It is well known that the unmagnetized objects Mars, Venus and Titan continuously loses fractions of their atmospheres into space as a consequence of the interaction with the solar wind/corotating magnetosphere. We present some recent findings of how ionospheric escape at Venus and Mars is increased during times when corotating interaction regions or coronal mass ejections impact on the planet and make some predictions on how Titan’s ionosphere could be affected in a similar way when the plasma parameters in the corotating plasma of Saturn varies. During the current solar minimum we scan the ACE satellite data for CIRs and CMEs and estimate their arrival at Mars and Venus. We then compare the anti-sunward fluxes of heavy planetary ions during the impact of these events to the fluxes at the times between. The escape increases by a factor of ~1.7 at Venus and by a factor of ~2.5 at Mars, on average. Taking into account the occurrence rate of these events we find that 30% of the total outflow from Mars and 50% from Venus takes place during rough space weather. We also discuss whether it is the increased solar wind dynamic pressure that causes the increase escape rate or if it is an effect of the concurrent rotation of the interplanetary magnetic field. The magnetic field rotation causes the induced magnetosphere to reconfigure and change polarity, which could trigger reconnection events and substorm-like processes. During such processes plasma can be accelerated in the downstream direction through electrodynamic effects.