



Figure S1: Histogram of S3A–S3B radar freeboard difference for tracks averaged on a 50x50km grid. The green line shows the mean difference ($\approx 0.053\text{cm}$). A total of 35 tracks from the 14th and 15th October 2018 were gridded and compared. During this period S3A and S3B were operating in tandem mode, with S3A trailing S3B by ~ 30 seconds in the same orbit. Sea ice drift during 30 seconds can be considered negligible, therefore we can assume that S3A and S3B are observing the same sea ice, and that differences are therefore the result of noise on individual freeboard measurements (see Wingham et al. (2006) for discussion of speckle noise on CS2 measurements). The standard deviation on the difference ($\approx 6\text{cm}$) provides an estimate of the uncertainty on 50km grid-averaged S3 and CS2 radar freeboard measurements.