SEASONAL NORTH-SOUTH ASYMMETRY IN SOLAR RADIATION AT THE TOP OF JUPITER'S ATMOSPHERE

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The presentation by Beebe and Suggs is largely contained in a paper which has been submitted to *Icarus*. The abstract of that paper is reproduced here:

Although the orbital eccentricity and axial tilt are small, the near temporal coincidence of perihelion and the northernmost excursion of the subsolar point produce asymmetries in the solar radiation incident on Jupiter's atmosphere. Calculations of the incident radiation and the latitudinal gradient of the insolation are presented. North-south asymmetries in the zonal wind and morphology of the large scale cloud systems observed by Voyager 1 and 2 are cited. In the absence of an identified internal mechanism capable of generating the observed asymmetries, seasonal forcing of this magnitude should be considered.

DR. WEST: Well, I think the terminology, "clouds over" and "clears out," is incorrect. I think everywhere on Jupiter is clouded over and what you are seeing is not a difference in clouding over and clearing out, but a difference in the amount of chromophores that are visible at any given latitude at a particular time.

DR. ORTON: A brief comment on the obvious aspects of the particular coincidence of the two effects you've seen taken place. In fact, for the northern hemisphere, we do see large excursions in the rather brief monitoring we've done so far. The north is warmer and gets cooler than southern latitudes, at least in the stratosphere. There is a definite asymmetry in the deeper infrared characteristics as well.

DR. STONE: Just to repeat what is perhaps obvious, you are measuring a difference in the gradient on the seasonal timescale, and therefore a timescale of about ten years, which is also comparable to the radiative time constant.

DR. BEEBE: This is the timescale of the cloud morphology cycle time as well. The observational cycle time was about six years ± three years at latitudes where we have recurring types of phenomena.

DR. BELTON: For how many different epochs do we have the north/south zonal velocity information, and does the asymmetry between north and south stay the same in each one of those epochs?

DR. BEEBE: In the New Mexico State data set, we've got almost 1-1/2 Jovian years, and that is a self-consistent data set. Previous to that, we have to

go back to B. M. Peek's work, which is the most consistent. That takes us back to the turn of the century.

DR. BELTON: Does the asymmetry change, you know...?

DR. BEEBE: No. The jet at 23 deg N has always been recorded as one of the very fastest jets on the planet. In the old traditional nomenclature, the jet at 23 deg N was measured in System I, so it's been traditionally recognized that it is a very fast jet.

DR. ALLISON: Reta, last time I visited your observatory, you had on the wall about 20 photographs of Jupiter taken over the years, and you can see just by visual inspection of that sequence that Jupiter appears to change its overall aspect between what was observed during the Pioneer encounter (sort of a softly banded appearance) to something more resembling its appearance during the Voyager encounter (with more turbulent structure). Have you tried to correlate that kind of change with a seasonal cycle? Is there any straightforward correlation?

DR. BEEBE: Your observation is influenced to a large extent by what the South Equatorial Belt (SEB) is doing, since it dominates such a large portion of the planet. The SEB activity has been very carefully studied and no correlation between albedo and seasonal change has been found. Recently, Hunt Guitar, a student of mine, determined the rate of zonal translation of the Red Spot at opposition over a 20 year period. Over that period it does appear that the translational speed correlates with the season. The maximum zonal velocity occurs about a quarter of a year before maximum insolation at that latitude.