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Habitats above planetary surfaces: earth and Mars

F. Daerden (2), C. Muller (1) and D. Moreau (1)

(1) B.USOC-IASB-BIRA, Brussels, Belgium (christian.muller@busoc.be, 00 32-2 3748423)
(2) BIRA-IASB, Brussels, Belgium (frank.daerden@aeronomie.be)

Abstract

Introduction: The planetary atmospheres carry clouds and various types and aerosols. Their variety on Venus, Mars and earth is huge ranging from almost invisible hazes to the dense clouds of the Venus upper atmosphere. The physical conditions of these different environments will be described with their implication for possible habitats.

Earth: Life has colonized the entire land surface, ocean and the entire accessible subsurface. The lower troposphere is certainly not a sterile zone, not only birds and insects use this environment not only to move but to carry sometime pathogens (avian flu, malaria etc.) but aerosols and droplets can carry the germs of respiratory diseases. Recently, balloon experiments have revealed the presence of bacteria on aerosols collected above the ozone layer at 40 km altitude. For example, Sattler et al. (2001) showed that bacteria in cloud droplets at high altitudes on Earth are actively growing and reproducing, and concluded that the limiting step for the persistence of microbial life in cloud droplets is residence time in the atmosphere.

Mars: The Mars clouds and aerosols show a variety which is still to be investigated. Most of the observed clouds correspond to earth cirrus clouds or even polar stratospheric clouds but some denser clouds have also been surprisingly observed.

Fig.1: stratus clouds observed by the PATHFINDER camera, the indication "you are here" corresponds to the earth location as the original purpose of this image was to show earth as seen from Mars (NASA document).

Conclusions: The conditions for these environments to be habitats will be reviewed not only in terms of droplets temperatures and sizes but also in terms of chemistry and radiation.

References

[1] **Sattier, B., Puxbaum, H., Psenner, R., Bacterial growth in supercooled cloud droplets, G.RL. vol 28, 239-242, 2001**