



Occurrence rate and dawn dusk asymmetry of fast flows near lunar orbit

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We use five years (2011-2015) of ARTEMIS data to statistically investigate earthward (EW) and tailward (TW) flows at around 60 RE downtail. We find that a significant portion of fast flows is directed EW. Depending on the flow speed, the EW directed flows contribute by 43 % (flows > 400 km/s) to 53 % (flows > 100 km/s) to the observed flows. As expected, EW (TW) flows are predominantly accompanied with positive (negative) Bz. A dawn-dusk asymmetry in the flow occurrence is seen for both EW and TW flows with about 50%-60% (60%-70%) of the EW (TW) flows occurring in the dusk sector. This asymmetry is stronger for TW than for EW flows and increases slightly with higher flow speeds. Considering only the flow component perpendicular to the magnetic field, the portion of EW flows reduces to about 30%-40%, depending on the flow speed. The dawn-dusk asymmetry is also seen in perpendicular flows. We conclude that EW flows contribute significantly to the totally observed magnetotail flows near lunar orbit. The stronger dawn-dusk asymmetry for TW flows compared to EW flows indicates that the dawn-dusk asymmetry is more pronounced closer to the Earth.