HITRAN2016: Part I. Line lists for H_2O, CO_2, O_3, N_2O, CO, CH_4, and O_2

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The HITRAN2016[a] database is now officially released[b]. Plethora of experimental and theoretical molecular spectroscopic data were collected, evaluated and vetted before compiling the new edition of the database. The database is now distributed through the dynamic user interface HITRAN*online* (available at www.hitran.org) which offers many flexible options for browsing and downloading the data[c]. In addition HITRAN Application Programming Interface (HAPI) offers modern ways to download the HITRAN data and use it to carry out sophisticated calculations[d]. The line-by-line lists for almost all of the 47 HITRAN molecules were updated in comparison with the previous compilation (HITRAN2012[e]). Some of the most important updates for major atmospheric absorbers, such as H_2O, CO_2, O_3, N_2O, CO, CH_4, and O_2, will be presented in this talk, while the trace gases will be presented in the next talk by Y. Tan. The HITRAN2016 database now provides alternative line-shape representations for a number of molecules, as well as broadening by gases dominant in planetary atmospheres. In addition, substantial extension and improvement of cross-section data is featured, which will be described in a dedicated talk by R. V. Kochanov. The new edition of the database is a substantial step forward to improve retrievals of the planetary atmospheric constituents in comparison with previous editions, while offering new ways of working with the data.

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[a] I. E. Gordon, L. S. Rothman, C. Hill, R. V. Kochanov, Y. Tan, et al. The HITRAN2016 Molecular Spectroscopic Database. JQSRT 2017;submitted.
[b] Many spectroscopists and atmospheric scientists worldwide have contributed data to the database or provided invaluable validations.
[c] C. Hill, I. E. Gordon, R. V. Kochanov, L. Barrett, J.S. Wilzewski, L.S. Rothman, JQSRT. 177 (2016) 4-–14
[d] R.V. Kochanov, I. E. Gordon, L. S. Rothman, P. Wcislo, C. Hill, J. S. Wilzewski, JQSRT. 177 (2016) 15—30.
[e] L. S. Rothman, I. E. Gordon et al. The HITRAN2012 Molecular Spectroscopic Database. JQSRT, 113 (2013) 4–50.