Special Issue

Rossby Waves and Implications in Weather and Space Weather

Message from the Guest Editor

Rossby waves are a class of inertial waves, occurring in thin layers within fluid regions of stars and planets due to the variation in Coriolis forces with latitude. The discovery of Rossby waves in the Earth's atmosphere led to great advances in the ability to forecast our planet's weather patterns. It is the combination of mean west-to-east atmospheric flow and Rossby waves in the atmosphere that creates “jet streams” at midlatitudes. Understanding their interactions and the resulting longitudinal structure allows for an accurate prediction of how synoptic weather patterns evolve and propagate to the east. We will show that “tachocline nonlinear oscillations” occur, like nonlinear Orr mechanism in fluid dynamics. TNOs have periods similar to those observed in the solar atmosphere—enhanced periods of solar activity, or “seasons”—occurring at intervals between six months and two years. Thus, a key to forecasting the timing, amplitude, and location of future activity bursts, and hence space weather events, could lie in our ability to simulate the longitudinal patterns produced by the interactions of Rossby waves and magnetic fields.

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Message from the Editor-in-Chief

Continued developments in instrumentation and modeling have driven atmospheric science to become increasingly more complex with a deeper understanding of concepts, mechanisms, and interactions. This is the field that innovation built and it has led to a better appreciation for the complexity with atmosphere. Human life is intertwined in this complexity as we strive to better understand our atmosphere. Climate change is constantly stretching the limits of our thinking and forcing new ideas and concepts to be played out. Welcome to the Anthropocene!

Editor-in-Chief

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