

ARTEMIS Observations of Lunar Pickup Ions in the Terrestrial Magnetotail Lobes

*A. R. Poppe^{1,2}, R. Samad¹, J. S. Halekas^{1,2}, G. T. Delory^{1,2},
W. Farrell^{2,3} and V. Angelopoulos⁴*

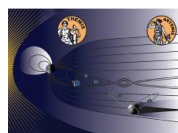
¹Space Sciences Lab., Univ. of California at Berkeley

²NASA Lunar Science Institute

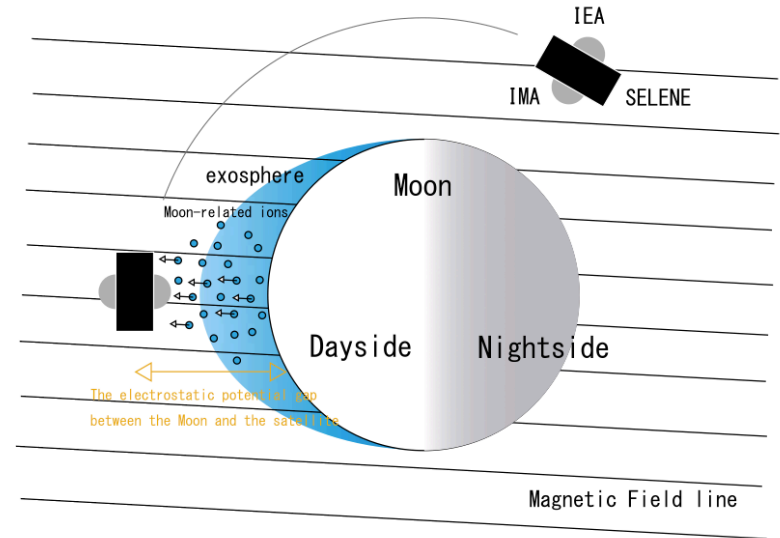
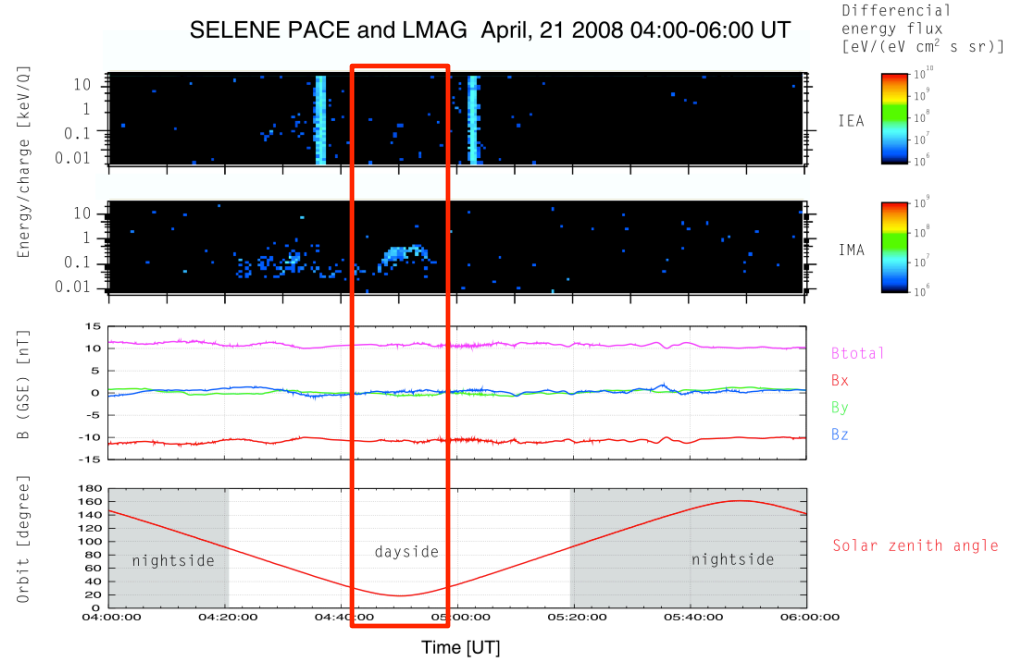
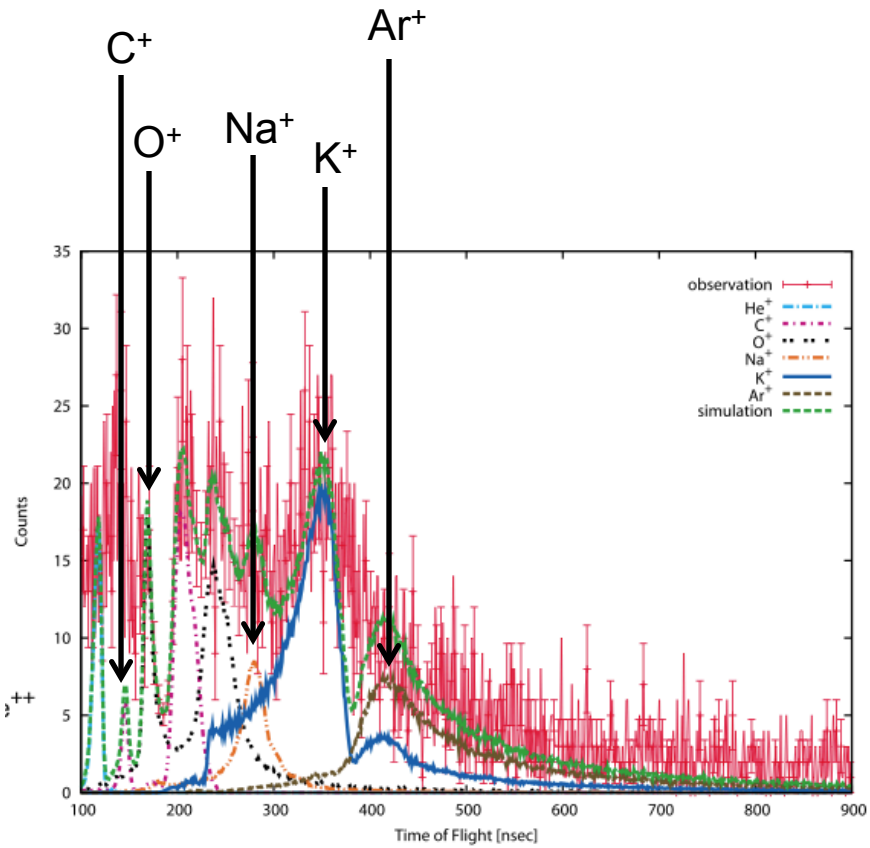
³Goddard Space Flight Center, NASA

⁴IGPP/ESS, UCLA

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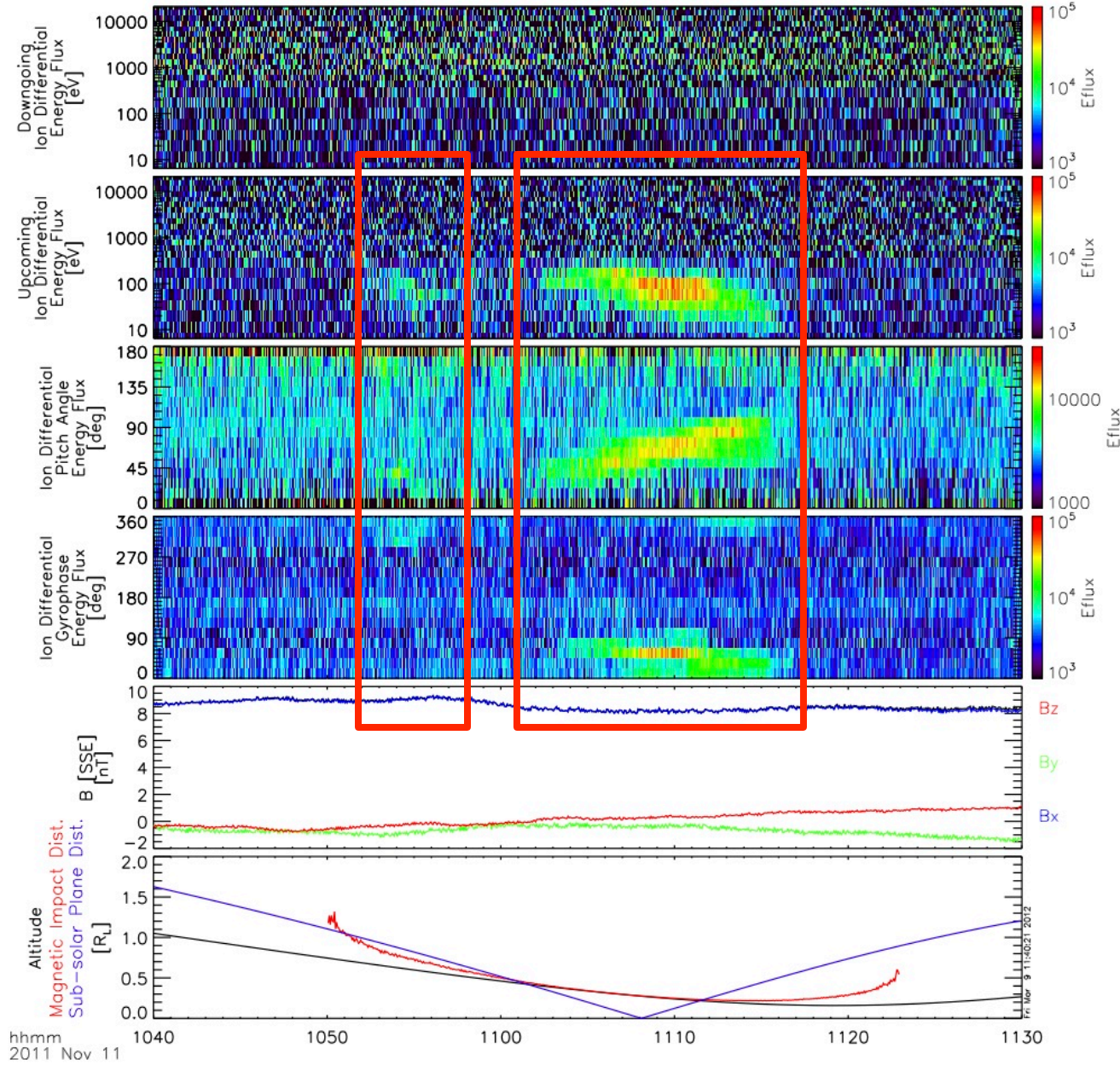
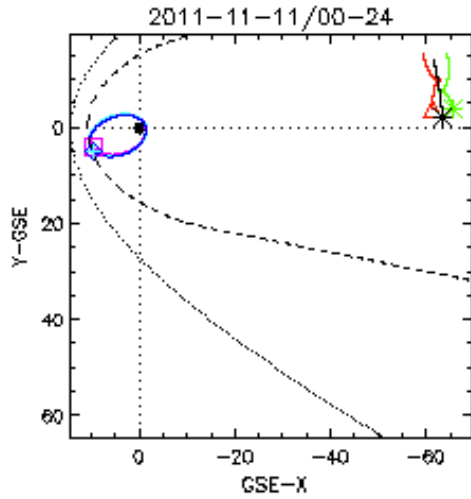
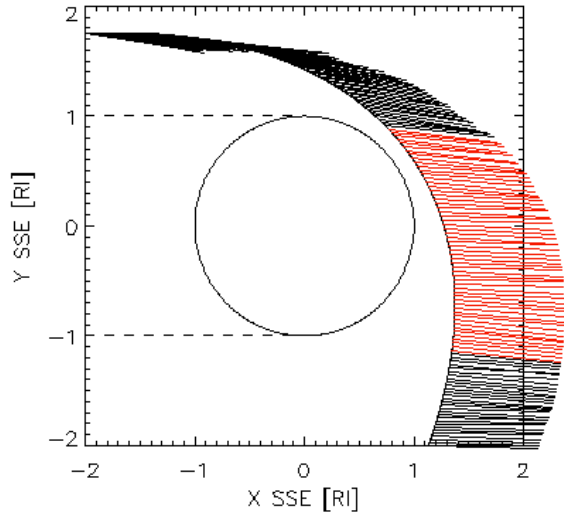


Previous Measurements by KAGUYA/SELENE Spacecraft [Tanaka et al., GRL, 2009]



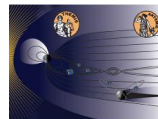
ARTEMIS P2

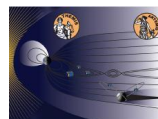
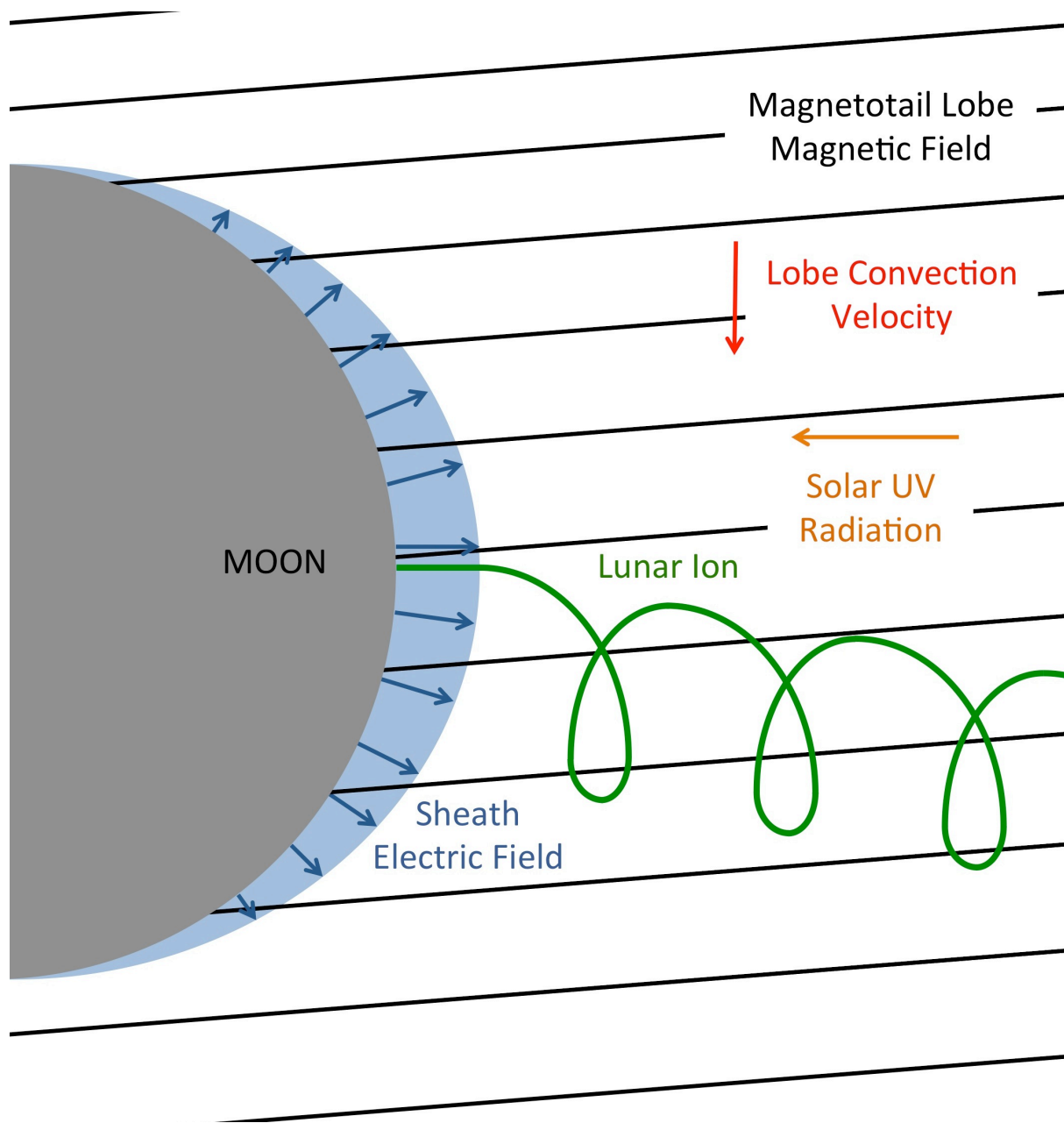
November 11, 2011



March 23, 2012

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Pickup Ion Variables

What We Know

Pitch angle and gyrophase
bunched

Centered at sub-solar point

Magnetic field vector

Continuous range of parallel
energies up to ~ 75 eV

Perhaps two discrete species

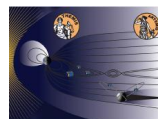
What We Don't Know

Ion mass

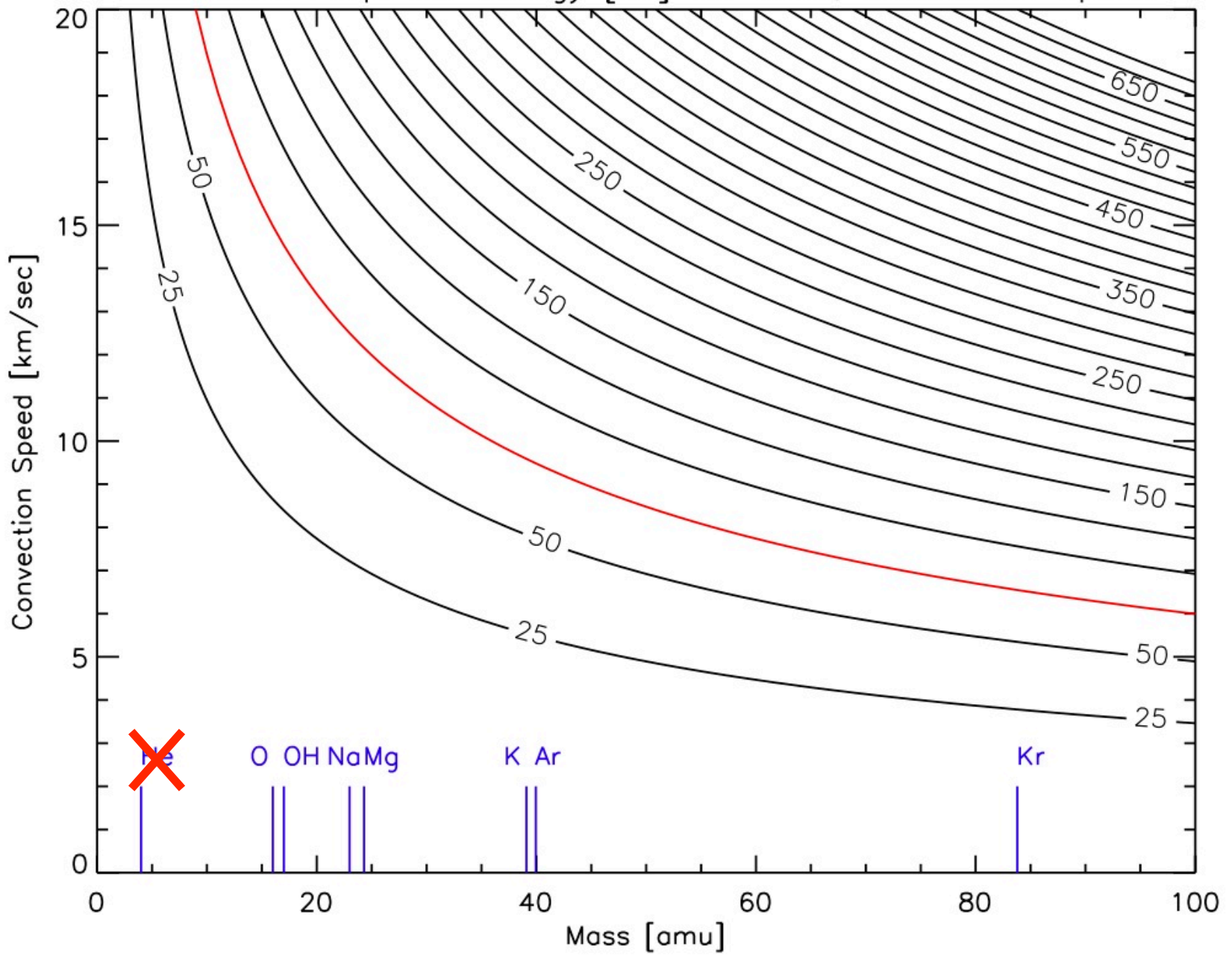
Ion origin (surface or
exospheric)

Convection velocity

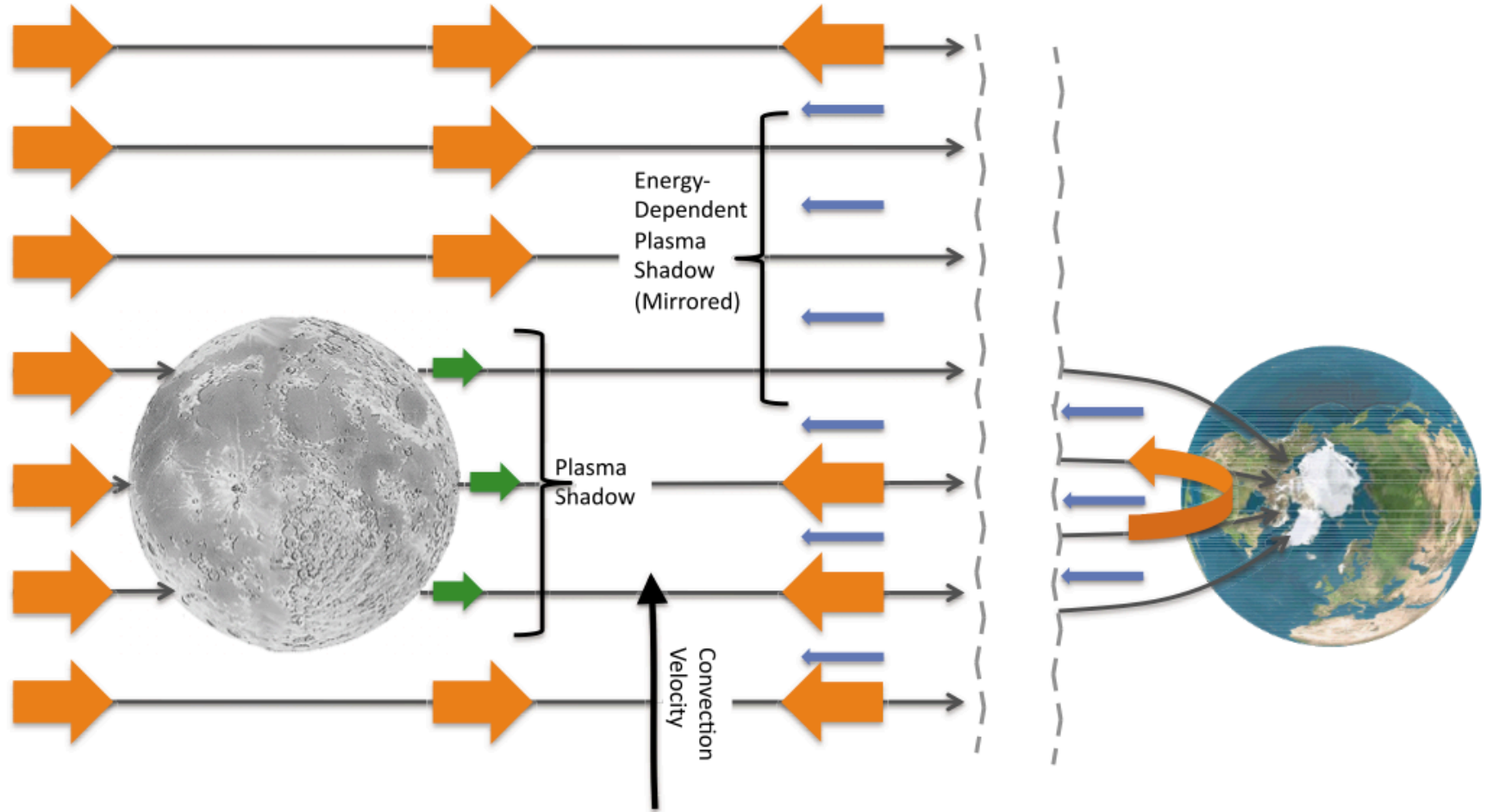
Sheath potential



Maximum Perp. Ion Energy [eV] vs. Mass, Convection Speed

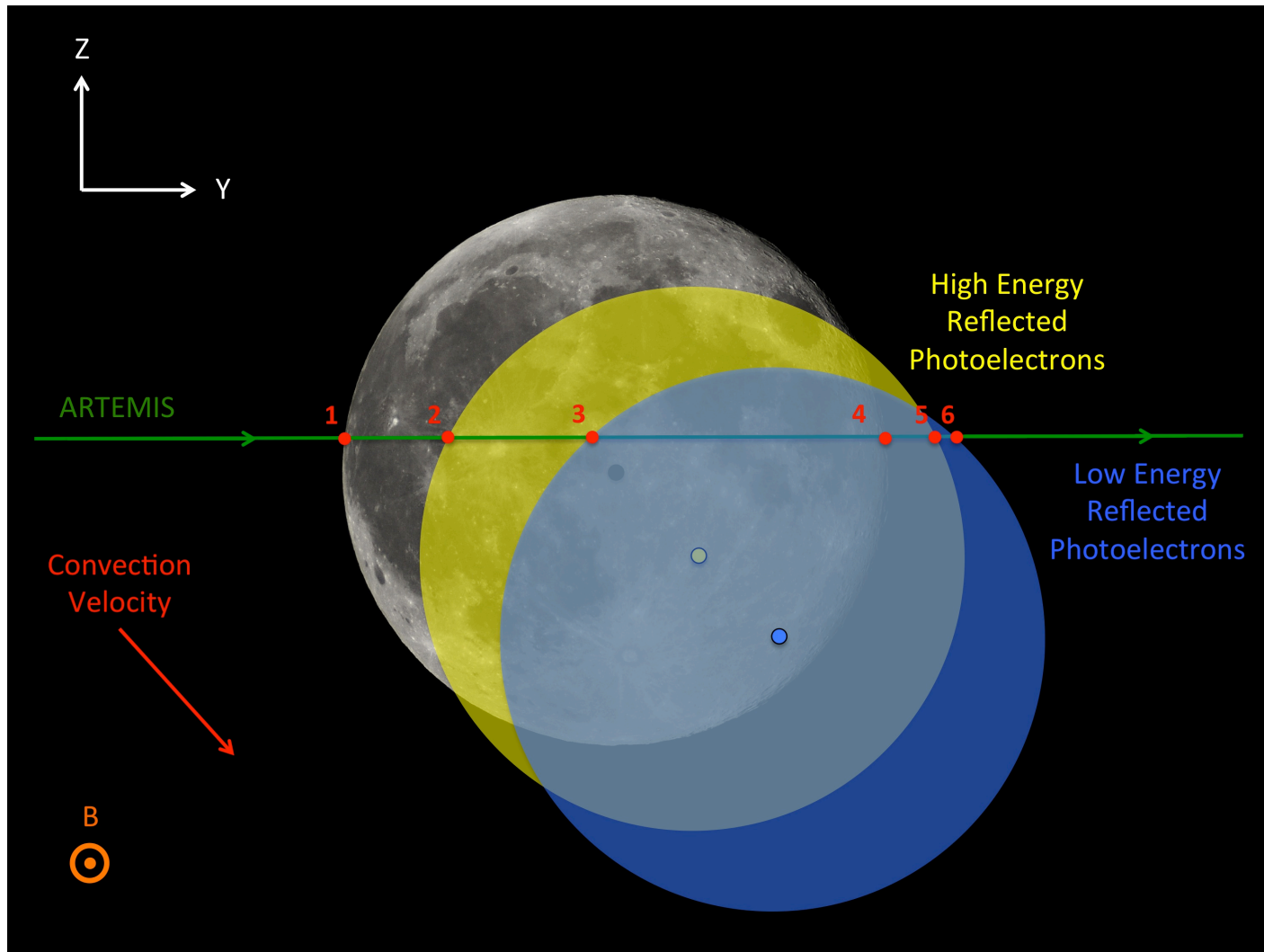


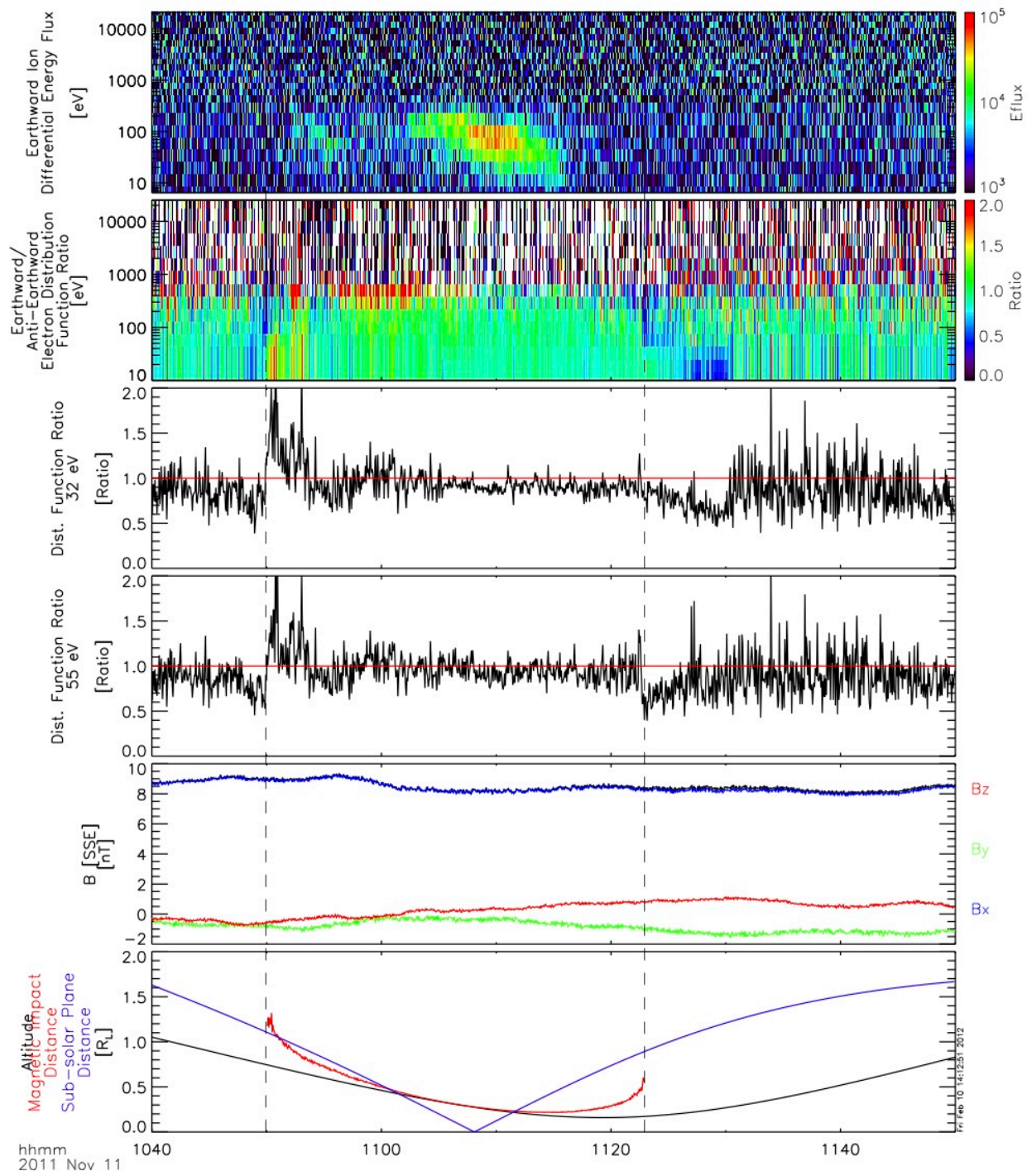
Convection Velocity



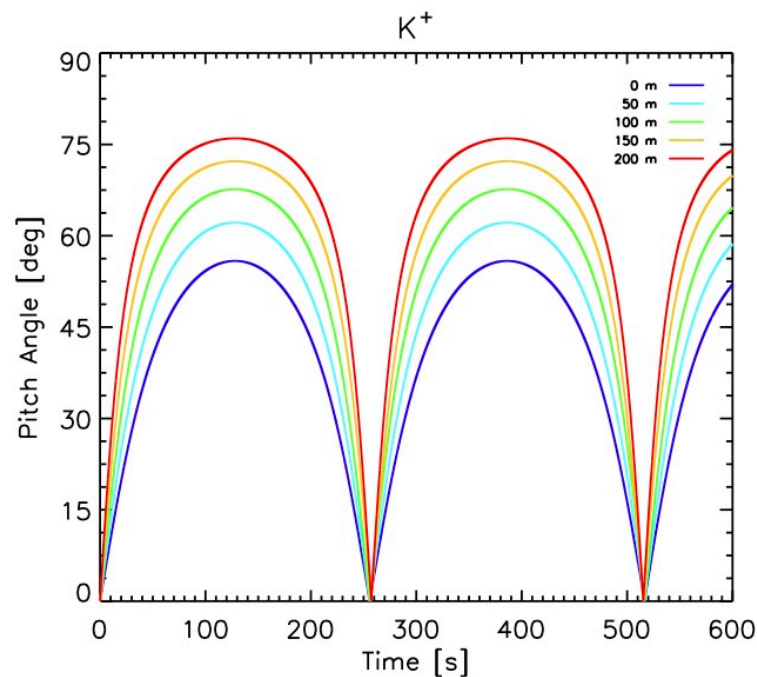
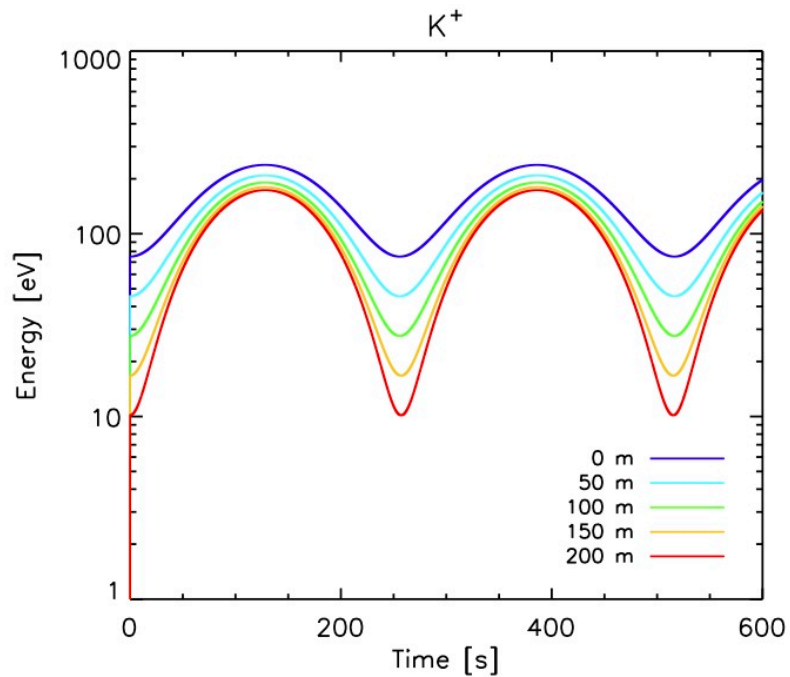
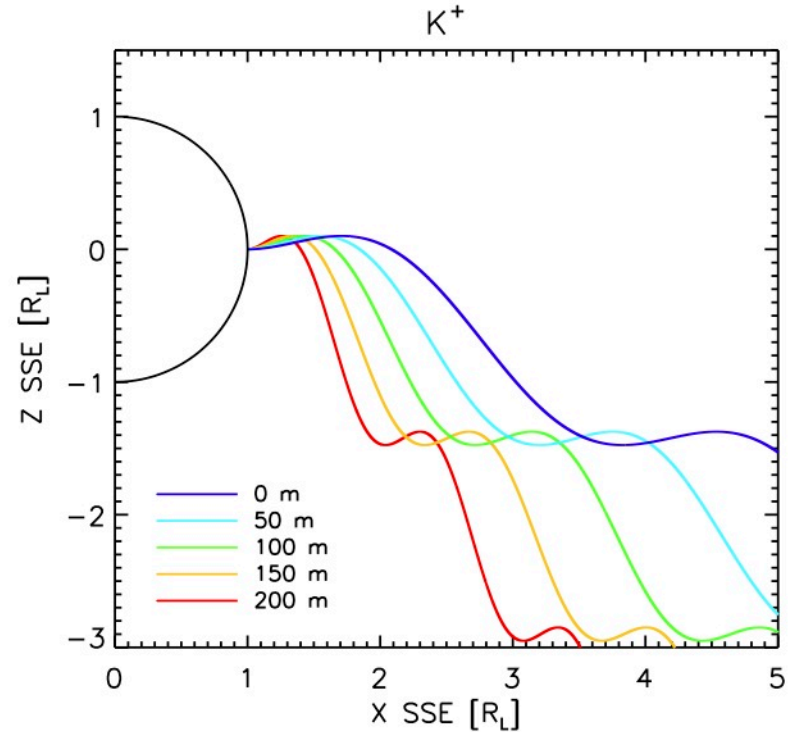
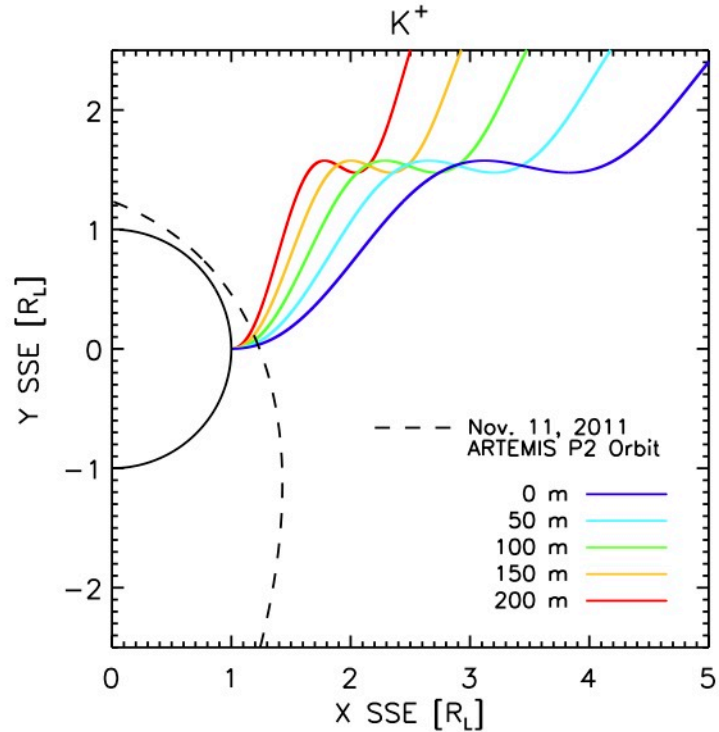
Halekas et al., 2011

Convection Velocity





hhmm
 2011 Nov 11



Summary and Future Work

- Observations of pick-up ions of lunar origin in the magnetotail lobes
- Centered at sub-solar point, possibly two discrete species
- Many pieces of information missing (convection velocity, ion mass), but working to constrain these as much as possible
- Use modeling to help understand pickup ion signatures
- Continuing to collect observations for statistics
 - 4-5 ARTEMIS dayside passes per spacecraft every tail crossing
 - Not every dayside pass in the tail lobes

