



Alfvén wave ion acceleration at Mars

Rickard Lundin and Anatol Guglielmi

Swedish Institute of Space Physics, Umeå, Sweden (rickard.lundin@irf.se, 0046 907869203)

Intense ULF wave activity characterizes the Martian plasma environment. The waves appear to be generated by the shocked solar wind plasma (sheath), subsequently propagating into the Martian induced magnetosphere. ULF waves are omnipresent in the Martian magnetosphere. Even the ionosphere down to 300 km altitude (pericenter of Mars Express) is characterized by strong density modulations in the ULF frequency range. Coincident with density modulations is ion energization. At times ions are energized to the same velocity, i.e. the energized ions has energies proportional to their mass, but the general feature is a mix of energy- and velocity-dependent energization. We consider the multispecies acceleration of ionospheric ions above Mars, comparing ion data from the ASPERA ion instrument on Mars Express with the wave activity inferred from the ion and electron modulation in the ULF frequency range. Due to the lack of magnetometer data we are unable to determine the wave mode, but the coincident modulation of ions and electrons implies MHD waves. We use ponderomotive force theory to compute ion energization by MHD waves, and compare with observations. We also consider wave focussing onto the plasma sheet as a means of further ion energization in the tail.