



Shortwave radiative heating rate profiles in hazy and clear atmosphere: a sensitivity study

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Aerosols have an impact on shortwave heating rate profiles (additional heating or cooling). In this survey, we quantify the impact of several key-parameters on the heating rate profiles of the atmosphere with and without aerosols. These key-parameters are: (1) the *atmospheric model* (tropical, midlatitude summer or winter, US Standard), (2) the *integrated water vapor amount (IWV)*, (3) the *ground surface* (flat and rough ocean, isotropic surface albedo for land), (4) the *aerosol composition* (dusts, soots or maritimes mixtures with respect to the OPAC-database classification), (5) the *aerosol optical depth* and (6) *vertical position*, and (7) the *single-scattering albedo* (ω_o) of the aerosol mixture. This study enables us to evaluate which parameters are most important to take into account in a radiative energy budget of the atmosphere and will be useful for a future study: the retrieval of heating rates profiles from satellite data (CALIPSO, MODIS, MERIS) over the Mediterranean Sea. All the heating rates are computed by using the vector irradiances computed at each pressure level in the spectral interval $0.2 - 3.6 \mu\text{m}$ (shortwave) by the 1D radiative transfer model for atmosphere and ocean: *MOMO (Matrix-Operator MOdel)* of the Institute for Space Science, FU Berlin ¹

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