on the frequency of ULF waves

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Project Information:
Plasma mass density is one of the fundamental quantities characterizing the plasma in the geospace. The density is related to a number of space weather issues including satellite drag, generation of killer electrons, ion escape to the solar wind, and long-term changes in the solar irradiance. Despite the importance of the mass density, this quantity is often poorly determined from in-situ measurements. In the proposed project we will construct a mass density model using the frequency of standing Alfven waves excited in the magnetosphere. We will determine the frequency using magnetic field measurements from geostationary and other satellites spanning more than a solar cycle. The density corresponding to the observed frequency will be obtained by numerically calculating the standing wave frequency using a realistic magnetic field and a density distribution along the field line that can be adjusted to fit the observation. A density model will be constructed statistically as a function of local time and radial distance and including dependence on the geomantic activity and solar cycle. It is important to carry out the project in the context of the NASA Living With a Star (LWS) program. As mentioned above, there are several reasons for having an improved magnetospheric mass density model in relation to spacecraft operations and human activity on and off the Earth.

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Duration:
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Citations:

Summary: no summary

Citation: Takahashi, Kazue; Denton, Richard E.; Gallagher, Dennis; (2002), Toroidal wave frequency at L = 6-10: Active Magnetospheric Particle Tracer Explorers/CCE observations and comparison with theoretical model, Journal of Geophysical Research (Space Physics), Volume 107, Issue A2, CiteID 1020, DOI 10.1029/2001JA000197, doi: 10.1029/2001JA000197

Summary: no summary

Citation: Denton, R. E.; Lee, D. H.; Takahashi, K.; Goldstein, J.; Anderson, R.; (2002), Quantitative test of the cavity resonance explanation of plasmaspheric Pi2 frequencies, Journal of Geophysical Research (Space Physics), Volume 107, Issue A7, CiteID 1093, DOI 10.1029/2001JA000272, doi: 10.1029/2001JA000272

Summary: no summary

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