



Giant Flux Ropes Observed in the Magnetized Ionosphere at Venus

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The Venus ionospheric response to solar and solar wind variations is most evident in its magnetic field properties. Early Pioneer Venus observations during the solar maximum revealed that the Venus ionosphere exhibits two magnetic states depending on the solar wind dynamic pressure conditions: magnetized ionosphere with large-scale horizontal magnetic field; or unmagnetized ionosphere with numerous small-scale thin structures, so-called flux ropes. Here we report yet another magnetic state of Venus' ionosphere, giant flux ropes in the magnetized ionosphere, using Venus Express magnetic field measurements during solar minimum. These giant flux ropes all have strong core fields and diameters of hundreds of kilometers, which is about the vertical dimension of the ionosphere. This finding represents the first observation of these giant flux ropes at Venus. The cause of these giant flux ropes remains unknown and speculative.