Monitoring Neptune's atmosphere with a combination of small and large telescopes

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Neptune's atmosphere is covered by tropospheric clouds and elevated hazes that are highly contrasted in hydrogen and methane absorption bands that dominate the red and near-infrared spectrum of the planet. The major cloud systems observed in these wavelengths evolve in time-scales of days, months and years. However, the differential rotation of the atmosphere, and the vertical wind shear implied by the motion of some of these systems, result in challenges in identifying common cloud systems observed in images obtained with a time difference of only a few weeks. Given the small apparent size of Neptune's disk (2.3 arc sec at best) there are outstanding difficulties in obtaining sufficient high-resolution data to trace Neptune's atmospheric dynamics and study the variability in the atmosphere.

In 2019 Neptune has been observed by a battery of different large telescopes and techniques including: Adaptive Optics observations from the Keck, Lick and other telescopes, observations from Hubble Space Telescope in two different dates, and lucky-imaging observations with the GranTeCan 10.4m, Calar Alto 2.2m and the 1.05m Pic du Midi telescope. In addition, some ground-based observers using small telescopes of 30-40 cm have been successful to image Neptune's major clouds completing a dense time-line of observations. We will present comparative results of Neptune's major cloud systems observed with these facilities at a variety of spatial resolutions and long-term drift rates of some of these cloud systems. These will be compared with similar multi-telescope results obtained in the past with several of these telescopes since 2015. Future punctual observations achievable with new observational facilities such as the JWST will benefit from ground-based coordinated campaigns and will require a combination of several telescopes to understand drift rates and evolutionary time-lines of major cloud systems in Neptune.