NRAO/Socorro Colloquium Series

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NMT

Numerical Modeling of Saturn's Northern Hexagon as a Meandering Shallow Jet

Abstract

Voyager flybys of Saturn in 1980-81 revealed a circumpolar hexagonal cloud morphology at 78 degree N planetographic latitude centered at the planet's north pole. This feature has been called Saturn's hexagon. Space- and ground-based observations have revealed the following characteristics of the hexagon; (1) an eastward atmospheric jetstream flows along the outline of the hexagon; (2) there are no large vortices associated with the wavenumber-6 system; (3) it propagates slowly in the System III reference frame, and (4) it has persisted for at least one Saturnian year (~29.5 Earth years) surviving seasonal changes.

Previous numerical models and laboratory experiments have shown that a hexagonal morphology can be reproduced and maintained by six interlocking pairs of cyclones and anticyclones that form a vortex-street; however, those models necessarily have intense closed-streamline vortices and fast drift rates, which are unlike the observed characteristics of the hexagon on Saturn. We present an alternative to the vortex-street model of the Saturnian hexagon. We show that instabilities in shallow jets can equilibrate as meanders closely resembling the morphology and phase speed of Saturn's Northern Hexagon. We also show that the winds at the bottom of the model are as important as the winds at the cloud level in matching the observed Hexagon's characteristics.

October 9, 2015

11:00 am

Array Operations Center Auditorium

All NRAO employees are invited to attend via video, available in Charlottesville Auditorium, Green Bank Auditorium, and VLA Video Conference Room.