Exospheric Na distributions along the Mercury orbit with the THEMIS telescope

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The variability of Na exosphere of Mercury shows time scales from less than one hour to seasonal variations. While the faster variations, accounting of about 10-20\% of fluctuations are probably linked to the planetary response to solar wind and Interplanetary Magnetic Field variability, the seasonal variations (up to about 80\%) should be explained by complex mechanisms involving different surface release processes, loss, source and migrations of the exospheric Na atoms. Eventually, a Na annual cycle can be identified. In the past, ground-based observations and equatorial density from MESSENGER data have been analysed. In this study, for a better investigation of the exospheric Na features, we have studied the local time and latitudinal distributions of the exospheric Na column density as a function of the True Anomaly Angle (TAA) of Mercury by means of the extended dataset of images, collected from 2009 to 2013, by the THEMIS solar telescope. Our results show that the THEMIS images, in agreement with previous results, registered a strong general increase at aphelion and a dawn ward emission predominance with respect to dusk ward and subsolar region between 90\textdegree{} and 150\textdegree{} TAA. Unlikely other analyses, ours evidences a predominance of subsolar column density along the rest of Mercury’s orbit. An unexpected relationship between Northward or Southward peak emission and both TAA and local time is also evidenced by our analysis. This result seems to contradict previous results obtained from different data sets and it is not easily explained, thus it requires further investigations.