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# Polar Atmospheric Dynamics of Giant Planets
Polar Atmospheric Dynamics of Giant Planets

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Spacecraft observations of Jupiter and Saturn since the early 1970s have identified three distinct dynamical regimes in the cloud-top winds. In the equatorial region, a fast, broad jetstream blows eastward where no vortices are found. In the mid-latitudes of both Jupiter and Saturn, many vortices exist between the numerous jetstreams that alternate in wind direction between eastward and westward. Closer to the poles, vortices become increasingly prevalent with latitude; however, Jupiter and Saturn critically differ in their atmospheric dynamics around the poles. On Jupiter, poleward of approximately 65 degree N/S latitudes, the banded structure that characterizes the lower latitudes becomes indiscernible, and the flow acquires an increasingly turbulent appearance with little zonal organization – we identify this regime as polar turbulence. Saturn, on the other hand, maintains zonally organized cloud bands up to the poles and lacks polar turbulence. The zonal structure of Saturn culminates in the southern hemisphere with a hurricane-like cyclonic vortex residing precisely at south pole, and the northern jetstream at 77 degree N follows a meandering path that manifests as a hexagonal cloud morphology when viewed from above. We will present numerical experiments that address the polar jetstream phenomena on giant planets, and the mechanism that separates the polar atmospheric dynamics regime from the lower latitudes.

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