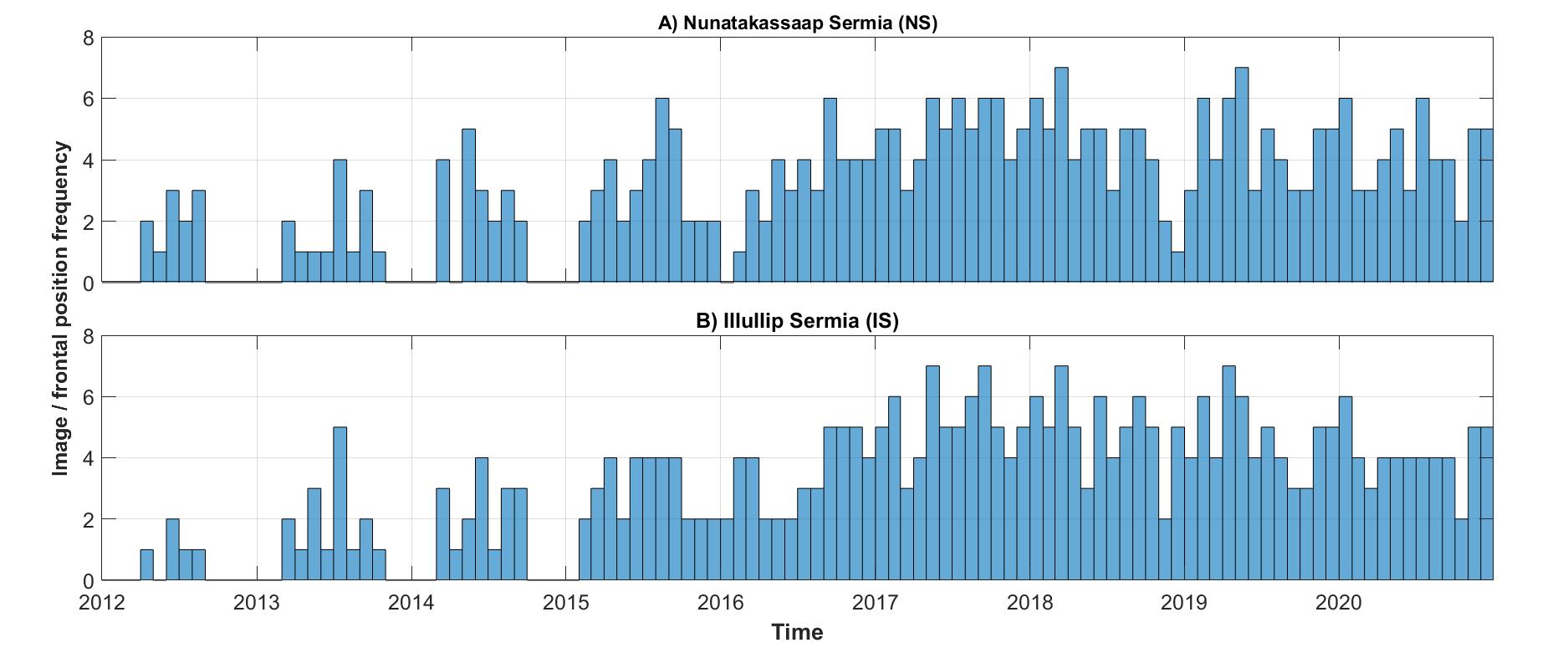
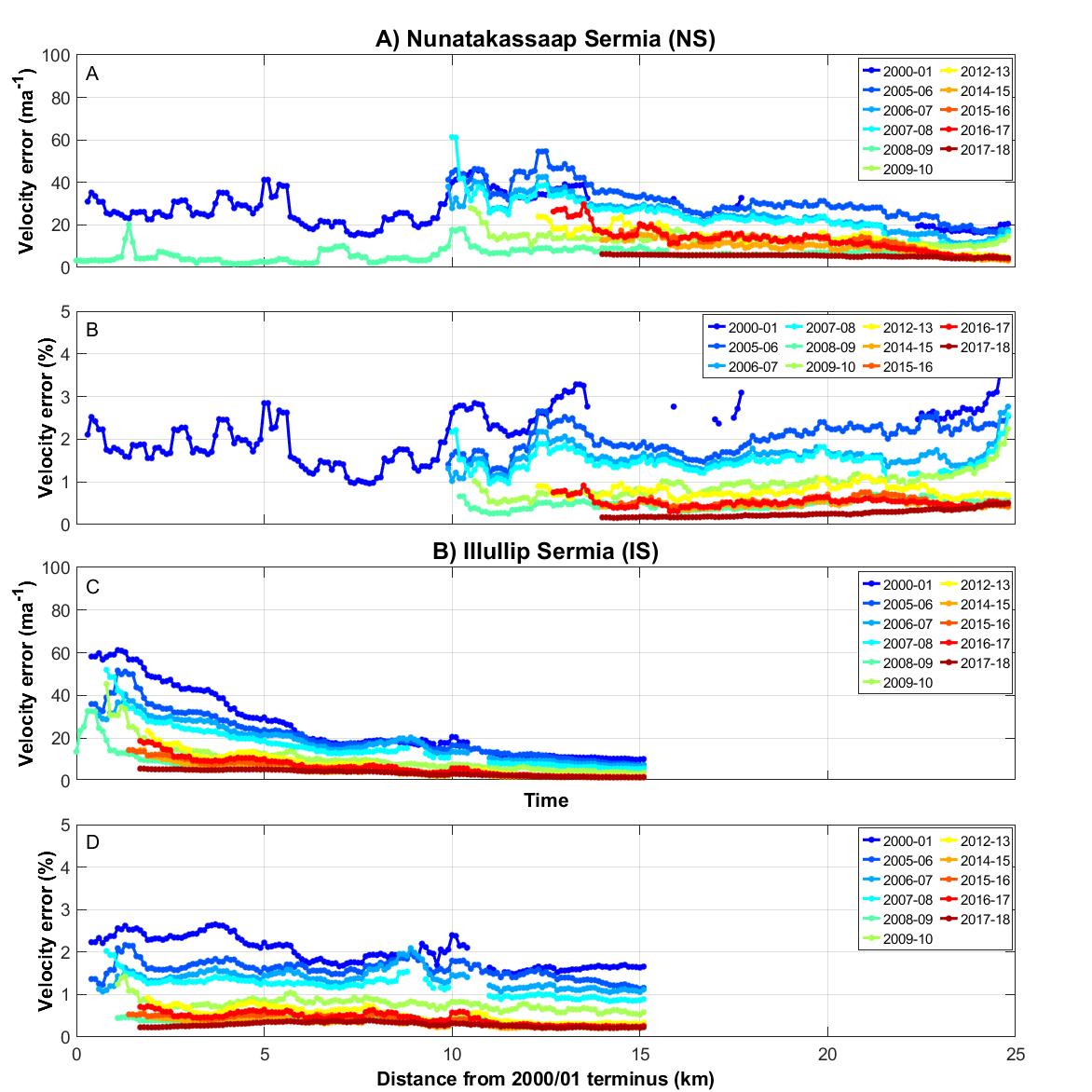
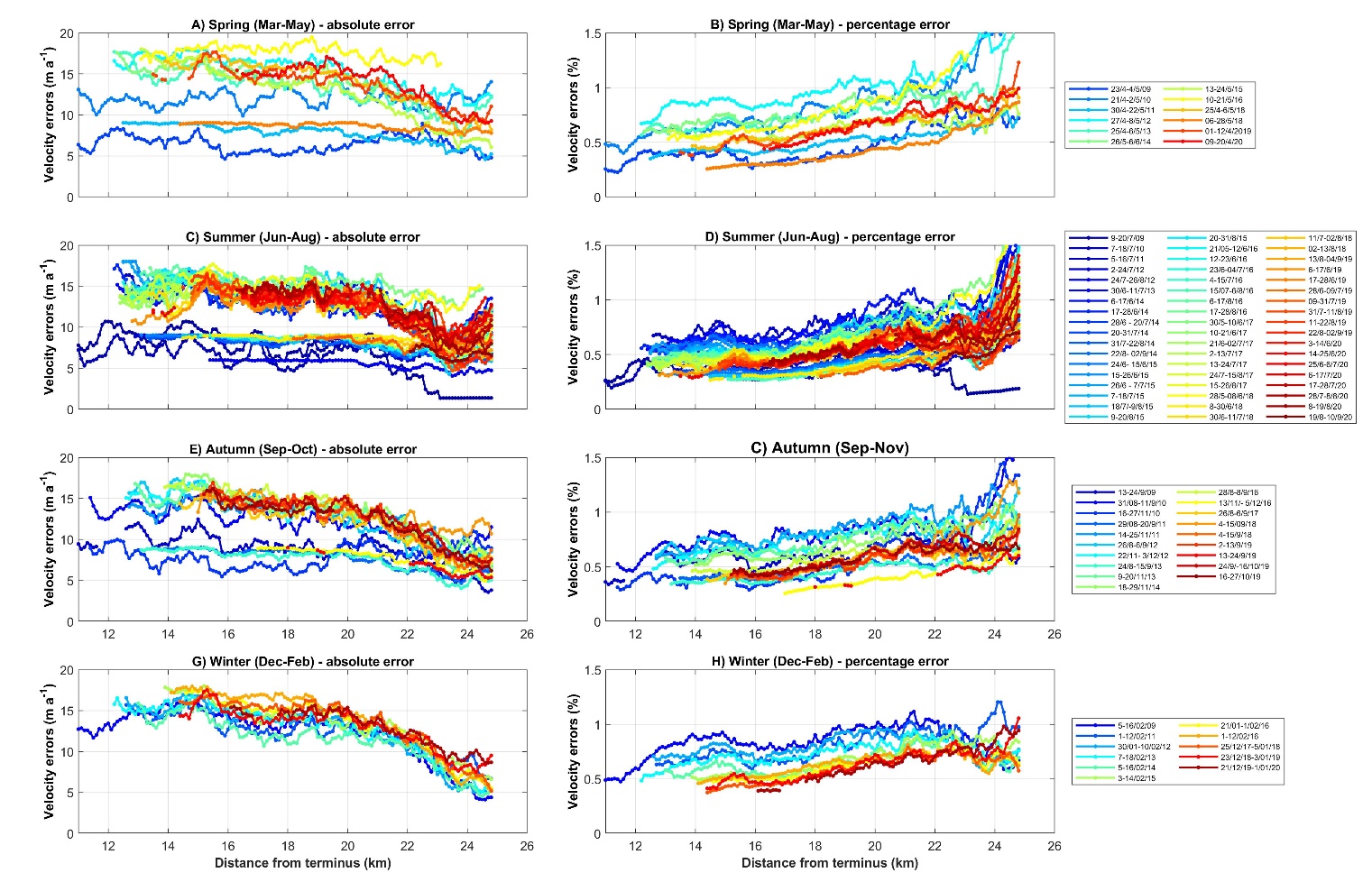
**Supplementary figures**



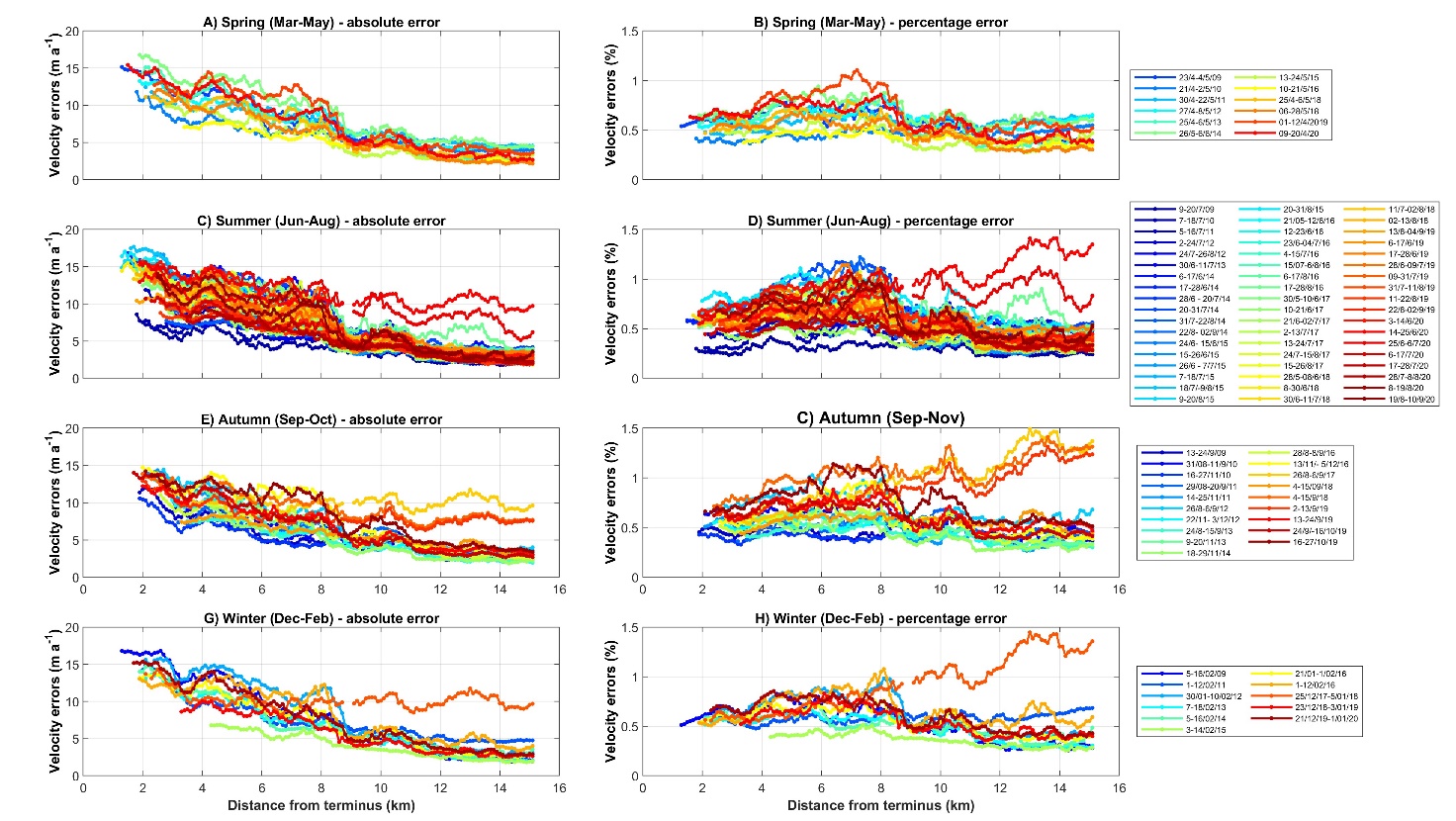
**Supplementary Information Figure 1**. Histogram of image, and hence frontal position, frequency during the study period for A) Nunatakssap Sermia (NS) and; B) Illullip Sermia (IS). Bar length indicates the number of images / terminus traces acquired during each month.



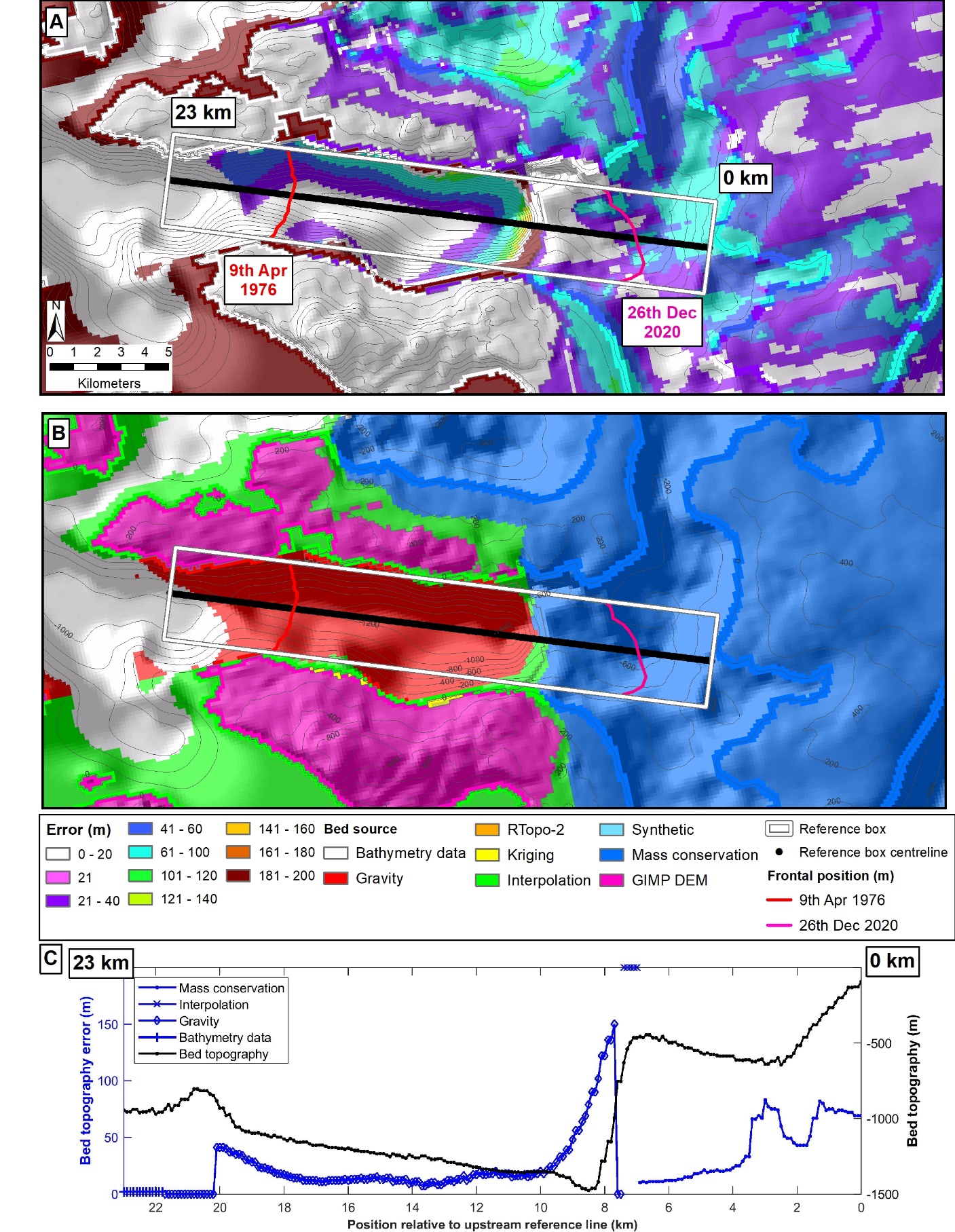
**Supplementary Information Figure 2**. Errors in interannual winter velocity dataset at NS (A & B) and IS (C & D), with absolute errors (A & C) and percentage errors (B & D). Ice velocity errors are colour-coded according to year of the winter velocity mosaic. Note that NS had a floating ice tongue in 2000-1, which had collapsed by the subsequent winter velocity mosaic in 2005-06. X-axis values are relative to the 2000-01 termini for each glacier. Source: MEaSUREs Greenland Ice Sheet Velocity Map from InSAR Data, Version 2 product (Joughin et al, 2015, updated 2018, Joughin et al, 2010).



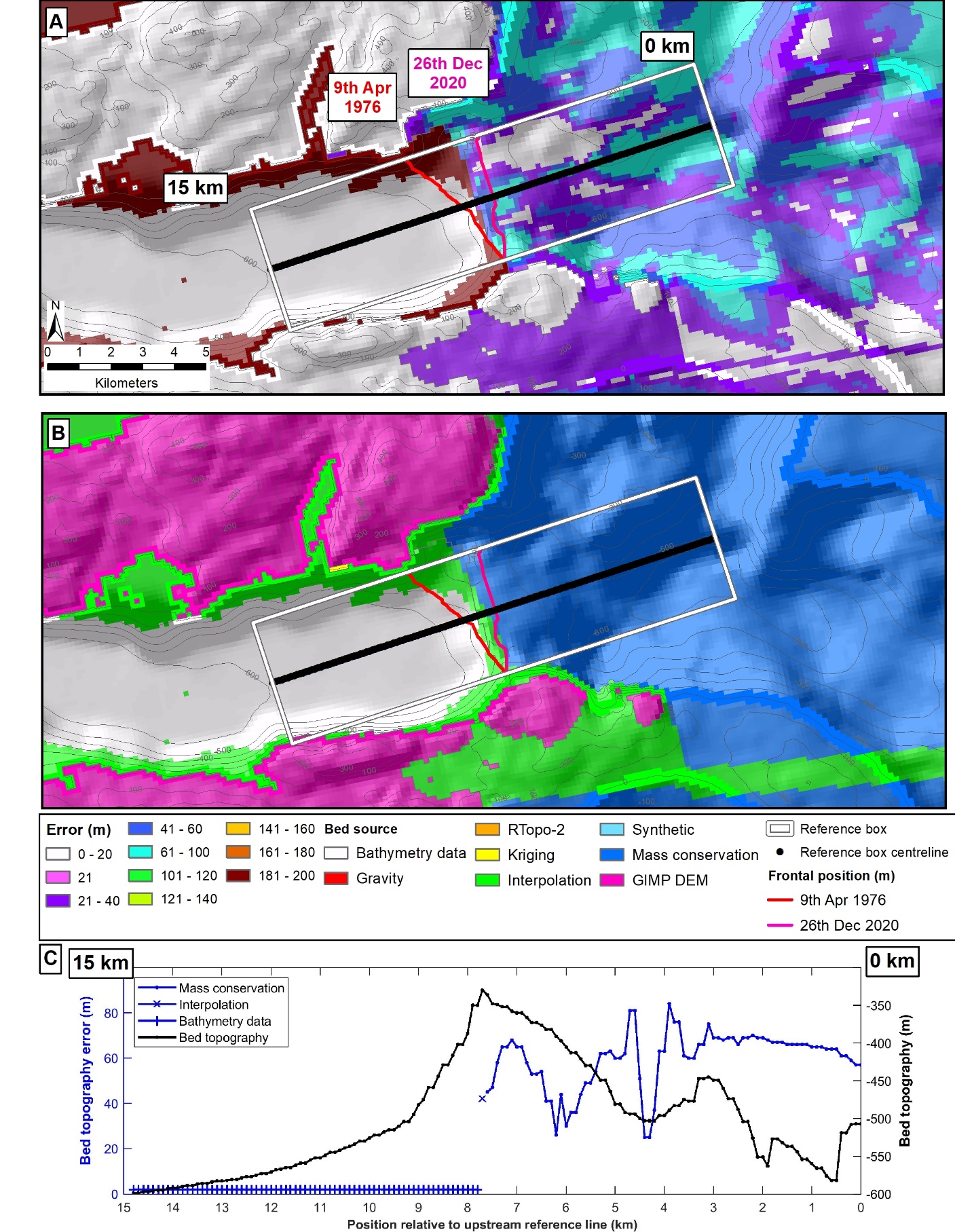
**Supplementary Information Figure 3**. Errors in seasonal ice velocities at Nunatakssap Sermia (NS), for spring (A & B); summer (C & D); autumn (E & F); and winter (G & H). Both absolute error (A,C,E & G) and percentage error (B,D,F & H) are given. Ice velocities are colour-coded according to date. X-axis values are relative to the 2000-01 termini for each glacier. Source: MEaSUREs Selected Glacier Site Velocity Maps generated from the InSAR Version 2 dataset were used to provide seasonal velocity data from 2009-2020 (Joughin et al, 2020).



**Supplementary Information Figure 4.** Errors in seasonal ice velocities at Illullip Sermia (IS), for spring (A & B); summer (C & D); autumn (E & F); and winter (G & H). Both absolute error (A,C,E & G) and percentage error (B,D,F & H) are given. Ice velocities are colour-coded according to date. X-axis values are relative to the 2000-01 termini for each glacier. Source: MEaSUREs Selected Glacier Site Velocity Maps generated from the InSAR Version 2 dataset were used to provide seasonal velocity data from 2009-2020 (Joughin et al, 2020).



**Supplementary information Figure 5**. Errors and data sources of basal topography data for Nunatakssap Sermia (NS). A) Errors in basal topography beneath NS and within its fjord, determined from BedMachine v3 (Morlighem et al., 2017). Contour interval is 200m. White box indicates the extent of the reference box used to digitise terminus positions and the terminus locations are marked for the earliest (9th Apr 1976; red) and latest (26th Dec 2020; pink) frontal positions available during the study period. B) Data sources for basal topography data.



**Supplementary information Figure 6**. Errors and data sources of basal topography data for Illullip Sermia (IS). A) Errors in basal topography beneath IS and within its fjord, determined from BedMachine v3 (Morlighem et al., 2017). Contour interval is 200m. White box indicates the extent of the reference box used to digitise terminus positions and the terminus locations are marked for the earliest (9th Apr 1976; red) and latest (26th Dec 2020; pink) frontal positions available during the study period. B) Data sources for basal topography data.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Dataset name | Data type | Spatial resolution | Temporal coverage | Temporal resolution | Filenames | Source |
| Operation IceBridge BedMachine Version 3 | Basal topography | 150 m, | N/A | N/A | BedMachineGreenland-2017-09-20.nc | Morlighem et al., 2017 |
| Arctic DEM | Surface elevation | 2 m | 20010-2017 | Weekly-monthly | SETSM\_W1W1\_20100829\_102001000EB97200\_102001000F10B700\_seg1\_2m\_v3.0\_dem.tif  SETSM\_W2W2\_20100516\_103001000500A200\_1030010005069700\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20110325\_102001001231C300\_1020010012D21900\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20110402\_1020010012934C00\_102001001211A500\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20110403\_10200100120C0100\_10200100129A8200\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20110411\_1020010012D16200\_10200100129BF800\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20110610\_1020010012A8D200\_102001001354D000\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20110610\_1020010013AA1900\_1020010012044900\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20110718\_1020010013804300\_10200100159A8D00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20110719\_1020010015159F00\_102001001537F900\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20110810\_102001001425C600\_10200100144A9500\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20110821\_102001001533A200\_1020010016BC7400\_seg3\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20120411\_102001001A262700\_102001001A27A600\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20120627\_102001001B5DA700\_102001001C367F00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20130310\_10200100200DB600\_10200100213C8900\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20150313\_102001003B94B200\_10200100381AAF00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20160427\_102001004CBC5800\_102001004EE0D700\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20160718\_102001005074FC00\_102001005397AE00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20160718\_10200100511F2D00\_10200100520AFB00\_seg8\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20160808\_10200100525C1100\_102001005216CD00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20160810\_1020010053C81000\_10200100553CDB00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20160815\_1020010055021B00\_102001005469F600\_seg7\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20160817\_1020010051AF4300\_1020010051812F00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20160912\_10200100571F7100\_102001005575BE00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20161004\_1020010056ABE600\_102001005689B900\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20170307\_102001005A7E2200\_102001005FA63F00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20170321\_102001005FAF2600\_102001005D2DAF00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20170628\_10200100654AC200\_102001006311E000\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20170705\_1020010064808900\_1020010065CB8500\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20170719\_102001006683D200\_1020010063971A00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20170724\_10200100635F6300\_10200100622CBB00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20170804\_10200100650D2100\_10200100657A3700\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20170905\_1020010066291600\_10200100678CD800\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV01\_20170927\_1020010066051E00\_1020010065088D00\_seg4\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20110325\_1030010009565300\_1030010009653900\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20110403\_103001000A7D9400\_103001000A87A000\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20110410\_103001000A2C3F00\_103001000ACDE700\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20120617\_1030010019715500\_1030010019718D00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20120719\_103001001A73FD00\_103001001A9B6B00\_seg8\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20120826\_103001001A1DFD00\_103001001B41B000\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20120826\_103001001C0AD300\_103001001A685300\_seg2\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20130410\_1030010021BB6700\_1030010021283500\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20140422\_103001003082B000\_103001002FA23900\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20150421\_103001004195DF00\_10300100406B1900\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20160321\_1030010052A9D900\_1030010053B0A300\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20160730\_103001005AD40F00\_103001005BBF4400\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20161016\_103001005E26B400\_103001005EC33A00\_seg3\_2m\_v3.0\_dem.tif  SETSM\_WV02\_20170324\_10300100674FEC00\_1030010066A13300\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV03\_20161019\_104001002432D000\_104001002472BA00\_seg2\_2m\_v3.0\_dem.tif  SETSM\_WV03\_20170222\_1040010029D40F00\_1040010028019900\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV03\_20170305\_104001002A7BA000\_104001002A4EBD00\_seg1\_2m\_v3.0\_dem.tif  SETSM\_WV03\_20170714\_104001002F624100\_104001002F829900\_seg1\_2m\_v3.0\_dem.tif | <https://www.pgc.umn.edu/>  guides/arcticdem/introduction-to-arcticdem/). |
| MEaSUREs Greenland Ice Sheet Velocity Map from InSAR Data, Version 2 | Ice velocity | 500 m | 2000-01 to 2017-18 | Annual (winter average) | greenland\_vel\_mosaic200\_2017\_2018\_vx\_v02.1.tif  greenland\_vel\_mosaic500\_2000\_2001\_vx\_v021.tif  greenland\_vel\_mosaic500\_2005\_2006\_vx\_v021.tif  greenland\_vel\_mosaic500\_2006\_2007\_vx\_v021.tif  greenland\_vel\_mosaic500\_2007\_2008\_vx\_v021.tif  greenland\_vel\_mosaic500\_2008\_2009\_vx\_v021.tif  greenland\_vel\_mosaic500\_2009\_2010\_vx\_v021.tif  greenland\_vel\_mosaic500\_2012\_2013\_vx\_v021.tif  greenland\_vel\_mosaic500\_2014\_2015\_vx\_v021.tif  greenland\_vel\_mosaic500\_2015\_2016\_vx\_v021.tif  greenland\_vel\_mosaic500\_2016\_2017\_vx\_v021.tif  greenland\_vel\_mosaic500\_2017\_2018\_vx\_v021.tif | (https://nsidc.org/data/NSIDC-0478/versions/2(Joughin et al., 2010b, 2015, updated 2018). |
| MEaSUREs Selected Glacier Site Velocity Maps generated from the InSAR Version 4 | Ice velocity | 100 m | 2009-2020 | Weekly to monthly | |  | | --- | | TSX\_W74.50N\_09Jul09\_20Jul09\_20-34-01\_vv\_v04.0.tif | | TSX\_W74.50N\_23Apr09\_04May09\_20-33-58\_vv\_v04.0.tif | | TSX\_W74.50N\_13Sep09\_24Sep09\_20-34-05\_vv\_v04.0.tif | | TSX\_W74.50N\_07Jul10\_18Jul10\_20-34-07\_vv\_v04.0.tif | | TSX\_W74.50N\_31Aug10\_11Sep10\_20-34-10\_vv\_v04.0.tif | | TSX\_W74.50N\_16Nov10\_27Nov10\_20-34-11\_vv\_v04.0.tif | | TSX\_W74.50N\_21Apr10\_02May10\_20-34-05\_vv\_v04.0.tif | | TSX\_W74.50N\_01Feb11\_12Feb11\_20-34-07\_vv\_v04.0.tif | | TSX\_W74.50N\_29Aug11\_20Sep11\_20-34-15\_vv\_v04.0.tif | | TSX\_W74.50N\_05Jul11\_16Jul11\_20-34-12\_vv\_v04.0.tif | | TSX\_W74.50N\_30Apr11\_22May11\_20-34-08\_vv\_v04.0.tif | | TSX\_W74.50N\_14Nov11\_25Nov11\_20-34-15\_vv\_v04.0.tif | | TSX\_W74.50N\_02Jul12\_24Jul12\_20-34-16\_vv\_v04.0.tif | | TSX\_W74.50N\_27Apr12\_08May12\_20-34-13\_vv\_v04.0.tif | | 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TSX\_W74.50N\_10Sep20\_21Sep20\_20-35-12\_vv\_v04.0.tif | | TSX\_W74.50N\_14Jun20\_25Jun20\_20-35-08\_vv\_v04.0.tif | | TSX\_W74.50N\_09Jul09\_20Jul09\_20-34-01\_vv\_v04.0.tif | | TSX\_W74.50N\_23Apr09\_04May09\_20-33-58\_vv\_v04.0.tif | | TSX\_W74.50N\_13Sep09\_24Sep09\_20-34-05\_vv\_v04.0.tif | | TSX\_W74.50N\_07Jul10\_18Jul10\_20-34-07\_vv\_v04.0.tif | | TSX\_W74.50N\_31Aug10\_11Sep10\_20-34-10\_vv\_v04.0.tif | | TSX\_W74.50N\_16Nov10\_27Nov10\_20-34-11\_vv\_v04.0.tif | | TSX\_W74.50N\_21Apr10\_02May10\_20-34-05\_vv\_v04.0.tif | | TSX\_W74.50N\_01Feb11\_12Feb11\_20-34-07\_vv\_v04.0.tif | | TSX\_W74.50N\_29Aug11\_20Sep11\_20-34-15\_vv\_v04.0.tif | | TSX\_W74.50N\_05Jul11\_16Jul11\_20-34-12\_vv\_v04.0.tif | | TSX\_W74.50N\_30Apr11\_22May11\_20-34-08\_vv\_v04.0.tif | | TSX\_W74.50N\_14Nov11\_25Nov11\_20-34-15\_vv\_v04.0.tif | | TSX\_W74.50N\_02Jul12\_24Jul12\_20-34-16\_vv\_v04.0.tif | | TSX\_W74.50N\_27Apr12\_08May12\_20-34-13\_vv\_v04.0.tif | | TSX\_W74.50N\_22Nov12\_03Dec12\_20-34-19\_vv\_v04.0.tif | | TSX\_W74.50N\_30Jan12\_10Feb12\_20-34-11\_vv\_v04.0.tif | | TSX\_W74.50N\_24Jul12\_26Aug12\_20-34-18\_vv\_v04.0.tif | | TSX\_W74.50N\_26Aug12\_06Sep12\_20-34-19\_vv\_v04.0.tif | | TSX\_W74.50N\_07Feb13\_18Feb13\_20-34-16\_vv\_v04.0.tif | | TSX\_W74.50N\_25Apr13\_06May13\_20-34-18\_vv\_v04.0.tif | | TSX\_W74.50N\_09Nov13\_20Nov13\_20-34-26\_vv\_v04.0.tif | | TSX\_W74.50N\_30Jun13\_11Jul13\_20-34-22\_vv\_v04.0.tif | | TSX\_W74.50N\_24Aug13\_15Sep13\_20-34-25\_vv\_v04.0.tif | | TSX\_W74.50N\_03Feb15\_14Feb15\_20-34-26\_vv\_v04.0.tif | | TSX\_W74.50N\_22Aug14\_02Sep14\_20-34-29\_vv\_v04.0.tif | | TSX\_W74.50N\_05Feb14\_16Feb14\_20-34-23\_vv\_v04.0.tif | | TSX\_W74.50N\_26May14\_06Jun14\_20-34-25\_vv\_v04.0.tif | | TSX\_W74.50N\_06Jun14\_17Jun14\_20-34-26\_vv\_v04.0.tif | | TSX\_W74.50N\_28Jun14\_20Jul14\_20-34-27\_vv\_v04.0.tif | | TSX\_W74.50N\_17Jun14\_28Jun14\_20-34-26\_vv\_v04.0.tif | | TSX\_W74.50N\_31Jul14\_22Aug14\_20-34-29\_vv\_v04.0.tif | | TSX\_W74.50N\_18Nov14\_29Nov14\_20-34-40\_vv\_v04.0.tif | | TSX\_W74.50N\_20Jul14\_31Jul14\_20-34-28\_vv\_v04.0.tif | | TSX\_W74.50N\_07Jul15\_18Jul15\_20-34-31\_vv\_v04.0.tif | | TSX\_W74.50N\_20Aug15\_31Aug15\_20-34-34\_vv\_v04.0.tif | | <https://nsidc.org/data/nsidc-0481/versions/> (Joughin et al., 2010a; Joughin et al., 2021) |

Supp. Info Table 1. List of all datasets used in the analysis, including bed data, surface elevation and ice velocities.

**Supplementary references**

Joughin, I., Smith, B., Howat, I. M., Scambos, T., and Moon, T., 2010a: Greenland flow variability from ice-sheet-wide velocity mapping. *Journal of Glaciology,* 56(197): 415-430.

Joughin, I., Smith, B. E., Howat, I., and Scambos, T., 2010b: MEaSUREs Greenland Ice Sheet Velocity Map from InSAR Data. Boulder, Colorado, USA: National Snow and Ice Data Center. Digital media.

Joughin, I., Smith, B. E., Howat, I., and Scambos, T., 2015, updated 2018: MEaSUREs Greenland Ice Sheet Velocity Map from InSAR Data, Version 2. *In* Boulder, C. U. (ed.). NASA National Snow and Ice Data Center Distributed Active Archive Center.

Joughin, I., Howat, I., Smith, B., and Scambos, T., 2021: MEaSUREs Greenland Ice Velocity: Selected Glacier Site Velocity Maps from InSAR, Version 4 [Data Set]. Boulder, Colorado USA.: NASA National Snow and Ice Data Center Distributed Active Archive Center.