PLANETWARD ION FLOWS IN VENUS' MAGNETOTAIL. Peter Kollmann[1*], *Pontus C. Brandt[1], Glyn Collinson[2], Zhao Jin Rong[3], Yoshifumi Futaana[4], and Tielong L. Zhang[5], [1]The Johns Hopkins University Applied Physics Laboratory (JHU/APL), Laurel, USA, Peter.Kollmann@jhuapl.edu; [2] NASA Goddard Spaceflight Center (GSFC), Greenbelt, USA; [3] Swedish Institute of Space Physics (IRF), Kiruna, Sweden; [4] Chinese Academy of Sciences, Beijing, China; [5] Space Research Institute (IWF), Graz, Austria*

Introduction: Venus is continuously losing parts of its atmosphere into space. A large fraction of this escape occurs in the form of ions flowing down along Venus' magnetotail. Countless studies followed these ions in order to constrain the atmospheric escape. Interestingly, there are also ions in the magnetotail that return to Venus. These flows, their properties, and possibilities for the underlying physics have been barely studied in the past.

Results: Data from the ASPERA-4 instrument on board of Venus Express is used in our study. We find that the planetward flow rate decreases with EUV irradiance. This irradiance changes over the 11-year solar cycle and over the age of our Sun. Since we also find that the planetward return rate is comparable to the escape rate, the relation between EUV and return flows also affects the net atmospheric escape. It turns out that the relation between net escape and EUV irradiance scales opposite to Mars, even though Mars is an unmagnetized planet as Venus (see Figure 1.)

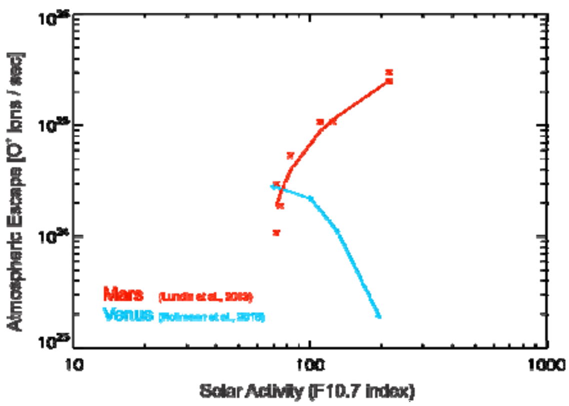

Figure 1: Net atmospheric ion escape rates of Venus (blue) and Mars (red) as a function of solar activity.

Planetary flows are often associated with magnetic reconnection. However, we find that the bulk of these flows do not correlate with proximity to the magnetotail current sheet, as it would be expected from magnetic reconnection. Instead, we find that the flows we observe are consistent with flows that naturally emerge from pickup ions moving in the magnetic environment of Venus.