Spatio-temporal Patterns of High Mountain Asia's Snowmelt Season Identified with an Automated Snowmelt Detection Algorithm, 1987-2016

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Properties of Passive Microwave Sensors

Table S 1 – Characteristics of PM sensors. Temporal coverage, number of orbits, and processing algorithms.

Satellite	Temporal Coverage	Number of Orbits Used (Descending/Ascending)	Processing Level/Algorithm
SSMI	Aug 1987 - Apr 2009 (22 years)	176,460/176,460	FCDR V07
SSMI/S	Jan 2008 - Apr 2015 (7 years)	41,896/41,896	FCDR V07
AMSR-E	May 2002 - Oct 2011 (9 years)	49,083/49,079	L1B
AMSR2	Jul 2012 - Oct 2016 (4 years)	28,510/28,506	L1R
GPM	Feb 2014 - Oct 2016 (2.5 years)	7,359/7,359	L1B

Flowchart of Melt Tracking Algorithm

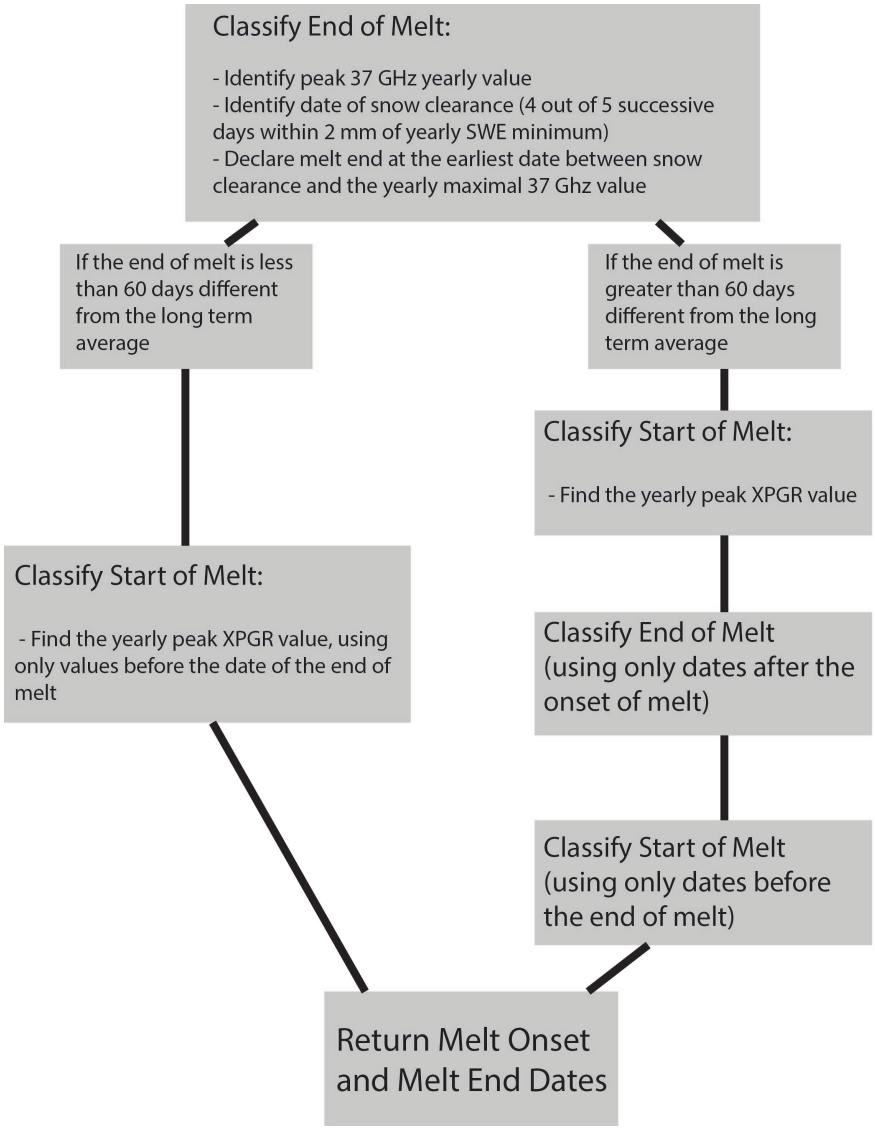

Figure S 1 – Flowchart illustrating the steps for the melt tracking algorithm.

Linear Matching Regression Parameters

	SSMI-AMSR			SSMI-SSMIS			SSMIS-AMSR2			AMSR2-GPM		
Tb_{37V}:	*Mean*	*STD*	*Range*	*Mean*	*STD*	*Range*	*Mean*	*STD*	*Range*	*Mean*	*STD*	*Range*
Int.:	-19.6	35.8	1.08e+03	-11.8	27	1e+03	-27.9	41.9	995	-4.11	35.9	937
Slp.:	1.08	0.145	4.12	1.05	0.113	4.12	1.11	0.168	3.99	1.02	0.145	3.78
***p*-val:**	5.61e-08	4.82e-06	0.000413	6.75e-15	5.79e-13	4.97e-11	2.24e-17	1.92e-15	1.65e-13	2.72e-19	2.19e-17	1.87e-15
Tb_{18H}:	*Mean*	*STD*	*Range*	*Mean*	*STD*	*Range*	*Mean*	*STD*	*Range*	*Mean*	*STD*	*Range*
Int.:	-22	39.9	1.14e+03	-22	25.5	1e+03	-32.4	45.4	1.05e+03	-3.17	41.5	989
Slp.:	1.1	0.164	4.2	1.12	0.115	3.82	1.13	0.188	3.88	0.995	0.167	3.59
***p*-val:**	1.3e-05	0.00079	0.0525	0.000122	0.0104	0.894	3.07e-05	0.00184	0.128	3.14e-29	2.69e-27	2.31e-25

Hierarchical Clustering Metrics

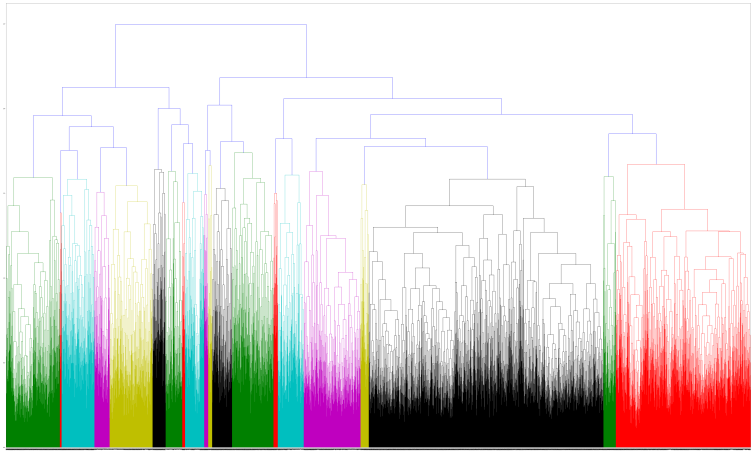

Figure S 2 – Hierarchical clustering Dendrogram.

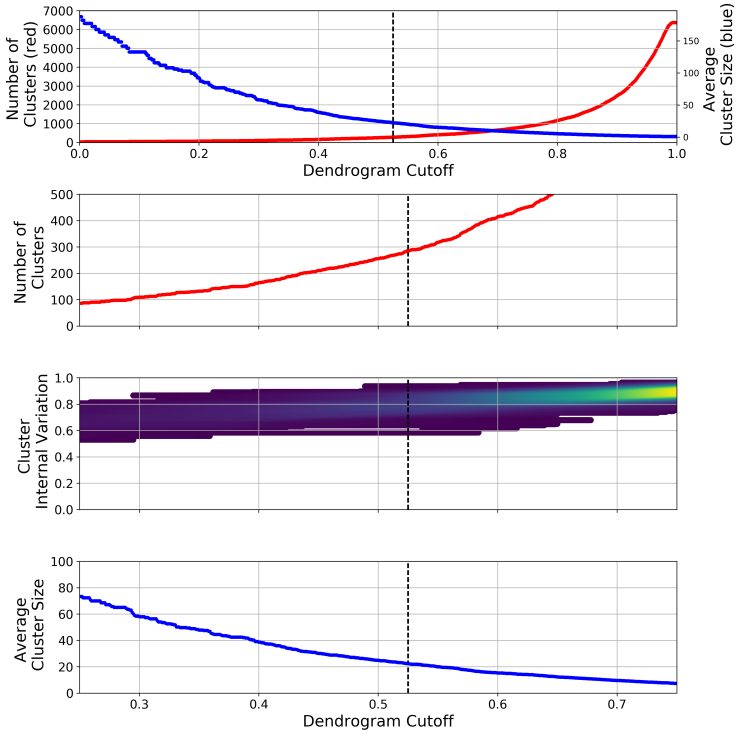

Figure S 3 – Metrics used to choose the hierarchical clustering distance threshold. Chosen threshold shown on each chart in black.

Impact of Analysis Timeframe

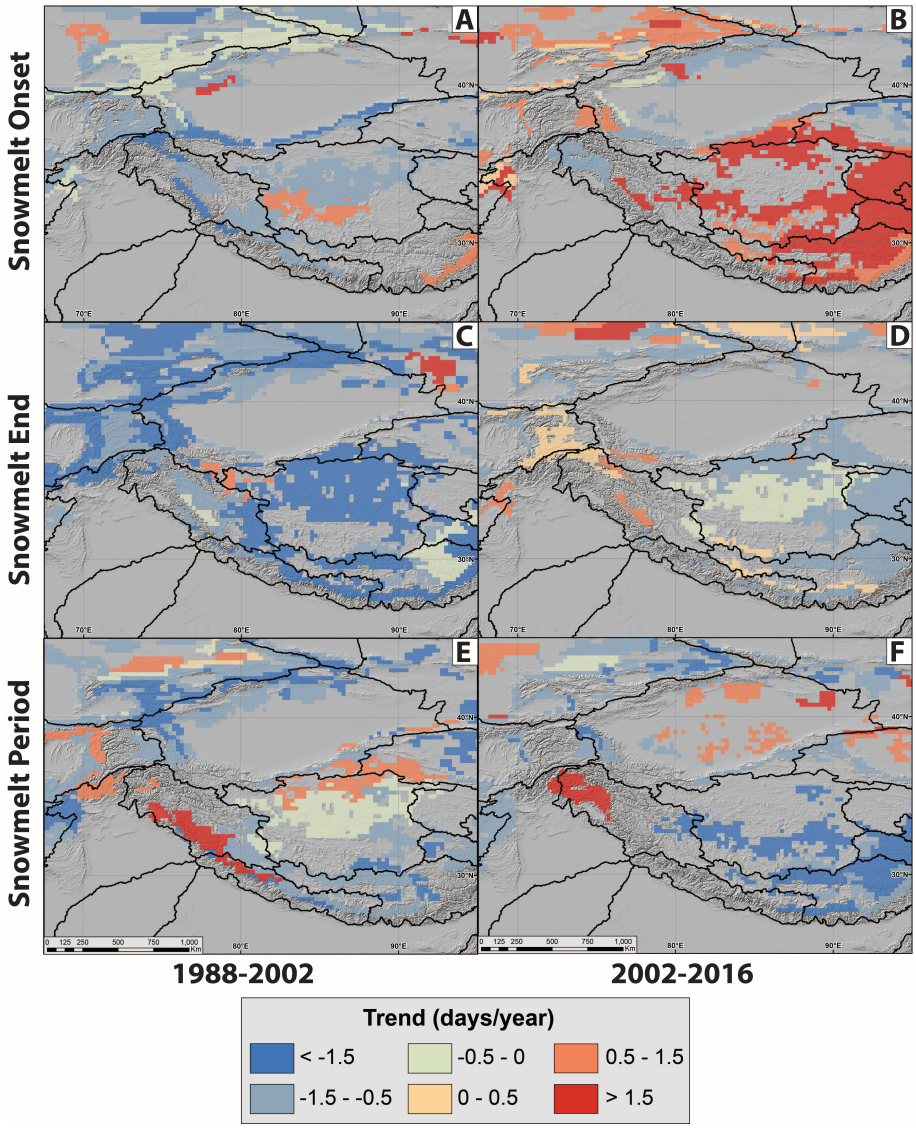

Figure S 4 – Impact of analysis timeframe on (A, B) snowmelt onset, (C,D) snowmelt end, and (E,F) snowmelt period. The onset date shows a reversal of trend in many regions, from negative to positive. Some snowmelt end dates have also reversed in trend.