



The GEISA spectroscopic database: current and future archive for planetary atmosphere studies

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Adequate tools are required to perform reliable radiative transfer modeling calculations to meet the needs of communities involved in understanding the atmospheres of the Earth and other planets. The role of molecular spectroscopy in modern atmospheric research has entered a new phase with the advent of highly sophisticated spectroscopic instruments and computers. This explains why an increasing need actually exists for comprehensive, trustworthy and operational interactive spectroscopic databases.

The development of GEISA (Gestion et Etude des Informations Spectroscopiques Atmosphériques: Management and Study of Spectroscopic Information) was started in 1976 at Laboratoire de Météorologie Dynamique (LMD) in France. GEISA is a computer-accessible spectroscopic database, designed to facilitate accurate forward radiative transfer calculations using a line-by-line and layer-by-layer approach. More than 350 users are currently registered for on line use of the GEISA facilities. The current 2003 edition of GEISA (GEISA-03) is a system comprising three independent sub-databases devoted respectively to:

LINE TRANSITION PARAMETERS:

The GEISA-03 sub-database of line transition parameters involves 42 molecules (97 isotopic species) and contains 1,668,371 entries (321,905 supplementary entries since GEISA-97), in the spectral range from 10^{-6} to $35,877 \text{ cm}^{-1}$. The included molecules

are constituents of the atmospheres of Earth (major permanent and trace molecules) and of other Planets (mainly for the Giant Planets).

ABSORPTION CROSS-SECTIONS

Cross-sections are available in two spectral regions of GEISA, i.e.: in the infrared (35 molecular species in the spectral range 200 cm^{-1} to 2000 cm^{-1}) and in the Ultraviolet/Visible (8 molecular species in the spectral range: $7,750\text{-}43,489\text{ cm}^{-1}$).

MICROPHYSICAL AND OPTICAL PROPERTIES OF ATMOSPHERIC AEROSOLS

The GEISA aerosols gathers the micro-physical and optical properties from four published aerosol data catalogs, the overall content of which deals with the archive of complex refractive indices and possibly computed optical related properties, for selected basic aerosol components. Softwares for data management and user-selected aerosol mixtures elaboration are available as well.

Currently, GEISA is involved in activities related to the assessment of the capabilities of IASI (Infrared Atmospheric Sounding Interferometer on board of the METOP European satellite) through the GEISA/IASI database derived from GEISA.

The GEISA-03 content will be presented placing emphasis on molecular species of interest for planetary atmosphere studies with detailed on the updated 2007 archive underway. A critical assessment on the needs, in terms of molecular parameters archive, related with recent satellite astrophysical missions will be given.

More information on free on line GEISA access are given at <http://ara.lmd.polytechnique.fr> and <http://ether.ipsl.jussieu.fr>