Geophysical Research Abstracts
Vol. 13, EGU2011-6237, 2011
EGU General Assembly 2011

Observational proofs for an unexpectedly large extension of the terrestrial hydrogen exosphere

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With Lyman-Alpha detectors onboard the earth-bound satellites TWINS-1/-2 we have carried out in the past two years registrations of Lyman-Alpha emissions from geocoronal hydrogen atoms. Solar Lyman-Alpha photons are resonantly scattered by these terrestrial H-atoms and lead to a diffuse geocoronal Lyman-Alpha glow emission. From huge samples of line-of-sight registrations of this glow intensity one can by inversion techniques construct the 3-dimensional hydrogen distribution which is underlying this glow. In these reconstructions we find very pronounced hints for the fact that the H-geocorona, compared with up-to-now model predictions, is much more extended to large geocentric distances, both on the day- and on the night-side of the Earth. This unexpected extent of the H-geocorona, evident from 3.5 earth‘s radii outwards, can be documented with TWINS Lyman-Alpha observations up to a geocentric distance of 7 Earth‘s radii. With IBEX ENA (Energetic Neutral Atom)observations of regions near the dayside magnetopause and the geomagnetic tail it is now possible to derive geocoronal H-atom densities at distances of the order of 10 to 15 earth‘s radii, allowing us now an extension of the Lyman-Alpha based H-geocorona up to these distances. This creates the need to study theoretical reasons why the Earth H-geocorona is so much more extended to large distances than expected by present models.