HITRAN and HITEMP: towards molecular spectroscopic databases for any possible scenario

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The HITRAN spectroscopic database is a backbone of the interpretation of spectral terrestrial and planetary atmospheric retrievals and is an important input to the radiative transfer codes. Apart from atmospheric applications HITRAN is being used in medicine, astrophysics, air-quality monitoring, instrument calibration and many other areas of science and industry. The most recent release of the database is HITRAN2016 [1]. It consists of line-by-line lists, experimental absorption cross-sections, collision-induced absorption data and aerosol indices of refraction.

The line-by-line lists for most of the HITRAN molecules were updated (and two new molecules added) in comparison with the previous compilation HITRAN2012 [2] that has been in use, along with some intermediate updates, since 2012. The extent of the updates ranges from updating a few lines of certain molecules to complete replacements of the lists and introduction of additional isotopologues. In addition, the amount of molecules in cross-sectional part of the database has increased dramatically from nearly 50 to over 300.

Taking advantage of the new structure and interface available at www.hitran.org [3] and the HITRAN Application Programming Interface [4] the amount of parameters has also been significantly increased, now incorporating, for instance, non-Voigt line profiles [5]; broadening by gases other than air and “self” [6]; and other phenomena, including line mixing.

The HITEMP database [7] is designed to serve applications that require modelling spectra at elevated temperatures. A new edition of HITEMP is now being prepared with substantial amount of new molecules added and parameters for the existing ones updated.

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References

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