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Spring snow albedo feedback over northern Eurasia: Comparing in situ measurements with reanalysis products

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Table 1: List of combined snow and albedo measuring stations used in this study

#	WMO ID	Name	Lat	Lon
1	37099	Sochi	43.5	39.8
2	31959	Rudnaja Pristan	44.4	135.9
3	34740	Gigant	46.5	41.3
4	34646	Chimljansk GMO	47.7	42.1
5	31707	Ekaterino-Nikolskoe	47.7	131.0
6	34561	Volgograd SHI	48.7	44.4
7	31770	Sovetskaja Gavan	49.0	140.3
8	31586	Konstantinovka	49.6	127.9
9	30954	Mangut	49.7	112.7
10	30965	Borzja	50.4	116.5
11	32071	Tjmovskoe	50.7	142.7
12	34139	Kamennaja Step	51.1	40.7
13	30209	Ershov	51.4	48.3
14	30825	Ivolginsk	51.8	107.3
15	34059	Rostoshi	51.9	43.7
16	30758	Chita	52.1	113.5
17	31416	Polinj Osipenko	52.4	136.5
18	31510	Blagovezchenka	52.8	79.8
19	29849	Kuzedeevo	53.3	87.2
20	30554	Bagdarin	54.5	113.6
21	31174	Bol'shoy Shantar	58.8	137.5
22	28624	Kusharenkovo	55.1	55.4
23	28561	Pamjatnaja	56.0	65.7
24	29664	Nazarovo	56.0	90.3
25	29580	Soljanka	56.2	95.3
26	30337	Kazachinskoe	56.3	107.7
27	32389	Kljuchi	56.3	160.8
28	28445	Verhnee Dubrovo	56.7	61.1
29	30252	Mamakan	57.8	114.0
30	29263	Eniseysk	58.4	92.2
31	31004	Aldan	58.6	125.4
32	31088	Ohotsk	59.4	143.2
33	25913	Magadan	59.5	150.7
34	24908	Vanavara	60.3	102.3
35	24817	Erbogachen	61.3	107.9
36	23707	Ust -Vjm'	62.2	50.4
37	25705	Srednikan	62.4	152.3
38	23734	Oktiabr'skoe	52.4	66.0
39	24507	Tura	64.3	100.3
40	23514	Irael	64.4	55.2
41	23552	Tarko-Sale	64.9	77.8
42	23472	Turukhansk	65.8	87.9
43	24382	Ust' Moma	66.5	143.2
44	23330	Salehard GMO	65.5	66.6
45	22324	Umba	66.7	34.3
46	23220	Elechkaja	67.1	64.1
47	24125	Olenek	68.5	112.4

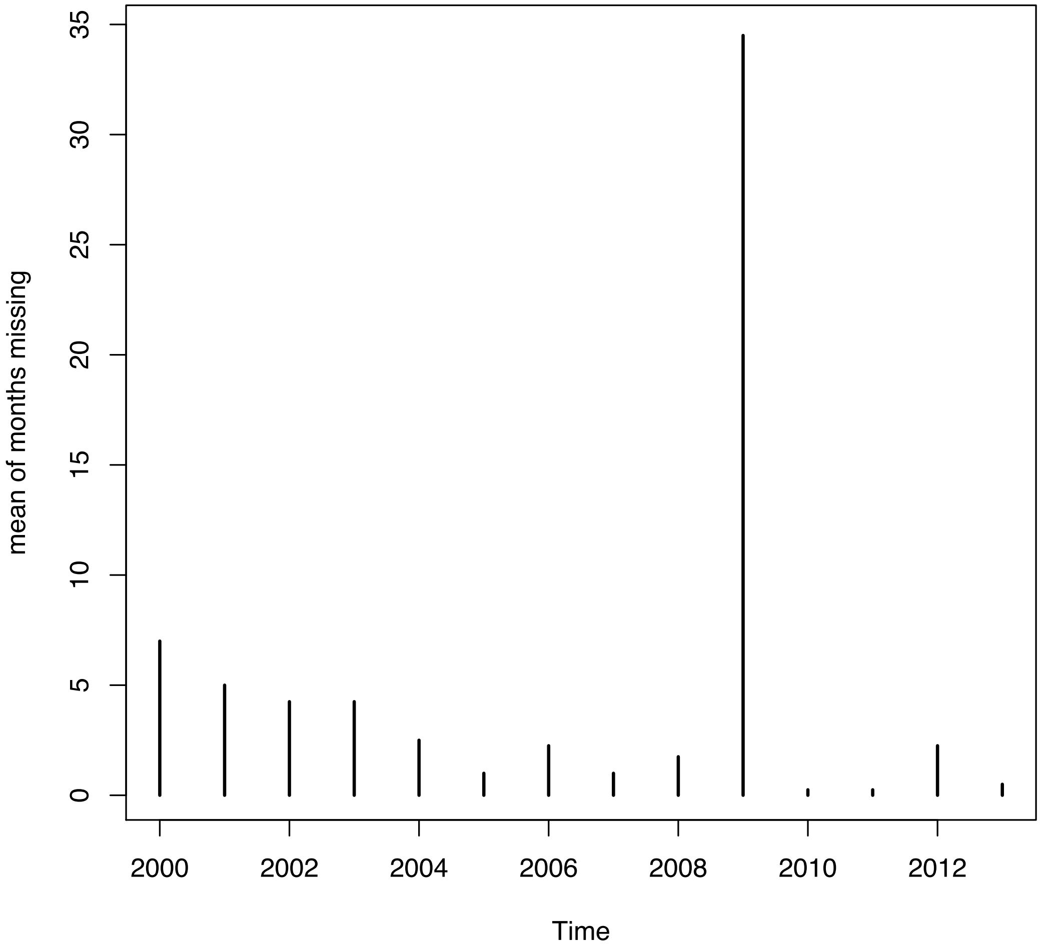

Figure 1: Average amount of missing values per year within the 44 station network for MAMJ

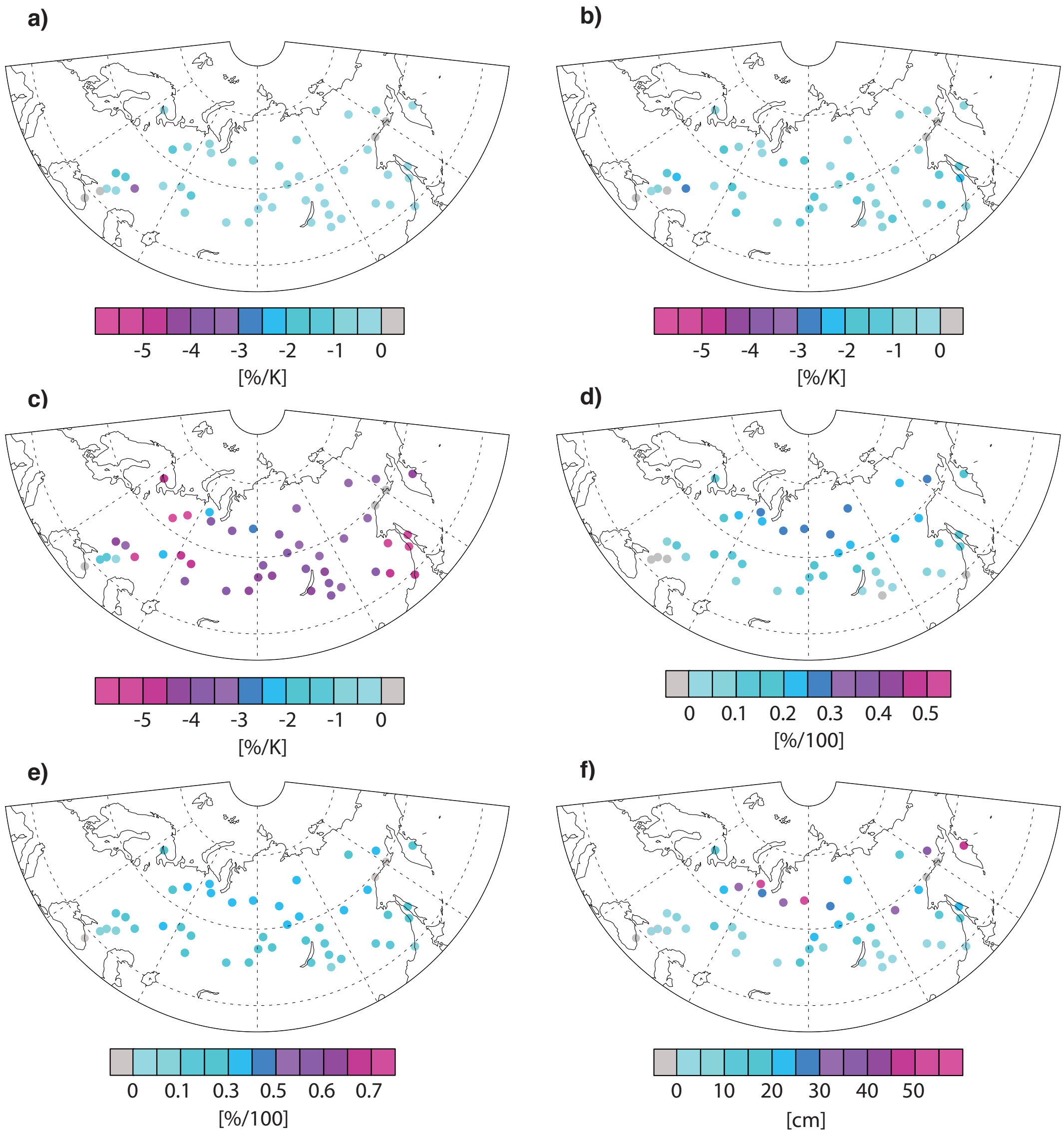

Figure 2: Same as for Figure 3 in the main document but for MERRA2.

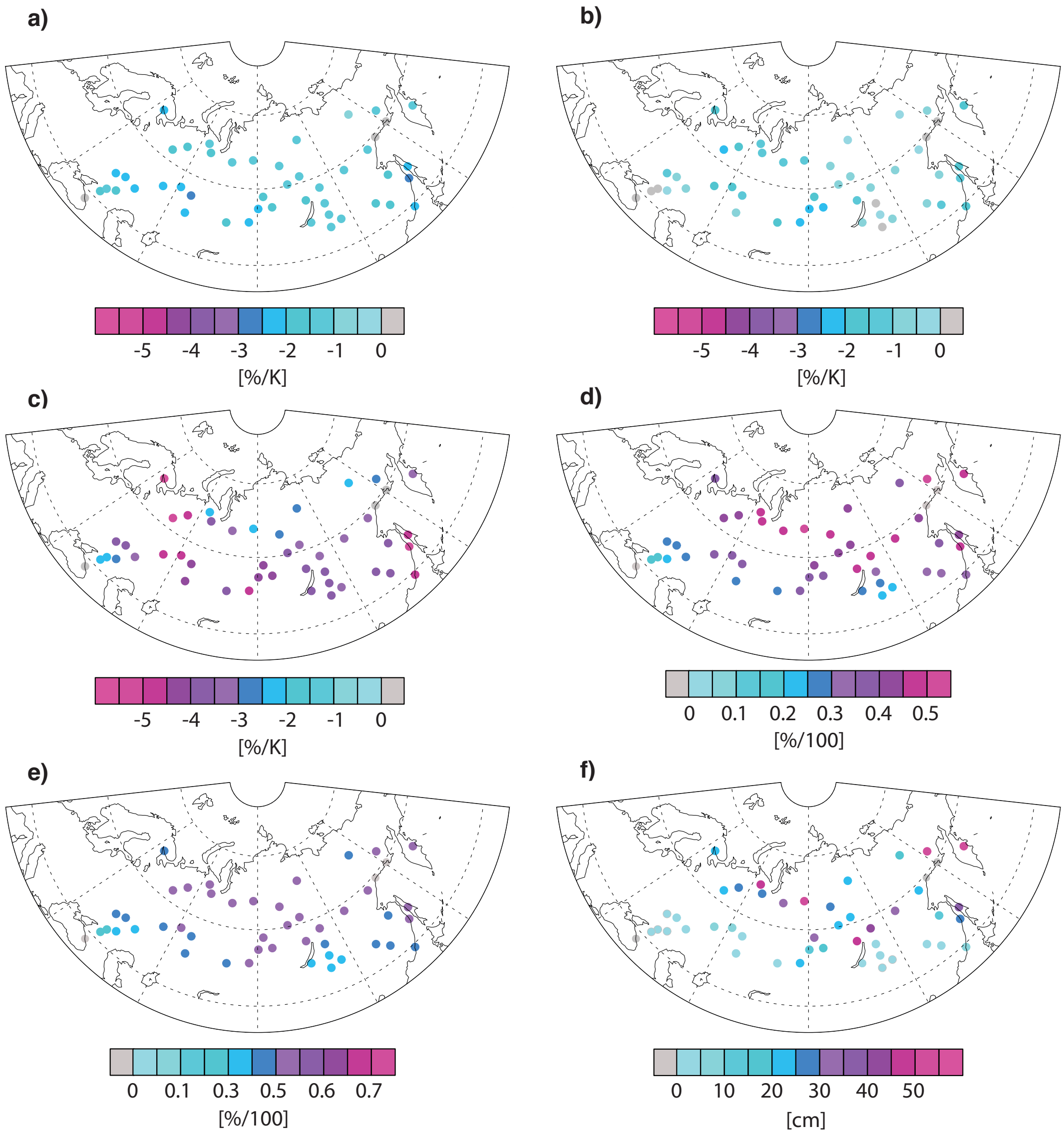

Figure 3: Same as for Figure 3 in the main document but for ERAI-LG.

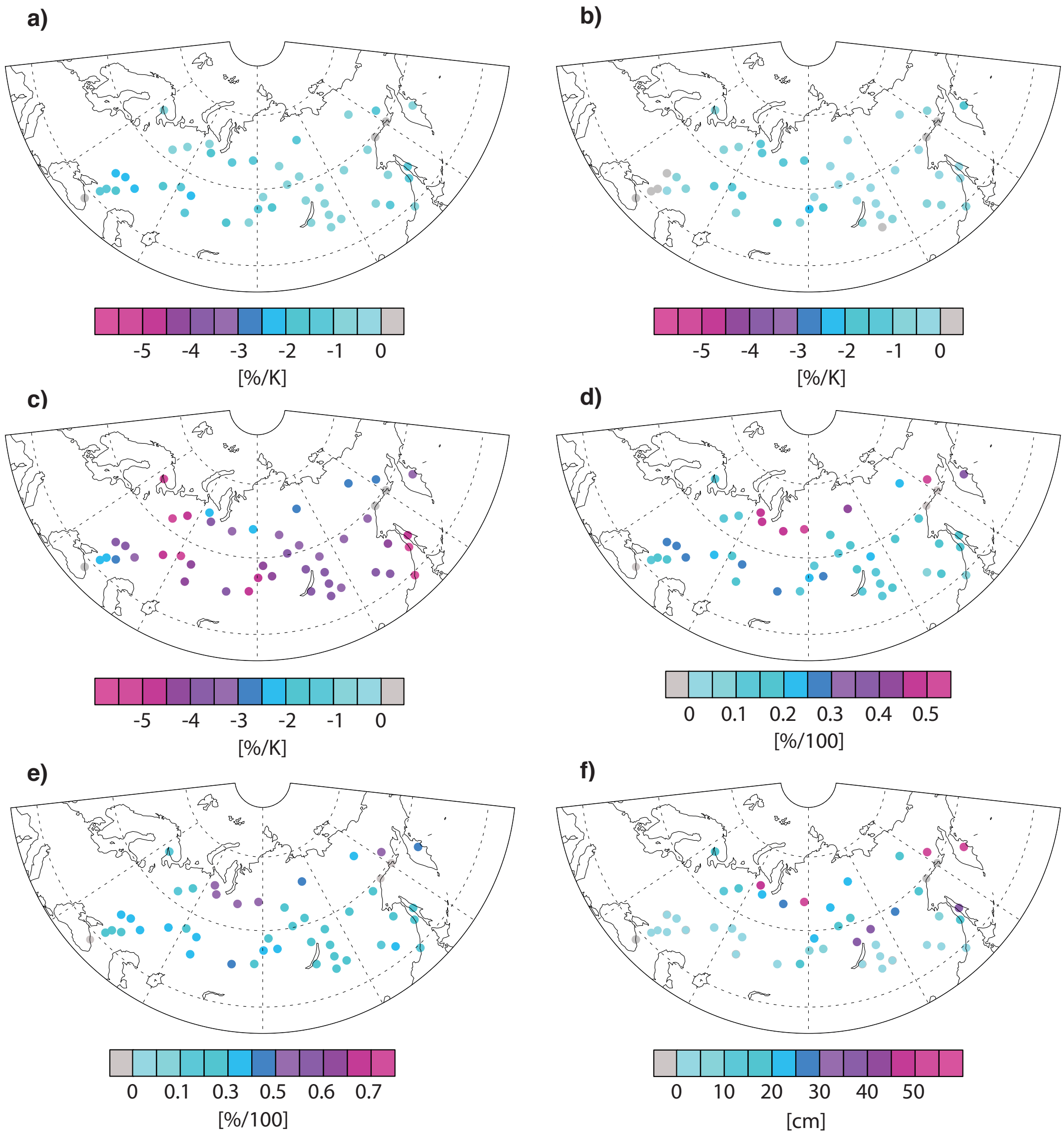

Figure 4: Same as for Figure 3 in the main document but for ERAI-L.

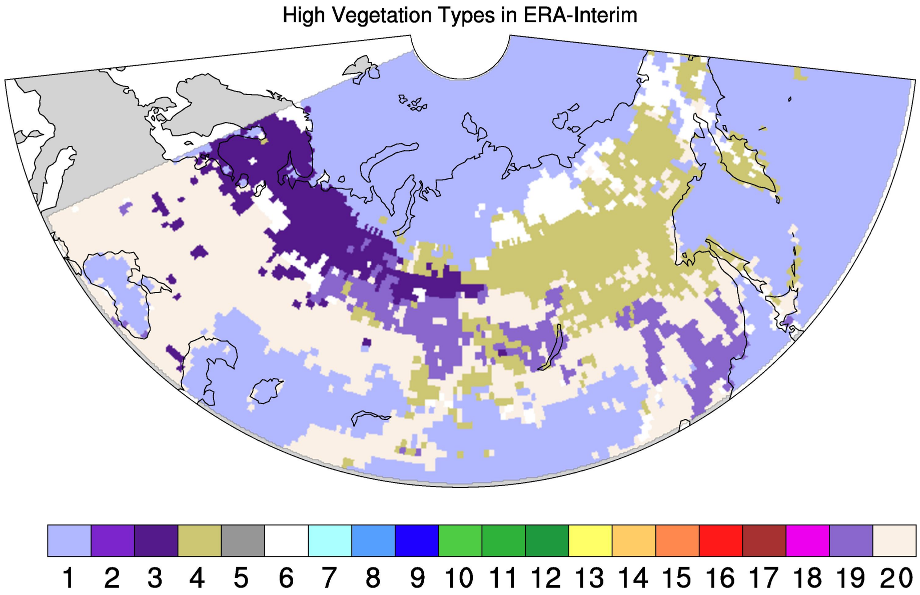

Figure 2: High vegetation distribution for Northern Eurasia in ERA-Interim. For explanation of color code, see Table 2.

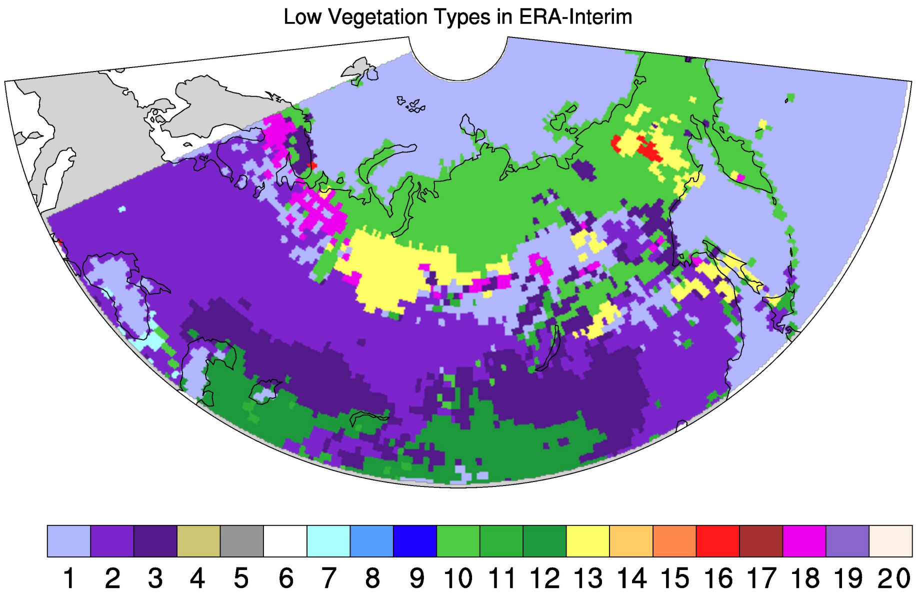

Figure 3: Low vegetation distribution for Northern Eurasia in ERA-Interim. For explanation of color code, see Table 2.

Table 2: Color code explanation for Figures 5&6

ERA-Interim vegetation types and parameter values. H/L refer to the distinction between high and low vegetation. cveg = vegetation cover fraction

Index	Vegetation Type	H/L	cveg
1	Crops, mixed farming	L	0.90
2	Short grass	L	0.85
3	Evergreen needleleaf trees	H	0.90
4	Deciduous needleleaf trees	H	0.90
5	Deciduous broadleaf trees	H	0.90
6	Evergreen broadleaf trees	H	0.99
7	Tall grass	L	0.70
8	Desert	—	0
9	Tundra	L	0.50
10	Irrigated crops	L	0.90
11	Semidesert	L	0.10
12	Ice caps and glaciers	—	—
13	Bogs and marshes	L	0.60
14	Inland water	—	—
15	Ocean	—	—
16	Evergreen shrubs	L	0.50
17	Deciduous shrubs	L	0.50
18	Mixed forest / woodland	H	0.90
19	Interrupted forest	H	0.90
20	Water and land mixtures	L	0.60

Aerosol impact on albedo changes

Using the MERRA2 aerosol product, we find a few days per station that show a co-existence between days with constant day-to-day snow depth (no snowfall or melt event), albedo decrease and strong (>75% percentile event for a location timeseries) aerosol deposition, both in stations and MERRA2 (not shown). We realize however, that there are other drivers for a local albedo decrease, which we are not able to isolate. Therefore, aerosols can modulate the albedo variability during periods of constant snow depth and are a good addition in reanalysis datasets. How big the quantitativ impact in the reanalysis really is, remains an open question. Further studies are needed to investigate the impact of aerosols on snow albedo representation.