**Spectroscopy** is at the root of modern planetology, enabling to determine the physical properties of planets remotely. **GEISA** a computer-accessible Spectroscopic Database with associated management software, designed for the interpretation of various atmospheric remote sensing observations and especially efficient for high spectral resolved Radiative Transfer simulations.

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**GEISA and RELATIONS TO SPACE MISSIONS**

Examples of the use of GEISA for space missions.

**CURRENT GEISA SYSTEM (created in 1974)**

Contents and Organization

**GEISA 2014 UPDATED CONTENT**

**LINE PARAMETERS SUB-DATABASE**

Three independent sub-databases (associated transport software): Line Parameters, intensity, and radiative transfer parameters with more than 100 different species. The database contains more than 10,000 transitions.

**VALIDATION OF GEISA**

The main difficulty in interpreting differences between radiative transfer simulations and observations is to be able to separate errors coming from the different actors of the radiative transfer simulation, for example errors coming from the incomplete knowledge of the atmospheric state and those due to the modeling itself. Based on the calibration/validation of small procedure developed for thermal infrared observations at Laboratoire de Météorologie Dynamique (http://ara.abct.lmd.polytechnique.fr), our analysis procedure aims at eliminating the atmospheric effect through the statistical analysis (bias and standard deviation) of numerous situations.

**Study of the residuals** makes it possible to validate a dataset provided by a laboratory feedback given before the final version of the GEISA database (Table 2).

For the strongest transitions, it may be possible to identify the parameters which could explain the shape of the residuals (Table 3).

With the new generation of spatial instruments (high spectral resolution), it is needed to take into account « minor » parameters such as the pressure shift.

**MAIN CONCLUSIONS**

- Calibration updates of both HITRAN (2008, 2012) and GEISA (2011, 2015) databases give to the users the possibility to have the best spectroscopic parameters at any time.
- Study of the residuals makes it possible to validate a relevant procedure by a laboratory feedback given before the final version of the GEISA database.
- For the strongest transitions, it may be possible to identify the parameters which could explain the shape of the residuals.
- The study of the impact of individual spectroscopic parameters on the simulation and observations called "residuals."