

Tracking the general circulation of Jupiter's atmosphere with images obtained by small telescopes

Naiara Barrado-Izagirre¹, J.F. Rojas², R. Hueso¹, and A. Sánchez-Lavega¹

¹ Escuela Técnica Superior de Ingeniería de Bilbao. UPV/EHU

² Escuela Universitaria de Ingeniería Técnica Industrial. UPV/EHU

Abstract

One of the most characteristic feature of Jupiter's atmosphere is its global wind structure which is characterized by strong zonal winds alternating in latitude and correlated with the bright Zones and dark Belts of the planet. This wind system presents a marked temporal stability although the structure of some of its bands change strongly in a quasi-periodic way. The wind system keeps also stable when dynamic perturbations occur such as the development of great convective storms or when impacts like those of 1994 and 2009 take place. Nowadays, amateur astronomers of all the planet obtain great Jupiter images at their telescopes' resolution limit using the "lucky imaging" technique and they share their data in data-bases that centralize them. In this work we analyzed the higher quality images from the data base of the International Outer Planet Watch (IOPW) to study the possible temporal variations of the planet's wind profile. To do so, we used image pairs separated by one or two planetary rotations in which we can measure the winds by tracking cloud details present in both images. To measure the displacement of the details we used both a correlation technique and the manual cloud tracking. Even if these kind of studies have been previously performed using high quality images from spacial mission or Hubble Space Telescope the possibility of analysing the general circulation of the planet with small telescope observations opens a new possibility for a continuum study of the atmospheric dynamic of Jupiter.