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Ion escape from Venus using statistical distribution functions

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We use more than three years of data from the ASPERA-4 instrument onboard Venus Express to compile statistical distribution functions of ion flux in and around induced magnetosphere of Venus. We present samples of statistical distribution functions, as well average flux patterns in the near Venus space based on the statistical distribution functions. The statistical distribution functions allows for a compensation of biased sampling regarding both position and angular coverage of the instrument.
Protons and heavy ions (mass/charge > 16) are the major ion species escaping from Venus. The escape is due to acceleration of planetary ions by energy transfer from the solar wind. The ion escape appears to exclusively take place in the induced magnetotail region and no heavy ions are present in the magnetosheath. Protons of solar wind origin are travelling around the planet and penetrating the tail, resulting in a mix of planetary and solar wind protons inside the induced magnetosphere boundary. The escape rates of ions inside the tail agree with results from recent published studies, where other analysis methods have been used.
We also compare our results for Venus with a recent study of ion escape from Mars, where the same analysis method has been applied to data from the ASPERA-3 instrument on Mars Express. Both Mars and Venus are unmagnetized planets and are expected to interact similarly with the solar wind. On Mars the heavy ions are seen escaping in both the magnetosheath and tail regions as opposed to Venus where escape only takes place inside the tail. A possible explanation is that the magnetosphere of Mars is smaller compared to the ion gyroradius, making it easier for the ions to pass through the induced magnetosphere boundary. On both planets the escape rates of heavy ions in the tail are constant with increasing tail distance, verifying that the ions are leaving the planet in this region.