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Analysis of the radiative budget of Venus atmosphere based on infrared Net Exchange Rate formalism

Sebastien Lebonnois (1), Vincent Eymet (2), Christopher Lee (3), and Jan Vatant d'Ollone (1)

(1) Laboratoire de Meteorologie Dynamique, Paris cedex 05, France, (2) Meso-Star, 8 rue des pechers, F-31410, Longages, France, (3) Ashima Research, Pasadena, CA, USA

Taking advantage of the Net Exchange Rate formalism we use for the infrared radiative transfer in the atmosphere of Venus, a detailed analysis of the energy exchanges is proposed here. Balance between solar heating and infrared energy exchanges is analysed for each region: upper atmosphere (from cloud top to 100 km), upper cloud, middle cloud, cloud base, and deep atmosphere (cloud base to surface). All solar energy absorbed below the clouds are reaching the cloud base through infrared windows, mostly at 3-4 μm and 5-7 μm. The continuum opacity in these spectral regions is not well known for the hot temperatures and large pressures of Venus deep atmosphere, but strongly affects the temperature profile from cloud base to surface. From cloud base, upward transport of energy goes through convection and short-range exchanges up to the middle cloud where the atmosphere is thin enough in the 20-30 μm window to cool directly to space. Total opacity in this spectral window between the 15 μm CO_2 band and the CO_2 collision induced absorption has a strong impact on the temperature above the cloud convective layer. We will present how sensitive the temperature profile is to uncertainties in gas opacity and discuss the chosen cloud model and solar flux deposition profile that we use for our latest GCM simulations.