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Validation of air temperature retrieval techniques applied to VIRTIS-M data

D. Grassi(1), P. Drossart(1), G. Piccioni(2), P. Irwin(3), N.I. Ignatiev(4), L.V. Zasova(4), A. Adriani(5), M. Moriconi(6)

(1) LESIA-Obs. de Paris, Meudon, France, (2) IASF-INAF, Rome, Italy, (3) Oxford Univ., United Kingdom, (4) IKI-RAN, Moscow, Russia, (5) IFSI-INAF, Rome, Italy, (6) ISAC-CNR, Rome, Italy

The air temperature profile in the middle atmosphere of Venus can be effectively monitored by means of night time radiance measurements covering the 4.3 microns carbon dioxide band. The data returned by the VIRTIS instrument on board of ESA Venus Express mission sample this spectral range with a step of 10 nm and a S/N exceeding 250 at best, even on individual spectra. A selection of measurements from previous missions is used in this work to build a reference input state vectors dataset of Venusian atmospheric conditions and, by means of a direct radiative transfer code, a corresponding ensemble of simulated upwelling radiances at the top of the atmosphere. Eventually, the convolution with VIRTIS M channel instrumental function and the addition of a random noise with the same statistic of instrumental NER provides a simulated VIRTIS-M dataset. We report here a performance assessment for two independent T(p) retrieval codes. Namely, retrieval outcomes for simulated radiances are compared against the input state vectors, demonstrating the capability of the codes to achieve satisfactory correspondence (errors in temperature < 3K) in a variety of physical conditions for the indicative altitude range 65-95 Km, the lower limit being represented by the level where cloud opacity reaches a value ˜ 1.