

## WORKING WITH HITRAN DATABASE USING HAPI: HITRAN APPLICATION PROGRAMMING INTERFACE

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A HITRAN Application Programming Interface (HAPI) has been developed to allow users on their local machines much more flexibility and power. HAPI is a programming interface for the main data-searching capabilities of the new “HITRANonline” web service (<http://www.hitran.org>). It provides the possibility to query spectroscopic data from the HITRAN<sup>b</sup> database in a flexible manner using either functions or query language. Some of the prominent current features of HAPI are: a) Downloading line-by-line data from the HITRANonline site to a local machine b) Filtering and processing the data in SQL-like fashion c) Conventional Python structures (lists, tuples, and dictionaries) for representing spectroscopic data d) Possibility to use a large set of third-party Python libraries to work with the data e) Python implementation of the HT lineshape<sup>c</sup> which can be reduced to a number of conventional line profiles f) Python implementation of total internal partition sums (TIPS-2011<sup>d</sup>) for spectra simulations g) High-resolution spectra calculation accounting for pressure, temperature and optical path length h) Providing instrumental functions to simulate experimental spectra i) Possibility to extend HAPI’s functionality by custom line profiles, partitions sums and instrumental functions

Currently the API is a module written in Python and uses Numpy library providing fast array operations. The API is designed to deal with data in multiple formats such as ASCII, CSV, HDF5 and XSAMS.

This work has been supported by NASA Aura Science Team Grant NNX14AI55G and NASA Planetary Atmospheres Grant NNX13AI59G.

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<sup>b</sup>L.S. Rothman et al. JQSRT, Volume 130, 2013, Pages 4-50

<sup>c</sup>N.H. Ngo et al. JQSRT, Volume 129, November 2013, Pages 89–100

<sup>d</sup>A. L. Laraia et al. Icarus, Volume 215, Issue 1, September 2011, Pages 391–400