

ULF WAVES IN THE UPPER IONOSPHERE AND ON THE GROUND: OBSERVATIONS AND MODEL

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The recent low-orbiting observations at satellites with highly sensitive magnetic measurements (Orsted, CHAMP, ST-5) provided a picture of the Pc1 and Pc3 wave structure in the topside ionosphere. Pc3 waves in space were detected very clearly in the compressional component of the satellite magnetic field data, whereas on the ground magnetometers, their signature was found in the H component. The occurrence of significant compressional component in Pc3 pulsations in the top-side ionosphere is a challenge to modern ULF wave theory assuming that incident waves are to be Alfvén mode. We have developed an analytical-numerical model of the magnetosphere-ionosphere-atmosphere-ground system which enables one to estimate quantitatively the expected relationship between the ULF wave magnetic component above the ionosphere and on the ground produced by different mechanisms. The results of the model are applied to the interpretation of the satellite observations of Pc1 and Pc3 waves in the upper ionosphere and by mid-latitude ground stations. These observations indicate a necessity to change some key notions about the physics of ULF waves.

ULF waves, low-orbiting satellites, ionosphere

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