

# **Mars Express Mission**

## **SPICAM**

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- A consortium of 3 laboratories:
- Service d'Aéronomie du CNRS, France
- Belgium Institute for Space Aeronomy, Belgium; P. Simon
- Space Research Institute (IKI), Russia; O.Korablev

# Why study the atmosphere of Mars ?

- *~150 extra-solar planets discovered around other stars (> 5%)*
- *Mars is the planet most similar to Earth, most likely site for life*
- *Finding present or extinct life on Mars would allow us to infer the probability of life around other stars*

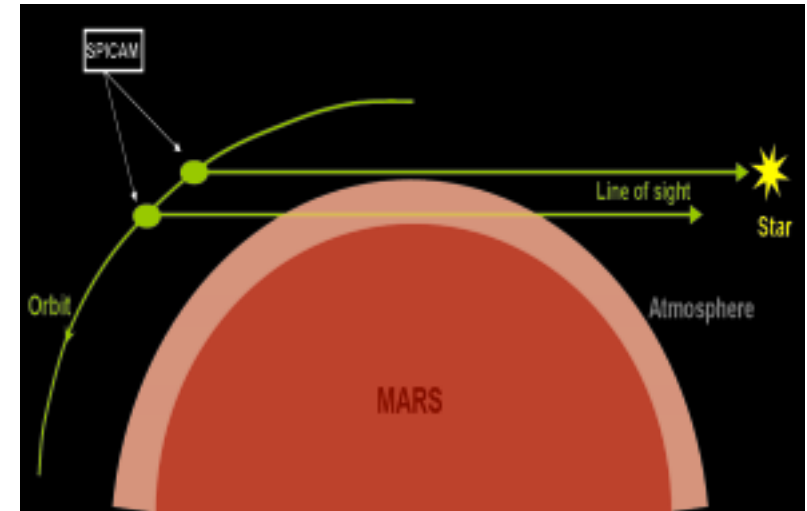
## **Contribution of SPICAM: present habitability of Mars**

- Could life survive in present conditions? Characterise the present environment at ground level: solar UV, ozone, water, gaseous oxidants
- Comparative planetology: what is learned on Mars may be useful for a better understanding of Earth (present and future)
- Prepare future exploration of Mars: modeling the atmosphere for descending probes, aerocapture, aerobraking

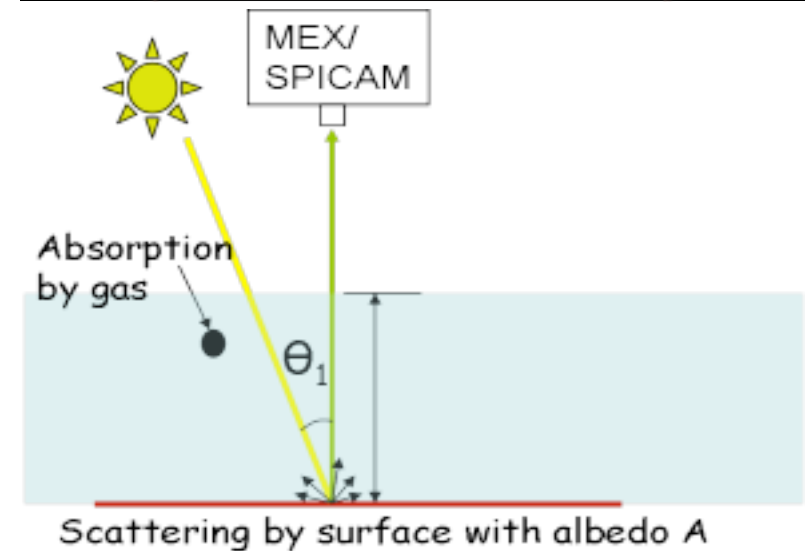
# SPICAM : the **ultraviolet** and **near-infrared** spectrometers

1. Determine **atmosphere composition and temperature** versus altitude, by looking at **light from stars occulted** by Mars' atmosphere at night limb (CO<sub>2</sub>, dust, ozone)

Star Occultation is the **only** remote sensing **method** able **to probe 60-150 km** altitude region (complementary to PFS)



2. Mapping over the planet **ozone, water vapour, dust**, by looking at **solar light reflected by the ground**



# SPICAM RESULTS

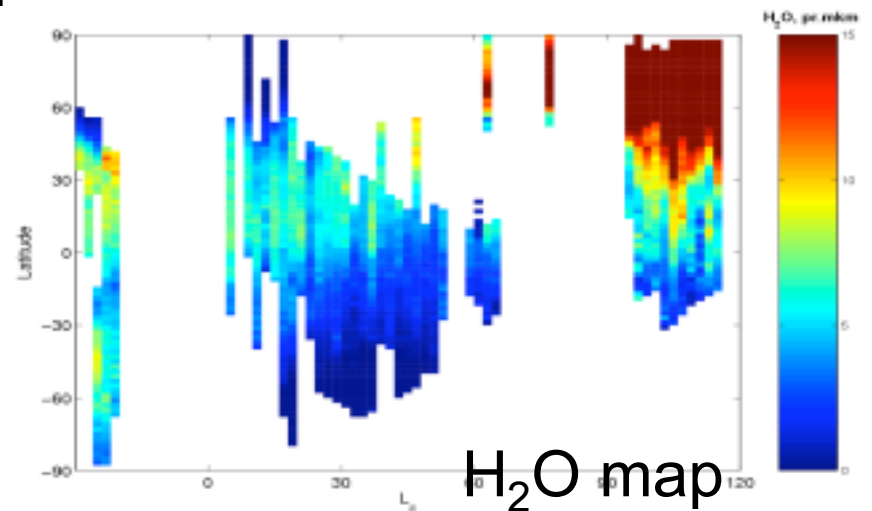
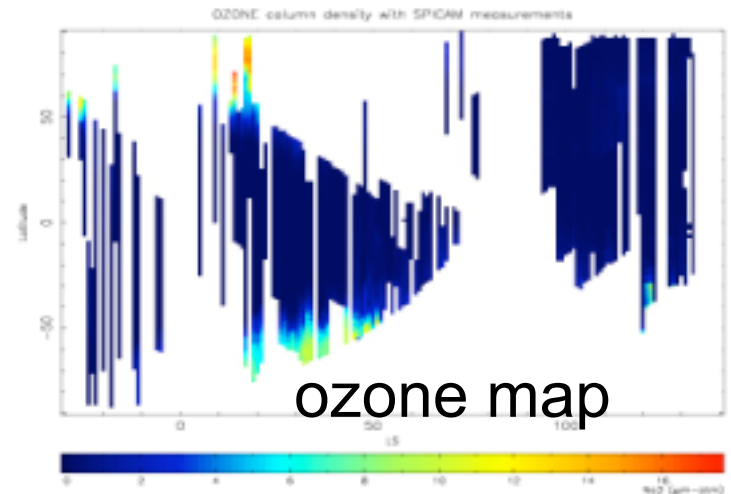
## First global ozone climatology and simultaneous measurements of water and ozone

Very small quantity of ozone on Mars (300 times less than Earth): a lot of solar UV at ground level

Role of water vapour to destroy ozone, predicted by a chemistry model: fully confirmed

Is the recently detected increase of water vapour in Earth's stratosphere a potential threat to Earth's ozone layer? Any connection to global warming?

Solar UV and oxydisers produced by water /ozone mixture are scavengers of organic material (hostile to life at ground level)



# SPICAM: looking ahead

Discovery of nitric oxide (NO) forming on night side of the planet

Information about atmospheric temperature, density and circulation patterns provides important hints for aerobraking, aerocapture, entry, descent and landing manoeuvres



**Prepares future of Mars exploration**