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Study of the dynamical recurrent patterns on Venus from the IR atmospheric windows observed by VIRTIS.

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This study is an investigation on the dynamical recurrent patterns in the Venus night-side along one year of mission by using the IR atmospheric windows. The VIRTIS instrument is a multispectral imager onboard the Venus-Express spacecraft that works in the range from 0.4 to 5 μm. We study the dynamical behavior of the lower clouds localized in a range of altitude from 45 to 50 km which can be sensed using radiation fluxes at the bands 1.7 and 2.3 μm originating in the lower atmosphere and modulated by the clouds. In this way the emergence signals put in evidence the structural and dynamical behaviour of the clouds themselves. The total image field of view is about 40˚ in latitude and 50˚ in longitude across the Venus South hemisphere. The value of radiance on each pixel is corrected for different emergence angles considering the spherical geometry of the planet. A dedicated software tool permits an automated analysis of the samples in the zonal direction: it selects the radiance on the images at fixed latitude and then it is used to retrieve the mean value and its associated variance vs latitude. We also performed an FFT signal analysis of the cloud brightness power spectrum between 10 – 1000 wavenumbers. The slope of the power spectrum is an indicator of the dynamical regime of the atmosphere, strictly related to the behavior of the energy exchange between different scales of motions, as explained by the classical turbulence theories for the kinetic energy spectra. The retrieved value for the slope of the power spectrum is in agreement with the theoretical values. We also attempt to use the FFT analysis to retrieve a collection of the most recurrent values of wavenumbers in order to identify the spatial scales of recurrent patterns in the cloud morphology

generally associated with different atmospheric waves.