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# MARTIC mission, a nanosat constellation to measure the middle atmosphere temperature at global scale

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## Résumé

The middle atmosphere (stratosphere + mesosphere) is a region very sensitive to global anthropogenic climate change but also to natural external forcings (solar variability, volcanic eruptions). The mesospheric temperature is poorly observed. There are currently only two space instruments observing temperature in the mesosphere, MLS-AURA and SABER-TIMED both of them being in operation for more than 14 years without guaranty for their future life. There is currently no confirmed project for the continuation. The MARTIC mission aims to fill this lack of observations. If the proposed measurement technique is simple, determining the vertical profile of solar light scattered by the atmospheric limb, the expected results are of considerable strategic interest for a large number of meteorological, climatological, aeronautical and space applications. The MARTIC instrument consists of two micro-cameras (CCD or CMOS sensors) observing, during the diurnal part of the orbit, the vertical profile of the sunlight scattering at limb. Above the top of the stratospheric aerosol layer, about 30-35 km, this scattering is only due to the Rayleigh scattering by air molecules, directly proportional to atmospheric density from which the vertical profile of temperature can be derived. Two spectral domains are observed, 400-450 nm where Rayleigh scattering is intense and absorption by ozone and other atmospheric constituents is weak, and 850-900 nm where Mie scattering by stratospheric aerosols can be detected. The MARTIC proposal builds on the heritage of the GOMOS stellar occultation spectrometer on-board ENVISAT for which we have developed a database of temperature profiles between 35 and 85 km covering the period 2002-2012.

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