Geophysical Research Abstracts
Vol. 13, EGU2011-10311, 2011
EGU General Assembly 2011

The exosphere of Europa: role of photolysis and radiolysis

Christina Plainaki, Anna Milillo, Alessandro Mura, Stefano Orsini, and Stefano Massetti
IFSI-INAF, Rome, Italy (christina.plainaki@ifsi-roma.inaf.it)

The exosphere of Europa is the result of different surface release processes and subsequent modification of the released particles. The main constituent of the icy surface is water with minor portion of heavy water (H_2O_2) and other impurities. This means that probably the major released species is H_2O. Nevertheless, the released particles experience photolysis and radiolysis due to solar UV and Jupiter's magnetospheric plasma respectively. The initial photolysis species in ice are OH, H and O, with the possibility of H_2. These dissociated species can react to reform water and/or new species: H_2, H_2O_2, O_2 and HO_2. At the end, the components of the Europa exosphere are a mixture of these different molecules. In fact, the Hubble Space Telescope observations, initially, revealed the existence of a tenuous O_2 atmosphere with a column density of about (0.24-1.4) 10^{15} cm^{-2}, whereas, later, the Ultraviolet Imaging Spectrograph on the Cassini, during its flyby of Jupiter, confirmed this discovery. In this work, starting from previously developed MC model for the generation of Europa's exosphere, where the only considered species was water, we make a first attempt to simulate the more realistic atmosphere of Europa, mainly consisting of O_2 and O. We compare the results of this analysis with those obtained by other models and with the in situ measurements and discuss them.