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Ground-based observations of Venus in near infrared

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Abstract

Recent works on Venus by amateur observers have dealt about topics different than the classical "UV markings". We focus here on analysis made in the strict near-infrared part of the spectrum (above 700 nm). A first section describes the specific techniques used to observe the planet (1). They attempt to calculate the rotation of Venus in near IR (2) and to identify features observed in the thermal emission from the night side (3).

1. Currents techniques to observe Venus from the ground

The venusian's orbital proprieties lead to use specific techniques of observations. Observers must make profit of the best evening or morning apparitions of the "8 years cycle". The best method is to observe the planet during several hours including during daytime.

Equipment used are classical amateur telescopes of diameters from 6 to 16 inches (150 to 400 mm) but a special mission has been realized by G.Monachino at the 24" cassegrain telescope of the St Véran observatory in France. Filters of 800 to 1000 nm cut-on in near infrared are now commonly used with the very fast, sensitive cameras.

Softwares used for analysis are mostly WinJupos and Excel.

2. The rotation of Venus in near IR

The rotation of Venus in near UV is a well known topic since it has been discovered by Charles Boyer [1]. From results obtained in 2012 we have tried to calculate the rotation of the planet in near IR, to try to confirm the hypothesis that the period of rotation is longer. The mean result obtained is 4.96 +/- 0,4 days but with great variations following the details measured. So far, no correlation is found with the variation of speed with latitude.

3. Latest results for observations of the thermal emission (night-side IR)

Observing the night side of Venus at a wavelength of 1000 nm (1 micron) when the planet present a narrow crescent phase reveals a thermal signal from the hot surface (400°C+) [2][3]. Amateurs obtained more images during the last year and thanks to WinJupos we are identifying more easily the dark patches as venusian mountains.

4. Summary and Conclusions

Near IR observations of Venus offers areas of research for amateurs. Although imaging details in that band is now a common thing among observers, they seldom use the techniques describes to maximize the quality of their data. As a result, there is still room for a great progress in that area: getting accurate results of the rotation period, or making a long-term survey of features observed in near IR, that look different from that visible in near UV. In the coming years, the growing access of amateurs to larger telescopes will increase the quality of the data that can be obtained from the ground.

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References

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