Evidence of high-elevation amplification versus Arctic amplification

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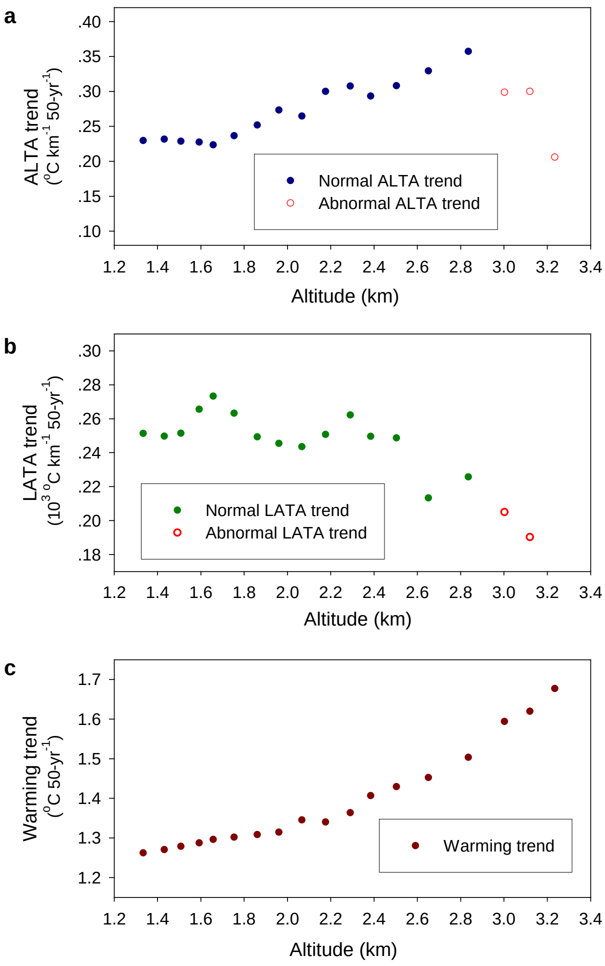
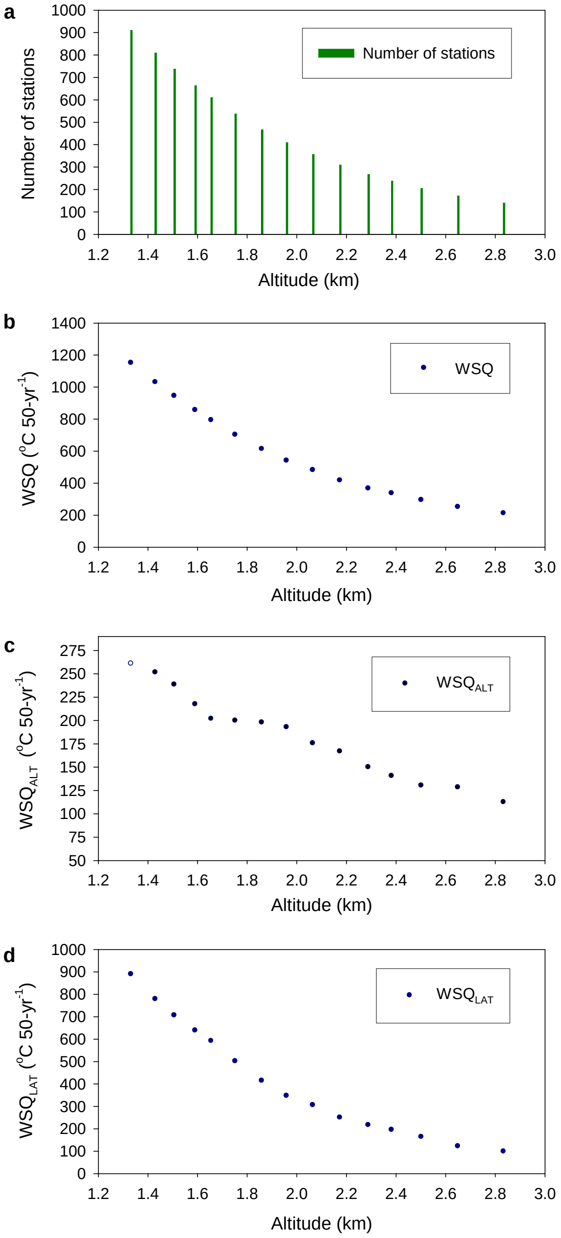
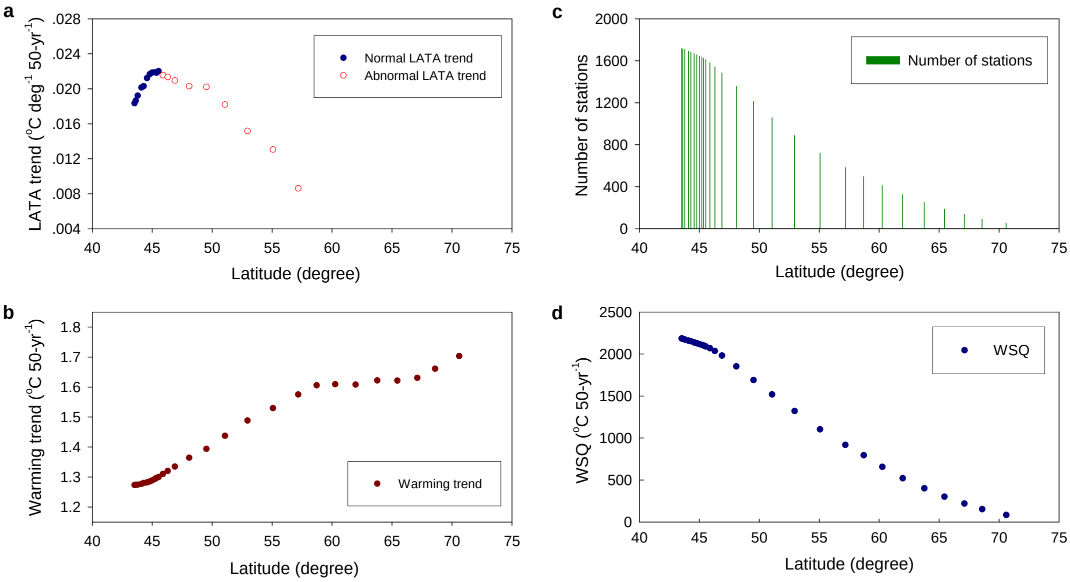
SUPPLEMENTARY INFORMATION



Supplementary Figure S1 Changes of (**a**) altitudinal amplification (ALTA) trend, (**b**) latitudinal amplification (LATA) trend and (**c**) warming trend with altitude. The data are obtained from sampling the data of Ele-high by omitting segments from the lower limit of altitudinal gradient in 100 m steps (see **Supplementary Table S3** for details).



Supplementary Figure S2 Changes of (**a**) number of stations, (**b**) total warming signal quantity (WSQ), (**c**) altitudinal warming signal quantity (WSQ_{ALT}), and (**d**) latitudinal warming signal quantity (WSQ_{LAT}) with altitude. The data on the number of stations are obtained from sampling the data of Ele-high by omitting segments from the lower limit of altitudinal gradient in 100 m steps (see **Supplementary Table S3** for details on the data, and **Methods** on calculations of WSQ, WSQ_{ALT} and WSQ_{LAT}).



Supplementary Figure S3 Changes of (**a**) latitudinal amplification (LATA) trend, (**b**) warming trend, (**c**) number of stations, and (**d**) the warming signal quantity (WSQ) with latitude. The data for plots **a-c** are obtained from sampling the data of NH-Ele-low by omitting segments from the lower limit of latitudinal gradient in 2.5-deg steps (see **Supplementary Table S4** for details on the data, and **Methods** on calculation of WSQ).

Supplementary Table S1 Statistics of station altitude (in km) and latitude (in deg) for the six groups of stations used in this study.

Scale	Code	Short name	Name of station group	Var.	Mean	Mini.	Max.	n
Global scale	A_1	Ele-high	High-elevation stations (>500 m) across the globe	Alt.	1.3334	0.5050	4.7000	910
				Lat.	37.31	3.40	63.25	
	A_2	Ele-low	Low-elevation counterparts of Ele-high [low-elevation stations (≤500 m) located in the same latitudes]	Alt.	0.1655	0.0010	0.5000	1732
				Lat.	40.78	3.60	63.22	
Northern Hemispheric scale	B_1	Lat-high	Low-elevation stations (≤500 m) in the Arctic region	Alt.	0.0927	0.0020	0.3990	184
				Lat.	65.48	60.13	82.05	
	B_2	Lat-low	Lower latitude counterparts of Lat-high [lower latitude stations (≤60 °N) in the same altitudes]	Alt.	0.1734	0.0010	0.5000	1531
				Lat.	40.89	1.48	60.00	
	C_1	Arctic stations	Stations in the Arctic region (North of 60 °N)	Alt.	0.1020	0.0020	0.7410	187
				Lat.	65.43	60.05	82.05	
	C_2	NH-Ele-low	Low-elevation stations (≤500 m) across the Northern Hemisphere	Alt.	0.1648	0.0010	0.5000	1715
				Lat.	43.53	1.48	82.05	
Global scale		All stations	All available stations around the globe	Alt.	0.5429	0.0010	4.7000	2781
				Lat.	40.81	1.48	82.50	

Supplementary Table S2 Number of stations with significant positive (SP), non-significant positive (NSP), positive (SP+NSP), significant negative (SN), non-significant negative (NSN), and negative (SN+NSN) trends for the six groups of stations used in this study.

Scale	Code	Short name	SP	NSP	Positive	SN	NSN	Negative	n
Global scale	A1	Ele-high	786 (86.4)	118 (13.0)	904 (99.4)	3 (0.3)	3 (0.3)	6 (0.6)	910
	A2	Ele-low	1462 (84.4)	239 (13.8)	1701 (98.2)	3 (0.2)	28 (1.6)	31 (1.8)	1732
Northern	B1	Lat-high	137 (74.5)	44 (23.9)	181 (98.4)		3 (1.6)	3 (1.6)	184
Hemispheric	B2	Lat-low	1328 (86.7)	182 (11.9)	1510 (98.6)	2 (0.1)	19 (1.2)	21 (1.4)	1531
scale	C1	Arctic stations	139 (74.3)	45 (24.1)	184 (98.4)		3 (1.6)	3 (1.6)	187
	C2	NH-Ele-low	1465 (85.4)	226 (13.2)	1691 (98.6)	2 (0.1)	22 (1.3)	24 (1.4)	1715
Global scale		All stations	2348 (84.4)	395 (14.2)	2743 (98.6)	6 (0.2)	32 (1.2)	38 (1.4)	2781

The trend for each station was extracted from the anomalies (relative to the 1961-1990 mean) using the least squares best-fit method. The trend significance is judged using 95% confidence level. The value in parentheses represents the percentage of the number of the stations relative to the total number of the stations of each group.

Supplementary Table S3 Changes of altitudinal amplification trend and latitudinal amplification trend derived from sampling the data of Ele-high by omitting segments from the lower limit of altitudinal gradient in 100 m steps.

Sample	**Alt. extent**	**Model ($T_t = a\,x_1 + b\,x_2 + c$)**					**Average Alt.**	**Average T_t**	**No. of stations**	**WSQ**
		a	***b*×10^3^**	***c***	***R***	***p***				
Entire	0.5-4.7 km	0.2297	0.2513	-0.0882	**0.434**	<0.0001	1.3334	1.262	910	1148.4
1	0.6-4.7 km	0.2315	0.2497	-0.0860	**0.430**	<0.0001	1.4313	1.271	809	1028.2
2	0.7-4.7 km	0.2287	0.2515	-0.0861	**0.424**	<0.0001	1.5078	1.279	737	942.6
3	0.8-4.7 km	0.2275	0.2656	-0.1382	**0.440**	<0.0001	1.5922	1.287	663	853.3
4	0.9–4.7 km	0.2235	0.2733	-0.1581	**0.448**	<0.0001	1.6568	1.296	610	790.6
5	1.0–4.7 km	0.2365	0.2632	-0.1521	**0.441**	<0.0001	1.7532	1.302	537	699.2
6	1.1–4.7 km	0.2519	0.2493	-0.1390	**0.463**	<0.0001	1.8605	1.308	466	609.5
7	1.2–4.7 km	0.2732	0.2454	-0.1822	**0.483**	<0.0001	1.9606	1.314	409	537.4
8	1.3–4.7 km	0.2647	0.2435	-0.1503	**0.472**	<0.0001	2.0664	1.345	356	478.8
9	1.4–4.7 km	0.2999	0.2507	-0.2833	**0.509**	<0.0001	2.1756	1.340	309	414.1
10	1.5–4.7 km	0.3077	0.2622	-0.3510	**0.522**	<0.0001	2.2899	1.363	267	363.9
11	1.6–4.7 km	0.2934	0.2496	-0.2575	**0.489**	<0.0001	2.3841	1.407	237	333.5
12	1.7–4.7 km	0.3080	0.2487	-0.3024	**0.485**	<0.0001	2.5032	1.429	204	291.5
13	1.8–4.7 km	0.3293	0.2133	-0.2417	**0.471**	<0.0001	2.6512	1.453	171	248.5
14	1.9–4.7 km	0.3571	0.2257	-0.3856	**0.470**	<0.0001	2.8351	1.503	139	208.9
15	2.0–4.7 km	0.2986	0.2050	-0.0976	**0.381**	=0.0001	3.0019	1.594	117	186.5
16	2.1–4.7 km	0.2999	0.1903	-0.0470	**0.363**	=0.0008	3.1197	1.620	104	168.5
17	2.2–4.7 km	0.2060	–	1.0108	**0.226**	=0.0293	3.2343	1.677	93	156.0
18	2.3–4.7 km	–	–	–	–	–	3.3142	1.718	86	147.7

The model between temperature trends (T_t, in °C 50-yr^{-1}) and altitudes (x_1, in km) and latitudes (x_2, in km) for each sample is determined using the stepwise regression method. Multiple correlation coefficient (R) is given with two-tailed p value in next column. Significant coefficient, at the 95 % confidence level, is set in bold. For samples 15 to 17, the multiple correlation coefficients (as well as the rates of altitudinal amplification trend and latitudinal amplification trend) are obviously smaller than those just before; and for sample 18, neither altitudinal amplification trend nor latitudinal amplification trend can be detected further. Also shown are the average altitude (km), average T_t (°C 50-yr^{-1}), number of stations, and warming signal quantity (°C 50-yr^{-1}, WSQ) for each sample.

Supplementary Table S4 Change of latitudinal amplification trend derived from sampling the data of NH-Ele-low by omitting segments from the lower limit of latitudinal gradient in 2.5-deg steps.

Sample	**Latitude extent**	**Model ($T_t = b\, x_2 + c$)**				**Average lat.**	**Average T_t**	**No. of stations**	**WSQ**
		b×10^3	**c**	**r**	**p**				
Entire	0°–82.5°N	0.1647	0.4748	**0.425**	<0.0001	43.53	1.273	1715	2183.1
1	2.5°–82.5° N	0.1675	0.4602	**0.428**	<0.0001	43.62	1.274	1711	2179.0
2	5.0°– 82.5° N	0.1726	0.4330	**0.433**	<0.0001	43.79	1.274	1704	2171.5
3	7.5°–82.5° N	0.1809	0.3885	**0.438**	<0.0001	44.10	1.277	1690	2157.6
4	10.0°–82.5° N	0.1823	0.3814	**0.433**	<0.0001	44.29	1.280	1681	2151.5
5	12.5°– 82.5° N	0.1906	0.3363	**0.439**	<0.0001	44.57	1.282	1667	2137.0
6	15.0°–82.5° N	0.1947	0.3139	**0.438**	<0.0001	44.79	1.285	1655	2126.3
7	17.5°–82.5° N	0.1963	0.3055	**0.434**	<0.0001	45.00	1.289	1643	2117.2
8	20.0°–82.5° N	0.1966	0.3037	**0.430**	<0.0001	45.21	1.293	1630	2107.7
9	22.5°–82.5° N	0.1961	0.3063	**0.424**	<0.0001	45.36	1.297	1620	2100.5
10	25.0°–82.5° N	0.1979	0.2966	**0.422**	<0.0001	45.53	1.299	1607	2088.2
11	27.5°–82.5° N	0.1935	0.3213	**0.406**	<0.0001	45.88	1.310	1578	2066.8
12	30.0°–82.5° N	0.1917	0.3317	**0.395**	<0.0001	46.30	1.320	1541	2033.9
13	32.5°–82.5° N	0.1882	0.3527	**0.379**	<0.0001	46.89	1.335	1483	1979.5
14	35.0°–82.5° N	0.1823	0.3882	**0.349**	<0.0001	48.09	1.364	1357	1851.2
15	37.5°–82.5° N	0.1815	0.3934	**0.330**	<0.0001	49.51	1.394	1211	1687.9
16	40.0°–82.5° N	0.1634	0.5086	**0.285**	<0.0001	51.07	1.437	1056	1517.8
17	42.5°–82.5° N	0.1364	0.6845	**0.226**	<0.0001	52.94	1.488	887	1319.9
18	45.0°–82.5° N	0.1173	0.8105	**0.178**	<0.0001	55.07	1.529	721	1102.7
19	47.5°–82.5° N	0.0773	1.0825	**0.109**	=0.0084	57.18	1.575	582	916.5
20	50.0°–82.5° N	-	-	-	-	58.71	1.605	494	793.1

The model between temperature trends (T_t, in °C 50-yr^{-1}) and latitudes (x_2, in km) is determined using the simple linear regression method. Pearson correlation coefficient (r) is given with two-tailed p value in next column. Significant coefficient, at the 95 % confidence level, is set in bold. For samples 11 to 19, the correlation coefficients (as well as the rates of latitudinal amplification trends) are obviously smaller than those just before; and for sample 20, no latitudinal amplification trend can be detected further. Also shown are the average latitude (deg), average T_t (°C 50-yr^{-1}), number of stations, and warming signal quantity (°C 50-yr^{-1}, WSQ) for each sample.