STUDY OF THE MARTIAN ATMOSPHERIC COMPOSITION BY SPICAM LIGHT ONBOARD THE MARS EXPRESS MISSION. J. L. Bertaux, D. Fonteyn, O. Korablev, O. Talagrand, N. Dubouloz, B. Sandel, A. Stern, and the SPICAM Light Team (E. Dimarellis, E. Neefs, M. Cabane, G. Cernogora, A. Hauchecorne, A. C. Levasseur-Regourd, E. Quémerais, P. Rannou, C. Hermans, G. Kockarts, C. Lippens, M. De Mazière, D. Moreau, C. Muller, P. Simon, J. Vercheval, E. Chassefiere, F. Forget, F. Hourdin, V. I. Moroz, and A. Rodin).

During the Mars Express mission, SPICAM Light will investigate key questions of the atmosphere of Mars, present state, climate and evolution. The objectives of SPICAM Light will be presented with the instrument capabilities.

The atmosphere of Mars contains ozone and water vapour, as does the Earth's atmosphere. However, the quantity of ozone is much smaller than on the Earth, and as a consequence the solar UV radiation reaches the ground. In addition, ozone on Mars is a strong source of oxidation at ground level, destroying very fast all organic molecules (together with the action of OH radicals produced by chemical reactions between O_3 and H_2O. When looking at nadir along track, the SPICAM UV spectrometer (118 - 320 nm on an intensified CCD, 3.8 kg) is essentially an Ozone detector, where its strongest UV absorption band at 250 nm is imprinted in the spectrum of the solar light scattered back from the ground. This very technique allowed the discovery of Ozone on Mars with Mariner 9, and is heavily used to map the total Ozone content of the Earth atmosphere from space. On Mars Express, the correlated study of ozone and water vapour will allow to compute the quantities of ozone and other oxidants, and solar UV reaching the ground. This Mars environment needs to be understood for a better understanding of conditions in which life could have developed on Mars (or not), and the possible transformation of the some rocks by oxidation.

The second major objective of the SPICAM UV is to determine the vertical profile of CO_2, temperature, O_3 and clouds and aerosols by the technique of stellar occultation. The instrument is oriented toward a star setting behind the horizon. From the atmospheric absorption imprinted progressively on the star spectrum, the density of CO_2, O_3 and dust are retrieved as a function of altitude, and also the temperature from scale height. Several (3-5) occultations per orbit are foreseen.

Finally, spectroscopic UV observations of the upper atmosphere will allow to study the ionosphere through the emissions of CO, CO^+, and CO_2^+, and its direct interaction with the solar wind, variable with solar activity. Also, it will allow a better understanding of escape mechanisms and magnitude estimates, crucial for the long-term evolution of the atmosphere.