

Supplementary Materials

Table S1. Pit observations used for snow pit conditions analysis and SnowModel data assimilation.

PitID	Date/Local Time	Easting	Northing	Campaign	Pit analysis	SnowModel
COGMSO_20191219	2019-12-19T16:00	754270	4325785	Time Series		x
COGMCO_20191220	2019-12-20T10:30	756903	4324357	Time Series		x
COGMCO_20200122	2020-01-22T10:15	756903	4324357	Time Series	x	x
COGMSO_20200122	2020-01-22T14:55	754270	4325785	Time Series	x	x
COGM2N4_20200128	2020-01-28T11:25	740811	4324488	IOP		x
COGM1N6_20200128	2020-01-28T13:20	741510	4324472	IOP		x
COGM3N22_20200128	2020-01-28T13:55	743509	4324117	IOP		x
COGM3N53_20200128	2020-01-28T15:31	747302	4323917	IOP	x	x
COGM2S25_20200129	2020-01-29T08:50	745161	4322395	IOP	x	x
COGM1S1_20200129	2020-01-29T09:05	741920	4322845	IOP		x
COGM2S48_20200129	2020-01-29T09:10	747670	4322397	IOP		x
COGM2S3_20200129	2020-01-29T10:35	742155	4322840	IOP		x
COGM3S5_20200129	2020-01-29T12:10	742531	4322632	IOP		x
COGM3S47_20200129	2020-01-29T12:56	747487	4322259	IOP		x
COGM2S36_20200129	2020-01-29T13:38	745711	4322356	IOP	x	x
COGM2S35_20200130	2020-01-30T13:10	745678	4322446	IOP		x
COGM2C33_20200130	2020-01-30T15:00	745787	4322066	IOP	x	x
COGM2C2_20200131	2020-01-31T09:00	740652	4327445	IOP	x	x
COGM2N12_20200131	2020-01-31T09:05	742466	4324372	IOP		x
COGM2C4_20200131	2020-01-31T10:05	740839	4327345	IOP		x
COGM1C7_20200131	2020-01-31T10:55	741378	4326992	IOP		x
COGM1C1_20200131	2020-01-31T11:07	740508	4327577	IOP		x

COGM2C9_20200131	2020-01-31T11:50	741580	4326713	IOP		x
COGM2C3_20200131	2020-01-31T12:27	740765	4327379	IOP		x
COGM1C14_20200131	2020-01-31T14:01	742453	4325752	IOP		x
COGM2C6_20200131	2020-01-31T14:05	741132	4327061	IOP		x
COGM1C8_20200131	2020-01-31T15:10	741493	4326833	IOP	x	x
COGM2S37_20200201	2020-02-01T08:40	745937	4322754	IOP	x	
COGM2N48_20200201	2020-02-01T14:51	746802	4324222	IOP	x	
COGM2S46_20200204	2020-02-04T10:30	747466	4322453	IOP	x	
COGM3S33_20200204	2020-02-04T11:24	745529	4322471	IOP		
COGM3S52_20200204	2020-02-04T14:43	748777	4322533	IOP		
COGM2S27_20200204	2020-02-04T15:15	745251	4322588	IOP	x	
COGM2S4_20200205	2020-02-05T09:30	742304	4322496	IOP	x	
COGM2S10_20200205	2020-02-05T09:45	743076	4322689	IOP		
COGM2S9_20200205	2020-02-05T10:55	743083	4322876	IOP		
COGM1S13_20200205	2020-02-05T13:15	743277	4322508	IOP	x	
COGM1N20_20200205	2020-02-05T13:30	743281	4324005	IOP		
COGM2S20_20200206	2020-02-06T08:47	744458	4322697	IOP	x	x
COGM2N13_20200206	2020-02-06T09:32	742685	4324287	IOP		
COGM1C1_20200208	2020-02-08T08:30	740506	4327589	IOP	x	x
COGM1N1_20200208	2020-02-08T08:56	740503	4324293	IOP		x
COGM1S2_20200208	2020-02-08T09:37	742115	4322712	IOP		x
COGM2N8_20200208	2020-02-08T09:51	742054	4324454	IOP		x
COGM2S7_20200208	2020-02-08T11:35	742605	4322584	IOP		x
COGM3N26_20200208	2020-02-08T13:25	743728	4324258	IOP		x
COGM2S16_20200208	2020-02-08T14:05	743950	4322638	IOP		x

COGM1S17_20200208	2020-02-08T15:30	743987	4322748	IOP	x	x
COGM2S45_20200210	2020-02-10T08:44	747316	4322396	IOP	x	x
COGM2N49_20200210	2020-02-10T15:16	746800	4323946	IOP	x	x
COGM1S12_20200211	2020-02-11T09:17	743158	4322557	IOP	x	x
COGM1N3_20200211	2020-02-11T11:08	740759	4324208	IOP		x
COGM2S6_20200211	2020-02-11T11:25	742602	4322943	IOP		
COGM2N14_20200211	2020-02-11T13:00	742850	4324221	IOP		x
COGM1N7_20200211	2020-02-11T13:40	741866	4324050	IOP		x
COGM2N21_20200211	2020-02-11T15:00	743466	4324104	IOP		x
COGM1N5_20200211	2020-02-11T15:04	741369	4324492	IOP		x
COGM1N23_20200211	2020-02-11T15:50	743548	4324077	IOP	x	x
COGM2C12_20200212	2020-02-12T08:48	742229	4326414	IOP	x	x
COGMCO_20200212	2020-02-12T08:52	756903	4324357	Time Series		x
COGM2C13_20200212	2020-02-12T10:12	742229	4326011	IOP		x
COGM1C5_20200212	2020-02-12T11:26	740919	4327334	IOP		x
COGMSO_20200212	2020-02-12T12:52	754270	4325785	Time Series	x	x
COGMSO_20200225	2020-02-25T15:00	754270	4325785	Time Series	x	
COGMCO_20200226	2020-02-26T07:15	756903	4324357	Time Series	x	
COGMCO_20200304	2020-03-04T09:21	756903	4324357	Time Series	x	
COGMSO_20200304	2020-03-04T15:50	754270	4325785	Time Series	x	
mw_o_am_030520_0809	2020-03-05T08:09	741079	4324261	Pathfinder	x	
sw_o_pm_030620_1705	2020-03-06T17:05	754044	4325657	Pathfinder	x	
COGMCO_20200312	2020-03-12T09:50	756903	4324357	Time Series	x	
sw_o_pm_031220_1622	2020-03-12T16:22	754269	4325786	Pathfinder	x	
mw_o_am_031620_0941	2020-03-16T09:41	754268	4325786	Pathfinder	x	

mw_o_pm_031620_1619	2020-03-16T16:19	741085	4324297	Pathfinder	x	
COGMCO_20200318	2020-03-18T09:25	756903	4324357	Time Series	x	
COGMCO_20200321	2020-03-21T10:30	754270	4325785	Time Series	x	
sw_o_am_032120_1106	2020-03-21T11:06	754267	4325870	Pathfinder		x
sw_o_am_032820_1000	2020-03-28T10:00	754310	4326542	Pathfinder	x	x
cl_o_am_032520_1104	2020-03-28T11:04	756903	4324352	Pathfinder		x
sw_o_pm_032820_1714	2020-03-28T17:14	754272	4325781	Pathfinder	x	x
mw_o_am_033120_1034	2020-03-31T10:34	741146	4324202	Pathfinder	x	
mw_o_pm_033120_1630	2020-03-31T16:30	741147	4324210	Pathfinder	x	x
sw_o_am_040620_0750	2020-04-06T07:50	754306	4326535	Pathfinder	x	x
sw_o_pm_040620_1700	2020-04-06T17:00	754308	4326539	Pathfinder	x	x
mw_o_pm_040820_1651	2020-04-08T16:51	741161	4324240	Pathfinder	x	x
mw_o_am_040920_0650	2020-04-09T06:50	741161	4324223	Pathfinder	x	x
mw_o_pm_040920_1318	2020-04-09T13:18	741144	4324213	Pathfinder		x
mw_o_pm_040920_1715	2020-04-09T17:15	741158	4324242	Pathfinder	x	x
cl_o_pm_041720_1609	2020-04-17T16:09	741157	4324241	Pathfinder	x	x
sw_o_pm_041920_1700	2020-04-19T17:00	754287	4325780	Pathfinder	x	x
sw_o_am_042120_0653	2020-04-21T06:53	754258	4325768	Pathfinder	x	x
sw_o_pm_042120_1726	2020-04-21T17:26	754258	4325772	Pathfinder	x	x
sw_o_pm_042220_1612	2020-04-22T16:12	754251	4325772	Pathfinder	x	
sw_o_pm_042220_1612	2020-04-22T16:12	754251	4325772	Pathfinder		x
sw_o_am_050320_0702	2020-05-03T07:02	754242	4325757	Pathfinder	x	X
sw_o_pm_050320_1910	2020-05-03T19:10	754242	4325761	Pathfinder	x	X
mw_o_am_033120_1034	2020/03/31T10:34	741146	4324202	Pathfinder		x

Table S2. Sentinel-1 data used. Images in bold are used to create the reference image.

Filename	Date	Orbit
S1B_IW_GRDH_1SDV_20190709T010936_20190709T011001_017050_02013B_7853	7/8/19	Ascending
S1A_IW_GRDH_1SDV_20190708T131810_20190708T131835_028026_032A4A_C2C4	7/8/19	Descending
S1B_IW_GRDH_1SDV_20190721T010937_20190721T011002_017225_020651_23A9	7/20/19	Ascending
S1A_IW_GRDH_1SDV_20190720T131811_20190720T131836_028201_032F90_8269	7/20/19	Descending
S1B_IW_GRDH_1SDV_20190802T010937_20190802T011002_017400_020B89_DF67	8/1/19	Ascending
S1A_IW_GRDH_1SDV_20190801T131811_20190801T131836_028376_0334E6_8F20	8/1/19	Descending
S1B_IW_GRDH_1SDV_20190814T010938_20190814T011003_017575_0210E8_90B4	8/13/19	Ascending
S1A_IW_GRDH_1SDV_20190813T131813_20190813T131837_028551_033A9B_D5E1	8/13/19	Descending
S1B_IW_GRDH_1SDV_20190826T010939_20190826T011004_017750_021663_E38A	8/25/19	Ascending
S1A_IW_GRDH_1SDV_20190825T131813_20190825T131838_028726_0340A6_4872	8/25/19	Descending
S1B_IW_GRDH_1SDV_20190907T010939_20190907T011004_017925_021BCA_FA55	9/6/19	Ascending
S1A_IW_GRDH_1SDV_20190906T131814_20190906T131839_028901_0346C1_22F8	9/6/19	Descending
S1B_IW_GRDH_1SDV_20190919T010940_20190919T011005_018100_022143_AAC0	9/18/19	Ascending
S1A_IW_GRDH_1SDV_20190918T131814_20190918T131839_029076_034CCF_8BC6	9/18/19	Descending
S1B_IW_GRDH_1SDV_20191001T010940_20191001T011005_018275_0226A6_0FDD	9/30/19	Ascending
S1A_IW_GRDH_1SDV_20190930T131815_20190930T131840_029251_0352D6_E0CA	9/30/19	Descending
S1B_IW_GRDH_1SDV_20191013T010940_20191013T011005_018450_022C1F_36A8	10/12/19	Ascending
S1A_IW_GRDH_1SDV_20191012T131815_20191012T131840_029426_0358D7_B2F8	10/12/19	Descending
S1B_IW_GRDH_1SDV_20191025T010940_20191025T011005_018625_023176_C3E5	10/24/19	Ascending
S1A_IW_GRDH_1SDV_20191024T131814_20191024T131839_029601_035ED9_DAA2	10/24/19	Descending
S1B_IW_GRDH_1SDV_20191106T010940_20191106T011005_018800_02370F_FD7A	11/5/19	Ascending
S1A_IW_GRDH_1SDV_20191105T131815_20191105T131840_029776_0364FB_60D7	11/5/19	Descending

S1B_IW_GRDH_1SDV_20191118T010940_20191118T011005_018975_023CC1_6172	11/17/19	Ascending
S1A_IW_GRDH_1SDV_20191117T131815_20191117T131840_029951_036B1F_33D0	11/17/19	Descending
S1B_IW_GRDH_1SDV_20191130T010940_20191130T011005_019150_02424E_DD1D	11/29/19	Ascending
S1A_IW_GRDH_1SDV_20191129T131814_20191129T131839_030126_03712F_DE0C	11/29/19	Descending
S1B_IW_GRDH_1SDV_20191212T010939_20191212T011004_019325_0247E1_FBED	12/11/19	Ascending
S1A_IW_GRDH_1SDV_20191211T131814_20191211T131839_030301_037735_C13A	12/11/19	Descending
S1B_IW_GRDH_1SDV_20191224T010939_20191224T011004_019500_024D70_FA02	12/23/19	Ascending
S1A_IW_GRDH_1SDV_20191223T131813_20191223T131838_030476_037D42_8E3A	12/23/19	Descending
S1B_IW_GRDH_1SDV_20200105T010938_20200105T011003_019675_025301_B53F	1/4/20	Ascending
S1A_IW_GRDH_1SDV_20200104T131813_20200104T131838_030651_03834B_6A1C	1/4/20	Descending
S1B_IW_GRDH_1SDV_20200117T010938_20200117T011003_019850_025891_F1C8	1/16/20	Ascending
S1A_IW_GRDH_1SDV_20200116T131812_20200116T131837_030826_038969_E6FF	1/16/20	Descending
S1B_IW_GRDH_1SDV_20200129T010937_20200129T011002_020025_025E2E_144D	1/28/20	Ascending
S1A_IW_GRDH_1SDV_20200128T131812_20200128T131837_031001_038F93_A88D	1/28/20	Descending
S1B_IW_GRDH_1SDV_20200210T010937_20200210T011002_020200_0263E1_8F2C	2/9/20	Ascending
S1A_IW_GRDH_1SDV_20200209T131811_20200209T131836_031176_0395AB_AB82	2/9/20	Descending
S1B_IW_GRDH_1SDV_20200222T010937_20200222T011002_020375_02697B_3BDB	2/21/20	Ascending
S1A_IW_GRDH_1SDV_20200221T131811_20200221T131836_031351_039BB0_BE85	2/21/20	Descending
S1B_IW_GRDH_1SDV_20200305T010937_20200305T011002_020550_026F12_CCFE	3/4/20	Ascending
S1A_IW_GRDH_1SDV_20200304T131811_20200304T131836_031526_03A1C0_915A	3/4/20	Descending
S1B_IW_GRDH_1SDV_20200317T010937_20200317T011002_020725_0274A1_0B86	3/16/20	Ascending
S1A_IW_GRDH_1SDV_20200316T131811_20200316T131836_031701_03A7CE_F347	3/16/20	Descending
S1B_IW_GRDH_1SDV_20200329T010937_20200329T011002_020900_027A23_2AB6	3/28/20	Ascending
S1A_IW_GRDH_1SDV_20200328T131811_20200328T131836_031876_03ADF5_7618	3/28/20	Descending
S1B_IW_GRDH_1SDV_20200410T010937_20200410T011002_021075_027FB0_144D	4/9/20	Ascending

S1A_IW_GRDH_1SDV_20200409T131812_20200409T131837_032051_03B426_DCE8	4/9/20	Descending
S1B_IW_GRDH_1SDV_20200422T010938_20200422T011003_021250_028536_9431	4/21/20	Ascending
S1A_IW_GRDH_1SDV_20200421T131812_20200421T131837_032226_03BA4B_5765	4/21/20	Descending
S1B_IW_GRDH_1SDV_20200504T010939_20200504T011004_021425_028AC6_E83C	5/3/20	Ascending
S1A_IW_GRDH_1SDV_20200503T131813_20200503T131838_032401_03C074_B419	5/3/20	Descending
S1B_IW_GRDH_1SDV_20200516T010939_20200516T011004_021600_029016_5D5E	5/15/20	Ascending
S1A_IW_GRDH_1SDV_20200515T131814_20200515T131839_032576_03C5F1_415F	5/15/20	Descending
S1B_IW_GRDH_1SDV_20200528T010940_20200528T011005_021775_029543_8791	5/27/20	Ascending
S1A_IW_GRDH_1SDV_20200527T131814_20200527T131839_032751_03CB3E_0754	5/27/20	Descending
S1B_IW_GRDH_1SDV_20200609T010941_20200609T011006_021950_029A81_E39D	6/8/20	Ascending
S1A_IW_GRDH_1SDV_20200608T131815_20200608T131840_032926_03D065_2B8B	6/8/20	Descending
S1B_IW_GRDH_1SDV_20200621T010941_20200621T011006_022125_029FD3_31CA	6/20/20	Ascending
S1A_IW_GRDH_1SDV_20200620T131816_20200620T131841_033101_03D5B3_6D8F	6/20/20	Descending

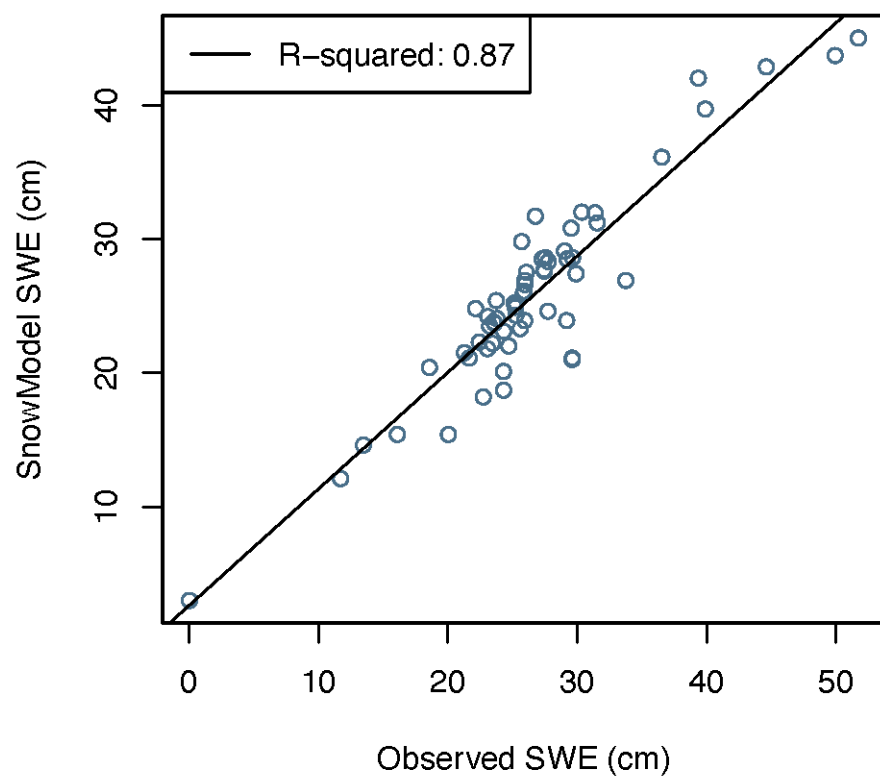


Figure S1. Comparison of SnowModel simulated and field-measured SWE. Adjusted R-squared of 0.87.