Supplementary Information for “Winter Arctic sea ice thickness from ICESat-2: upgrades to freeboard and snow loading estimates and an assessment of the first three winters of data collection” by Petty et al.

5 Correspondence to: Alek A. Petty (alek.a.petty@nasa.gov)

Figure S1: (bottom row) number of 10 km along-track reference surfaces from the three strong beams from November 2018 to April 2019 for Release 002/rel002 (left) to Release 005/rel005 (right). Panels above show the difference in counts between releases.

Figure S2: (bottom row) number of 10 km along-track reference surfaces from November 2018 to April 2019 for beam 1/B1 (left) through beam 6/B6 (right) using Release 005 data only. Beams 1, 3 and 5 are strong, 2, 4 and 6 are weak. Panels above show the difference in counts between beams.

Figure S3: Region mask of the Arctic, preliminary mask provided by W. Meier & S. Stewart, National Snow and Ice Data Center (NSIDC). CA: Central Arctic, BS: Beaufort Sea, CS: Chukchi Sea, ESS: East Siberian Sea, LS: Laptev Sea, KS: Kara Sea, BaS: Barents Sea, EG: East Greenland Sea, GBB: Gulf of Bothnia, Baltic Sea, BB: Baffin Bay & Davis Strait, BeS: Bering Sea, SO: Sea of Okhotsk, GA: Gulf of Alaska. The Inner Arctic Ocean domain used in the main manuscript is defined as the combined area of the Central Arctic, Beaufort Sea, Chukchi Sea, E Siberian Sea, Laptev Sea and Kara Sea.

25

Figure S4: Comparison of the gridded consensus/MEDIAN Operation IceBridge (OIB) daily spring 2013 to 2015 snow depth estimates with gridded quick-look (QL) OIB snow depths.