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Observational assessment on CME mass pile up in interplanetary space

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Coronal mass ejections (CMEs) propagating in the heliosphere are exposed to a drag force due to the ambient solar wind. Mass pile-up in interplanetary space can have strong effects on the drag force, and with that on the CME propagation time and energy input to the magnetosphere. For a sample of well observed events, we determine the de-projected 3D mass and its evolution up to a distance range of about 15Rs using combined STEREO-SECCHI COR1 and COR2 data, for which no pile-up at the CME front is found (see also Bein et al., 2013). Applying the GCS forward fitting model (Thernisien et al., 2006, 2009) on COR2 data, we obtain the volume of the CMEs. Working under the assumption that the CME mass is constant beyond 15Rs and that the CME undergoes self-similar expansion, we estimate the CME density at the distance of 1AU. The results are compared to in-situ proton density data measured for the associated ICME's sheath and magnetic structure for which we derive a trend towards a mass increase at the CME front.