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On the doctoral thesis

“Peculiarities of Spatial and Temporal Structure of Solar Activity and Cosmic Ray  
Variation Effects on the Lower Atmosphere Circulation” by S. V. Veretenenko

The study of the effects of solar activity on weather and climate has a long history, going back more than a century. There have been more than 2000 papers published showing correlations of atmospheric parameters, such as pressure and temperature, with solar radiation and solar wind parameters, but the mechanism or mechanisms have not been determined.

Svetlana Veretenenko has worked extensively on the study of how the variations in high energy particles modulated by solar activity, such as galactic cosmic rays and solar protons, can account for the observed correlations. Her analyses of the short term atmospheric pressure variations, which correlate with the short-term changes in these inputs, has been particularly valuable, in that it demonstrates that solar ultraviolet or solar total irradiance effects are not responsible. She has shown that responses involving changes in the intensity of cyclones can be understood by changes in atmospheric ionization, produced by the energetic particles, affecting the microphysics of clouds that then affects the development of the storm systems and ultimately the general circulation. Her innovative use of weather chart analysis to clarify these effects has been particularly valuable.

For longer term climate, rather than weather responses, she has shown the importance of changes in the intensity of the stratospheric polar vortices in determining the nature of the correlations.

Her work carries on the excellent traditions of the well-known St. Petersburg School of Solar Science, where Pudovkin was one of the pioneers in the field of solar effects on the atmosphere. Overall, her work has significantly advanced our understanding of the links between solar activity and weather and climate. I am convinced that she deserves the distinction of becoming a Doctor of Science.

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