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## Diurnal cycle of the Venus near-surface dynamics

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### 1. Introduction

Below 10 km the atmosphere of Venus virtually unknown, only the VeGa-2 has successfully measure the temperature in that region. At the surface, only Venera 9 and 10 directly measured the wind for respectively 49 min and 90 s, and several other probes like Venera 13 and 14 measured indirectly the wind speed. The amplitude of the measured wind speed is inferior to 2 m/s [4]. The planetary boundary layer has been studied with a global circulation model (GCM) [5], exhibiting a strong effect of the solar heating on the amplitude of the slope wind in the tropics. Additional studies are needed for the understanding of the near-surface dynamics and future landing missions. We propose to use a mesoscale model to study this part of the atmosphere.

### 2. Model

To study the near-surface dynamics, the LMD Venus mesoscale model [1] is used, composed of the Weather-Research Forecast (WRF) non-hydrostatic dynamical core [2] coupled with the IPSL Venus GCM physics package [3]. The domain is centered on Ovda Regio in Aphrodite Terra with a resolution of 20 km (Fig 1). The mesoscale boundary conditions are forced with the IPSL Venus GCM.

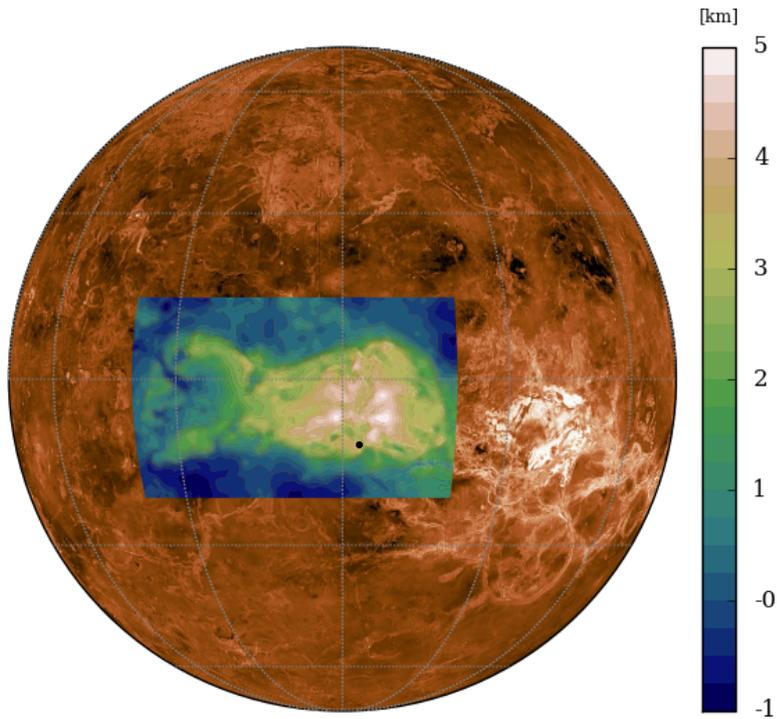


Figure 1: Topography (km) of the mesoscale model, centered on Ovda Regio in Aphrodite Terra with a resolution of 20 km.

### 3. Results

Fig 2 shows the diurnal variation at the specific point for the zonal (blue) and meridional (red) winds, exhibiting a wind direction around noon. The amplitudes of the winds are consistent with in-situ measurements. The surface heat flux reaches a maximum value of  $93 \text{ W/m}^2$  at noon. The surface temperature exhibits a diurnal cycle inferior at 2 K. Additional results about the near surface of Venus will be presented.

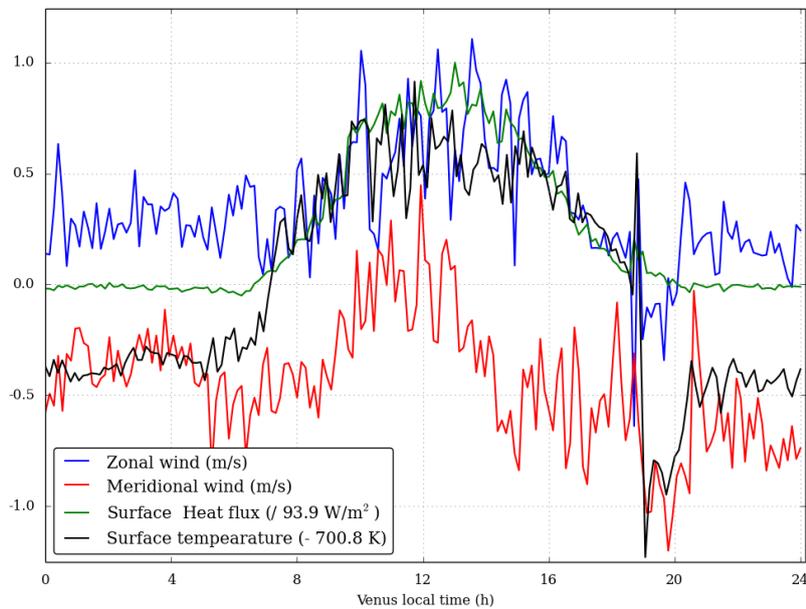


Figure 2: Diurnal variation of the zonal wind (blue) meridional wind (red), surface heat flux (green) and surface temperature (black) for at the black dot in Fig 1.

## References

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