EPSC Abstracts,
Vol. 2, EPSC2007-A-00276, 2007
European Planetary Science Congress 2007

Europa Sodium Cloud: orbital variability and Sodium recycling

F. Cipriani (1), F. Leblanc (2), O. Witasse (1)

(1) RSSD/ESTEC, Noordwijk, The Netherlands, (2) Service d Aéronomie du CNRS, France (Fabrice.Cipriani@esa.int, Francois.Leblanc@aerov.jussieu.fr)

Discovery and further observations of Europa's thin atmosphere of sodium have been carried out by M.E. Brown (Brown and Hill 1996, Brown 2001, Brown 2004) and A.E. Potter and co-workers (Leblanc et al, 2005).

The resonant scattering emission of sodium around Europa has been successfully modelled and compared to the compilation of such observations by Leblanc at al 2002; Leblanc et al 2005). Such an analysis confirmed that the cloud morphology is dominated by the production of Na from the trailing hemisphere. The influence of Europa's centrifugal latitude as well as the contribution of Io's sodium source at Europa orbit were also estimated. These studies concluded that the observed sodium atmosphere should be largely endogenic to Europa.

However, significant variations of the total emission intensity along Europa's orbit around Jupiter were reported that were difficult to explain without adhoc assumptions on the variability of the sodium ejecta rate with respect to Europa position in Jupiter magnetosphere.

In the present study, we investigate the redistribution of the ejected sodium atoms on the surface of the moon during its orbit around Jupiter following the suggestion by Leblanc et al (2005).

In our model, the redistribution of sodium atoms at Europa's surface occurs from a set of ejection and absorption of the sodium atoms. Ejection processes are sputtering induced by energetic jovian particles, as well as photo-stimulated and thermal desorptions from the surface. Absorption mainly depends on the surface temperature and

porosity.

We will present comparisons of the newly calculated sodium emission with the observations, as well as density distributions of sodium at Europa's surface. Consequences of those calculations on the sodium cloud morphology will also be discussed.