



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Dipartimento federale dell'interno DFI
Ufficio federale di meteorologia e climatologia MeteoSvizzera

Autunno e prima parte dell'inverno 2018/19



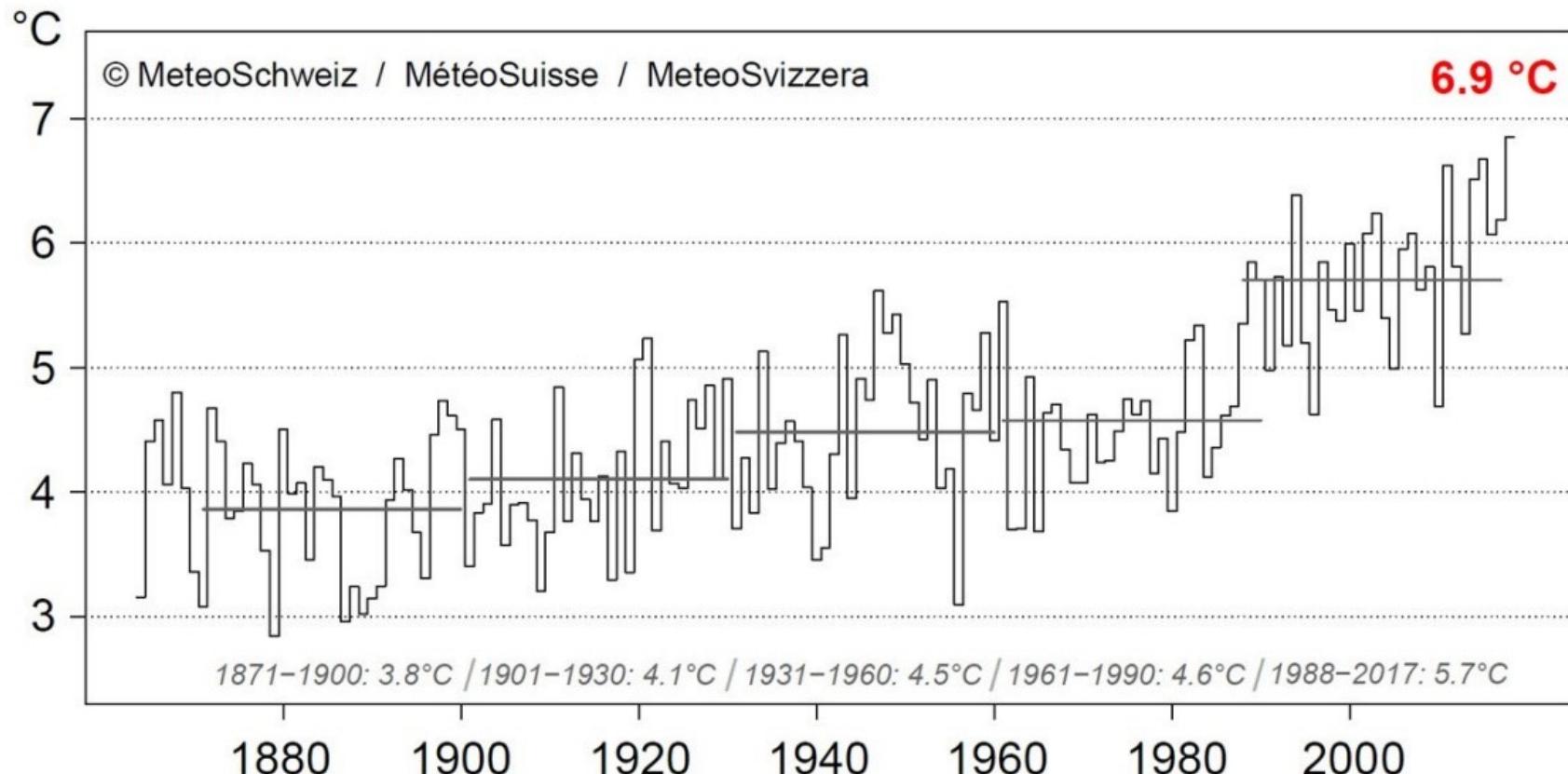


Contenuto

- Anno 2018
- Caratteristiche principali autunno 2018 e prima parte dell'inverno 2018/19
- Stratospheric Warming e freddo polare: alcune spiegazioni



2018: l'anno più caldo dall'inizio delle misurazioni sistematiche.



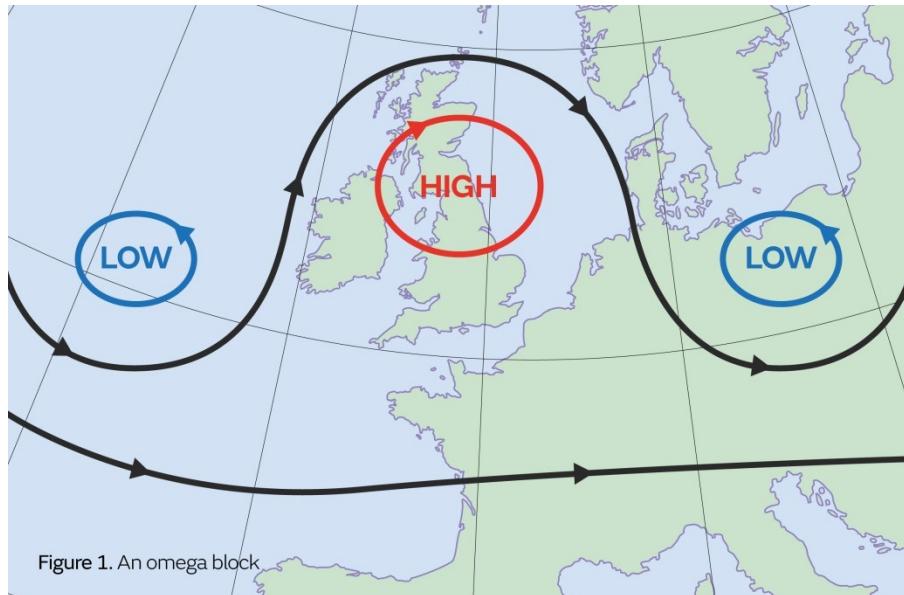
Nord: 1.5 – 2.0 °C; Sud: 1.0 – 1.5; Media CH: 1.5°



2018: l'anno dei blocchi atmosferici?

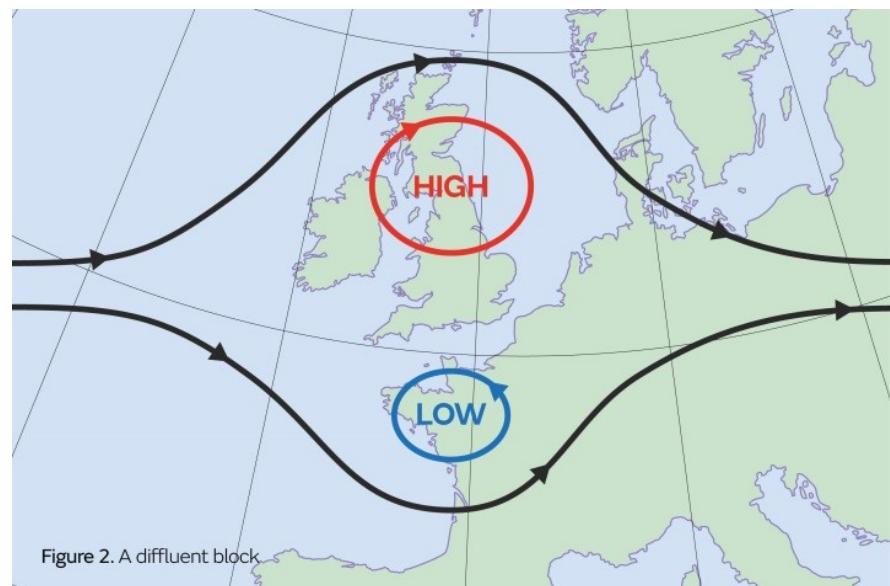


2018: una situazione spesso «bloccata»



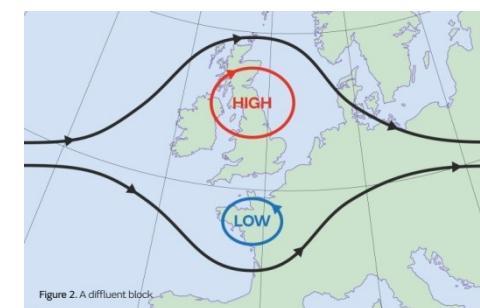
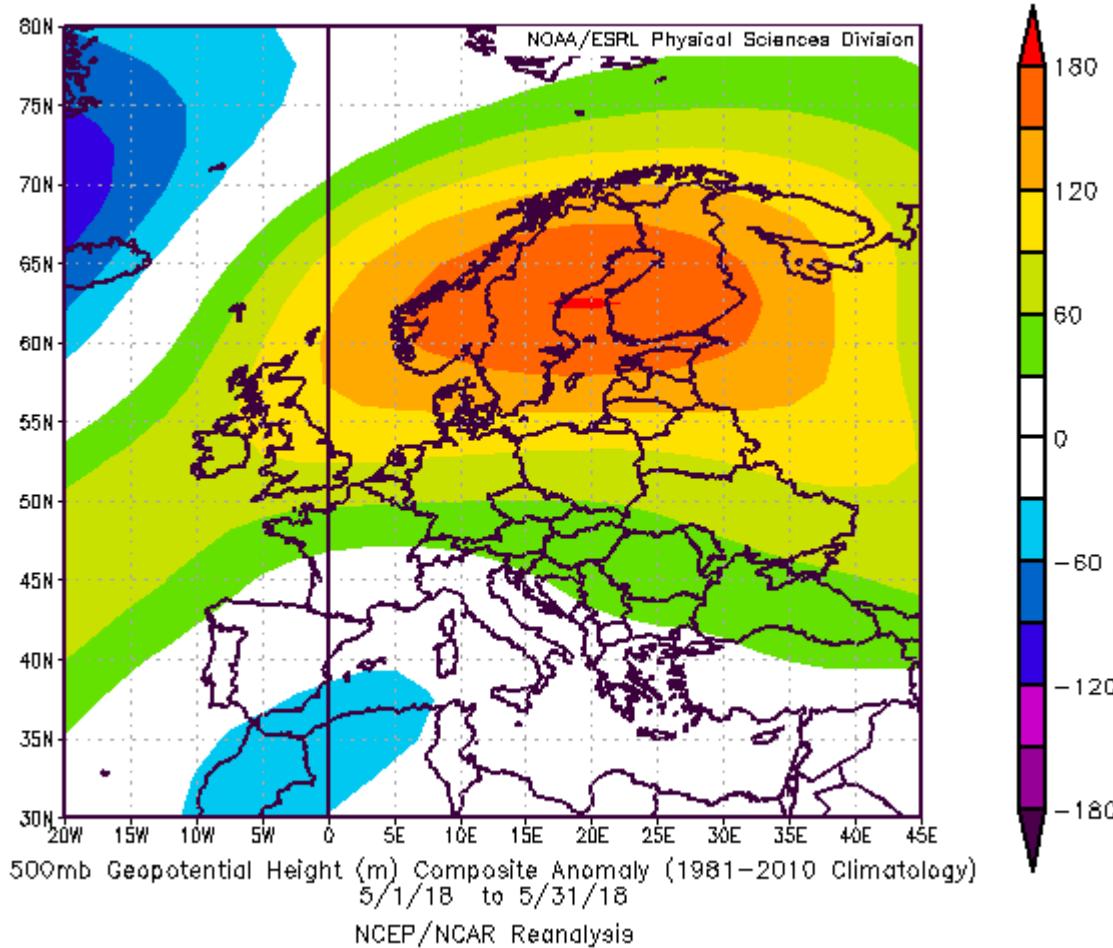
Blocco «omega»

Blocco «diffluente»





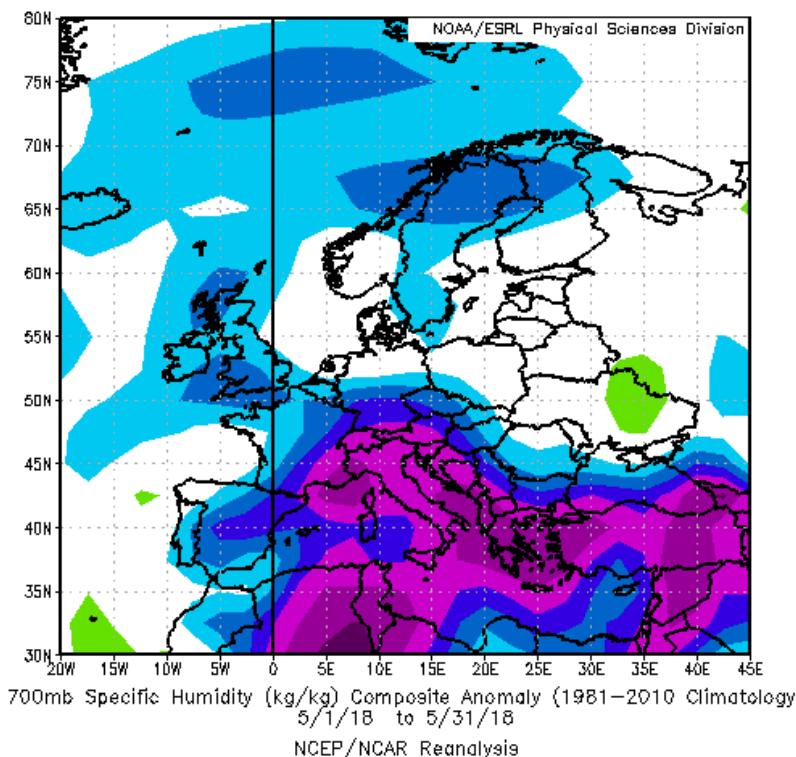
Blocco diffluente durante la stagione «calda»



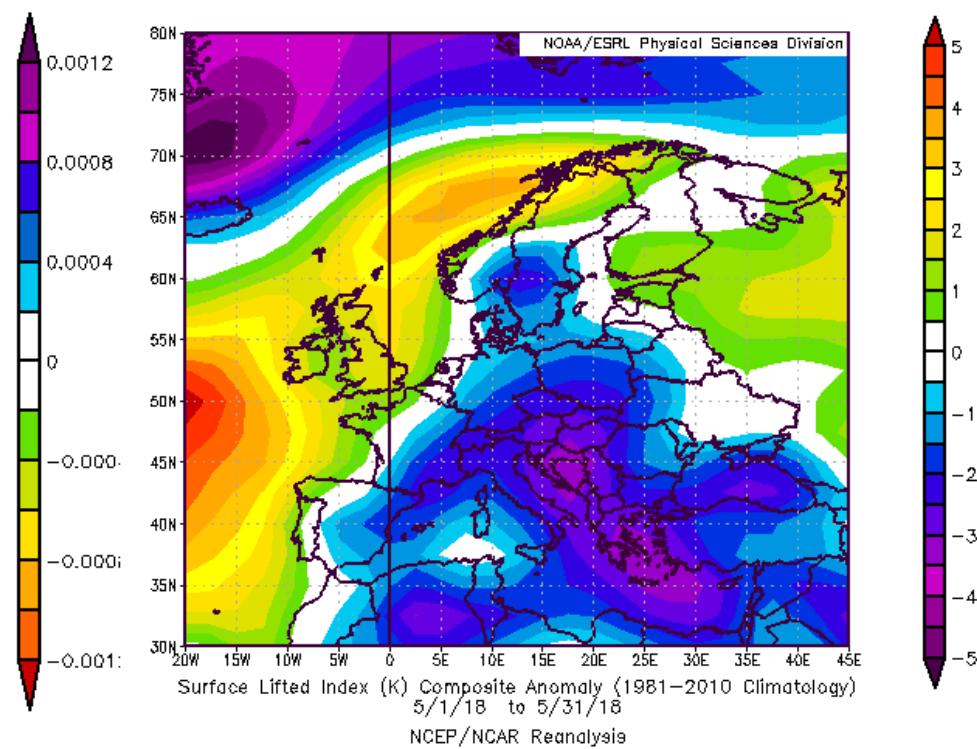


Blocco diffluente durante la stagione «calda»

700 hPa Specific Humidity



Surface Lifted Index Anomaly





Estate canicolare in Scandinavia

Surface air temperature anomaly for July 2018 relative to 1981-2010

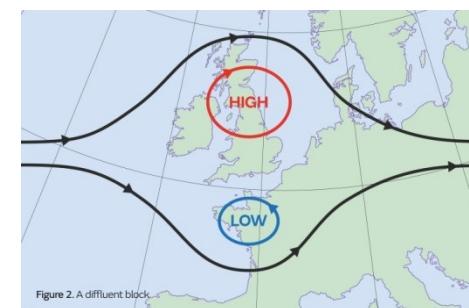
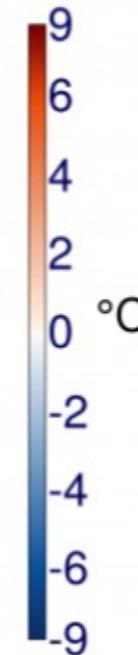
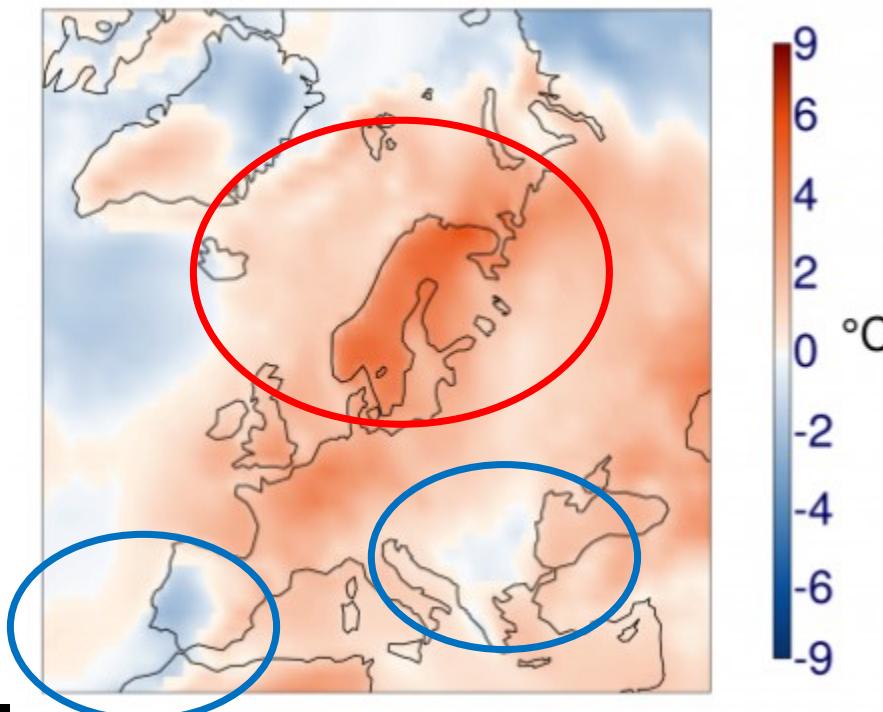
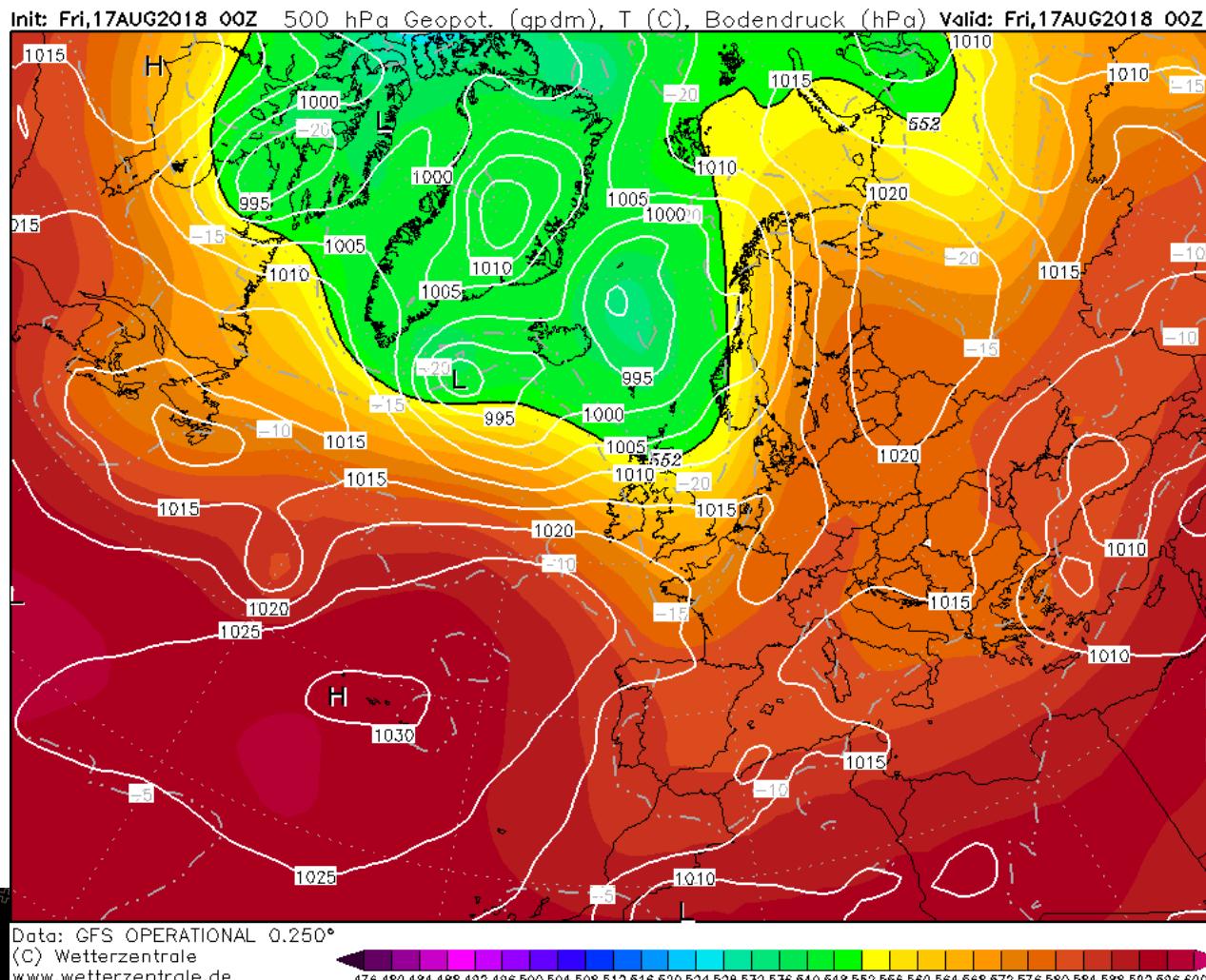


Figure 2. A diffluent block



Pochi sistemi frontali degni di nota





...finale a «omega»

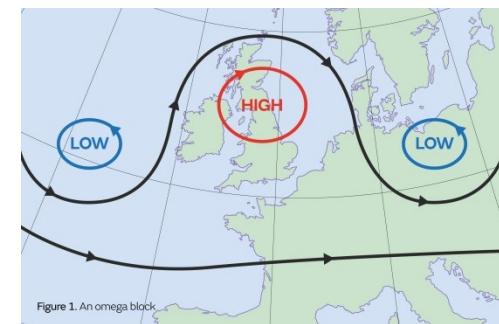
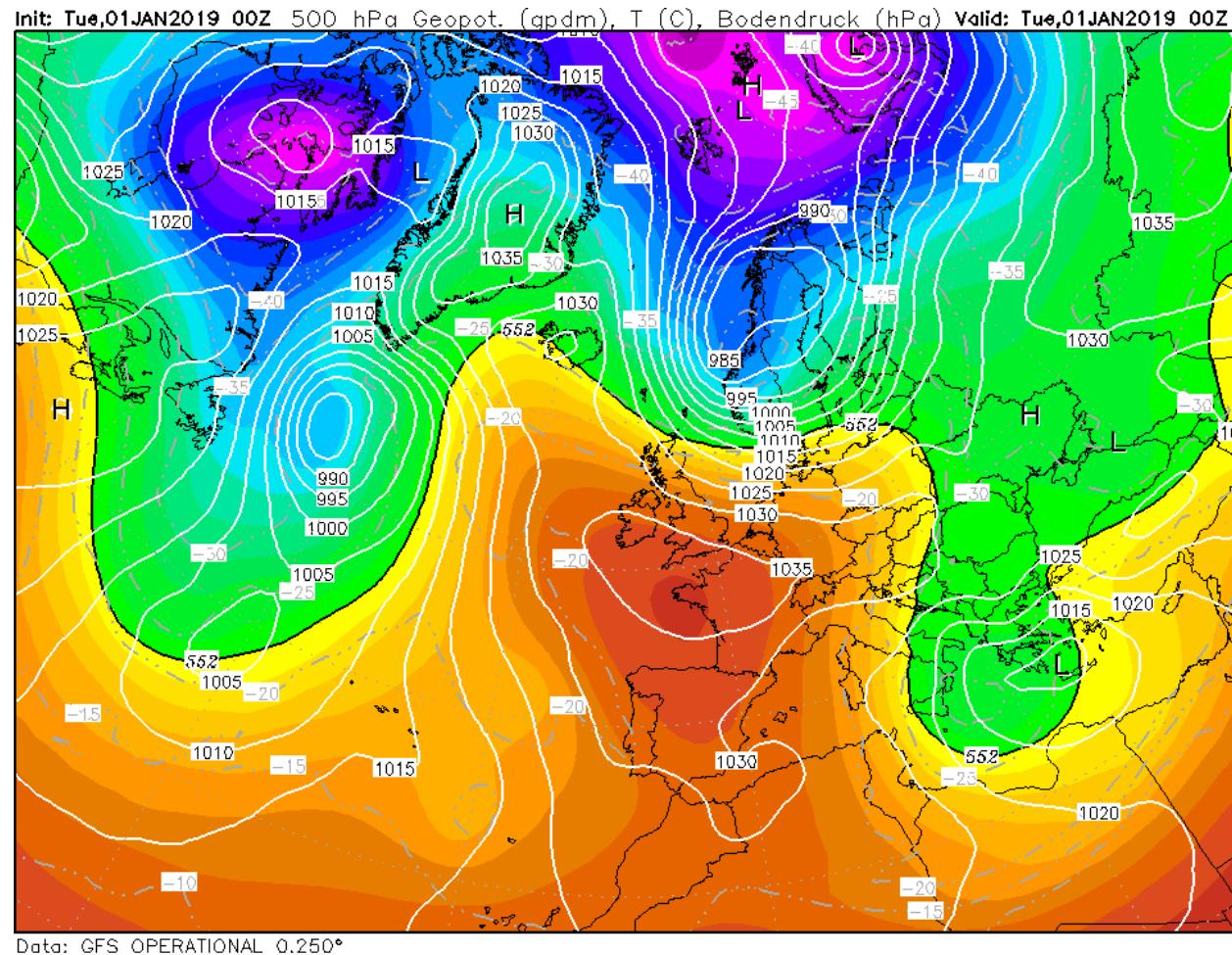


Figure 1. An omega block

Data: GFS OPERATIONAL 0.250°

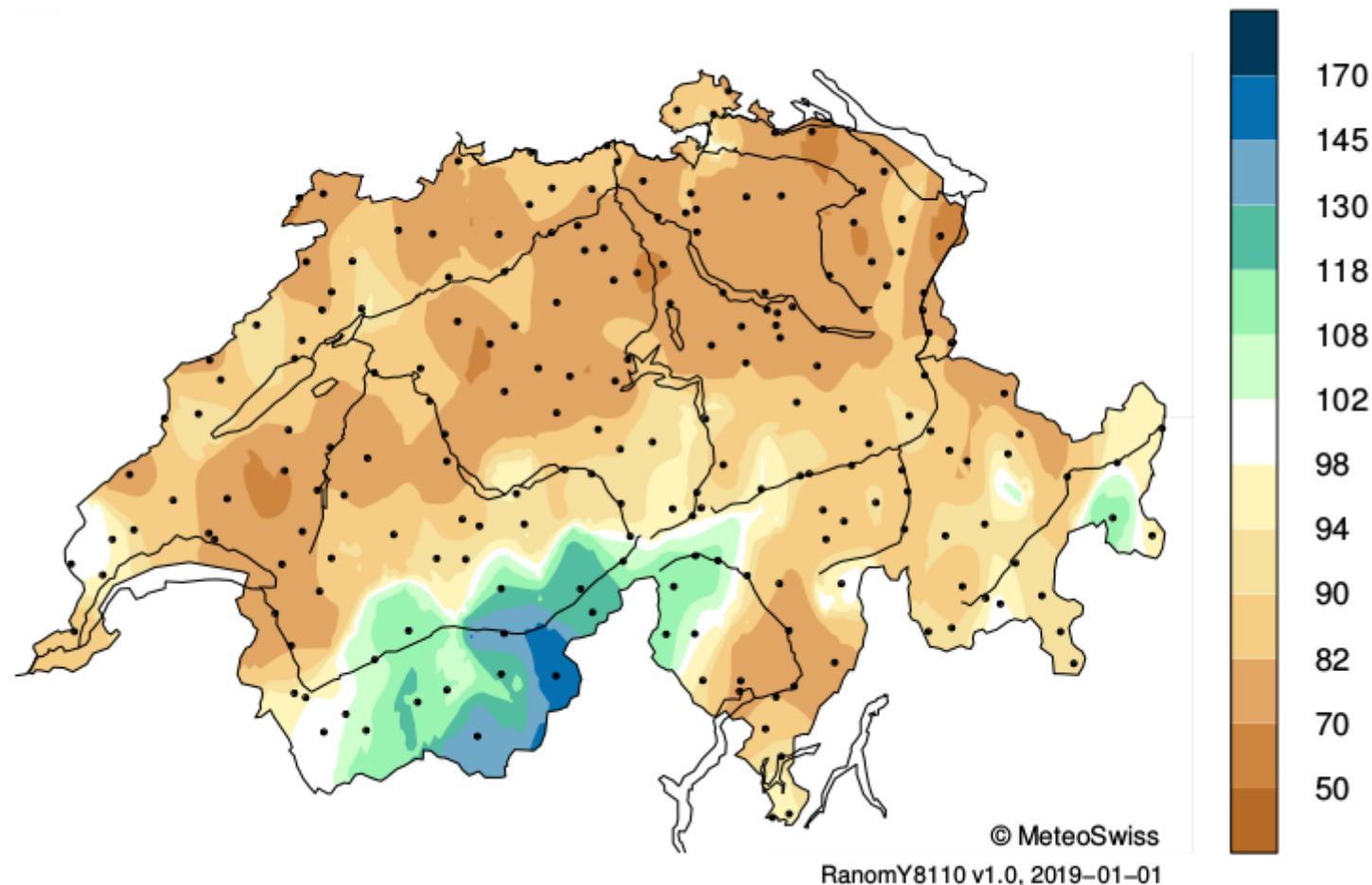
(C) Wetterzentrale
www.wetterzentrale.de





Anomalia Precipitazioni 2018

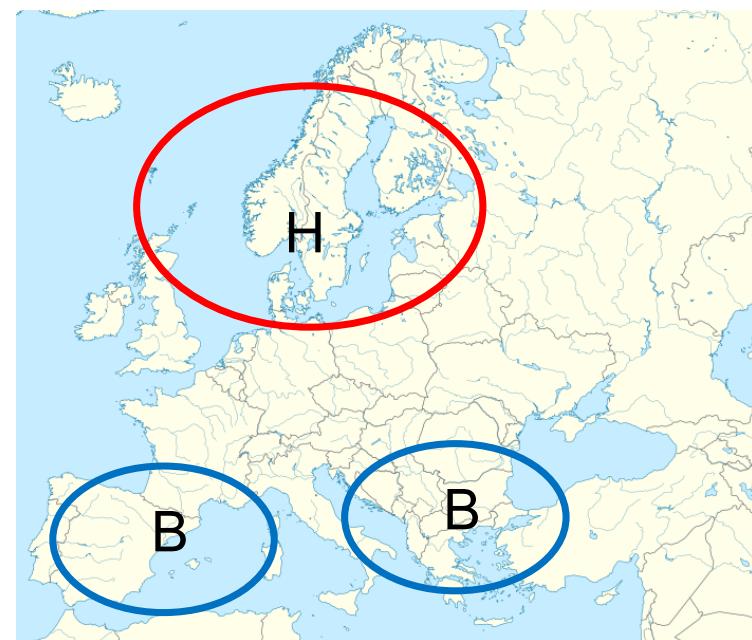
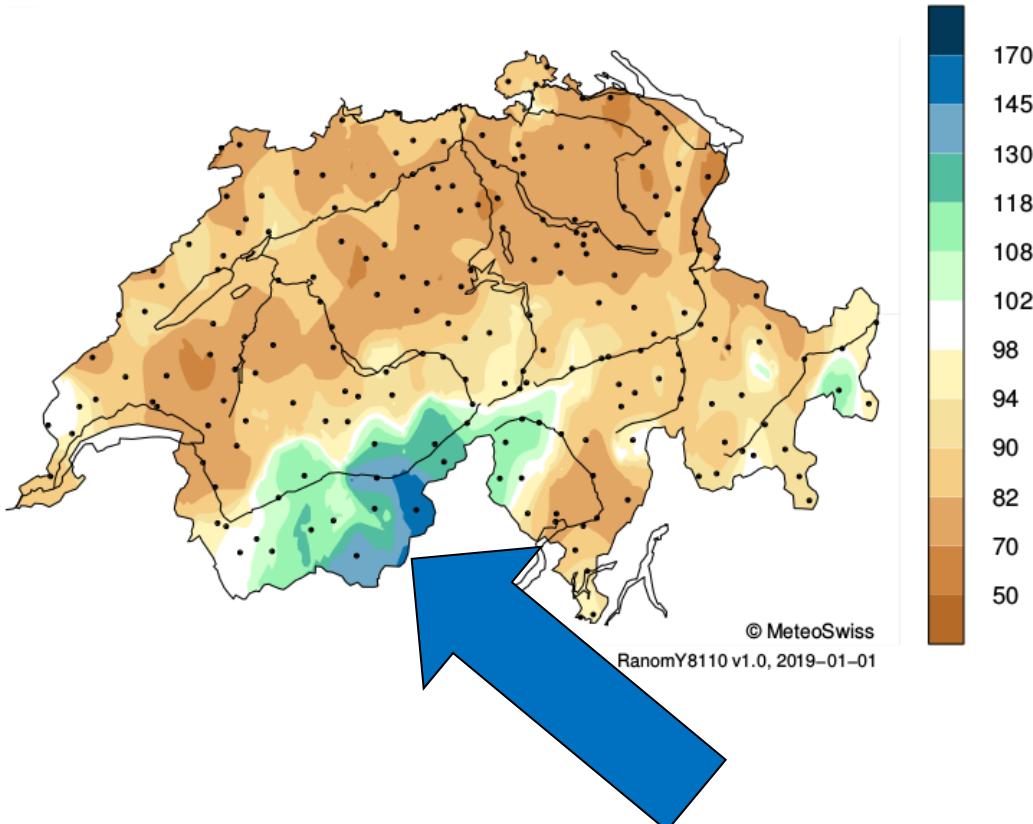
Yearly Precipitation Anomaly (%) 2018 (Ref. 1981–2010)





Anomalia Precipitazioni 2018

Yearly Precipitation Anomaly (%) 2018 (Ref. 1981–2010)





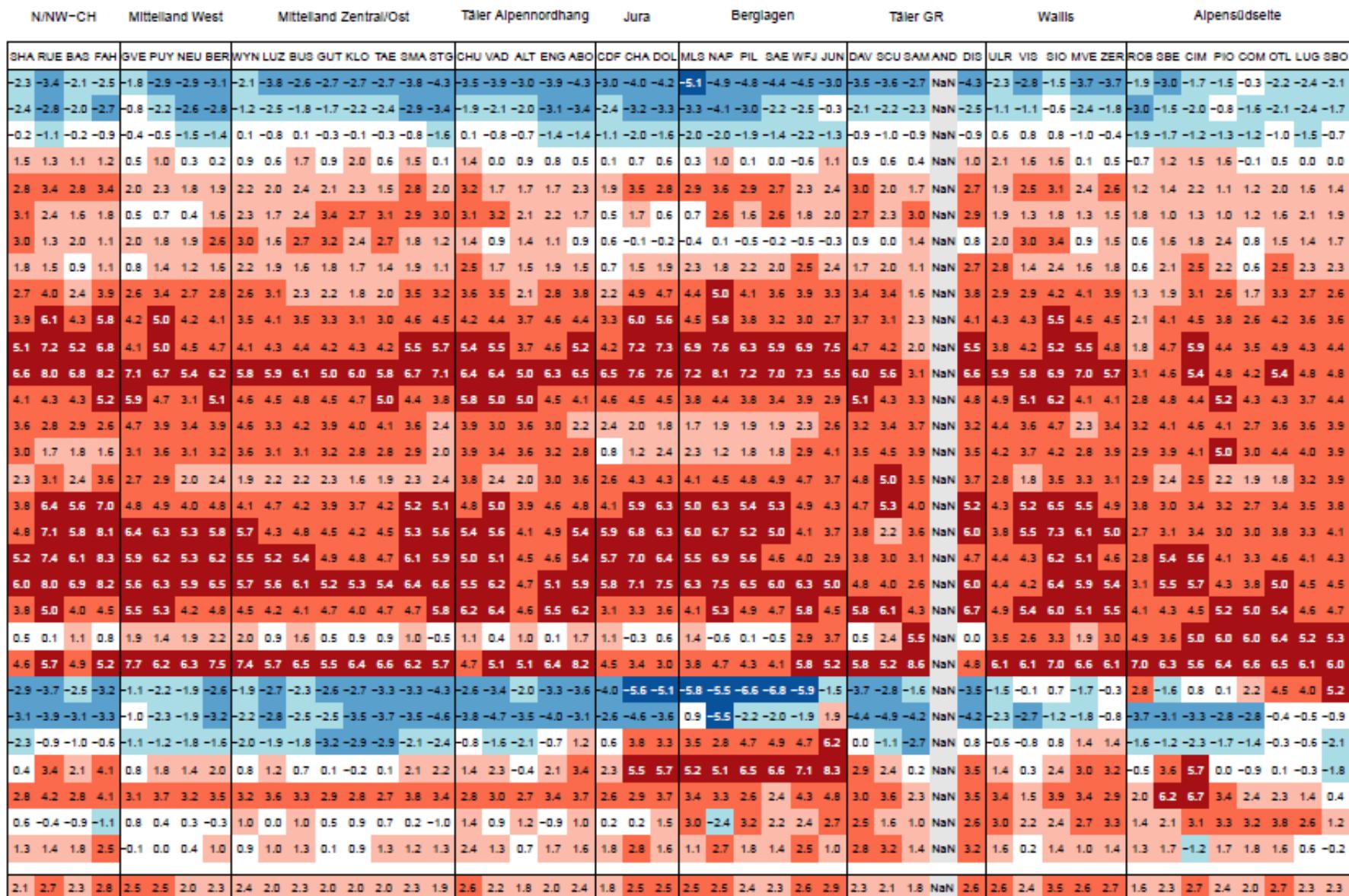
Autunno 2018

Anomalie Temperature Set– Dic 2018

Abweichung vom Temperaturmittel (°C)

September 2018

Normperiode: 1981 – 2010



Abweichung vom Temperaturmittel (°C)

Oktober 2018

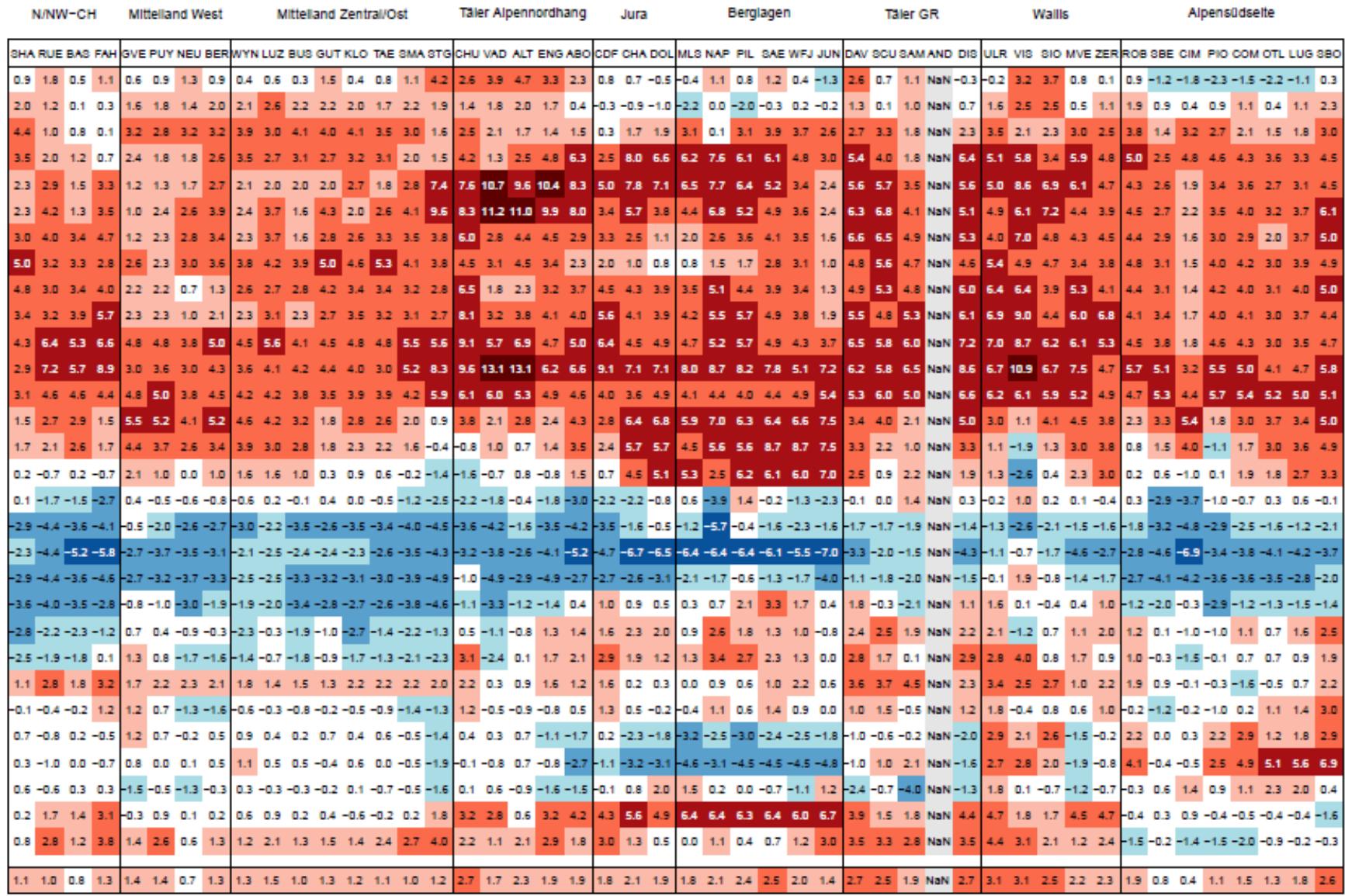
Normperiode: 1981 – 2010

N/NW-CH	Mittelland West	Mittelland Zentral/Ost	Täler Alpennordhang	Jura	Berglagen	Täler GR	Walls	Alpensüdseite	
GHA RUE BAG FAH	GVE PUY NEU BER	WYN LUZ BUS GUT KLO TAE SMA STG	CHU VAD ALT ENG ABO	CDF CHA DOL	MLG NAP PIL SAE WFJ JUN	DAW GCU SAM AND DIS	ULR VIG SIO MVE ZER	ROB GBE CIM PIO COM OTL LUG SBO	
-2.2 -4.0 -3.0 -4.0	-2.6 -3.6 -3.0 -2.3	-2.3 -2.7 -2.1 -2.0 -2.1 -1.9 -2.7 -3.6	-3.0 -2.9 -2.8 -4.2 -4.8	-4.3 -6.3 -6.7	-7.0 -5.5 -6.3 -6.1 -6.1 -6.7	-4.4 -2.6 -2.9 NaN -4.6	-2.5 -2.1 -1.8 -4.6 -3.6	-0.4 -3.2 -3.4 -1.6 0.2 -0.2 -0.2 -0.2	
-2.9 -4.0 -2.5 -3.7	-2.6 -2.5 -2.6 -2.7	-2.4 -2.2 -2.3 -2.3 -2.6 -2.6 -2.9 -3.7	-2.8 -3.0 -2.6 -3.5 -4.3	-4.4 -5.9 -4.6	-4.9 -5.4 -5.1 -6.6 -5.8 -2.5	-4.4 -2.5 -2.3 NaN -4.2	-2.3 -3.0 -2.8 -5.2 -4.7	-0.6 -2.1 -1.0 0.4 1.5 0.5 -0.2 -0.8	
-0.2 -1.1 -1.0 -1.2	0.4 0.5 0.6 0.4	0.4 0.5 0.0 0.0 0.1 0.4 -0.1 -0.6	-0.8 -1.0 0.0 -0.1 0.0	-0.7 -0.9 -0.4	-1.3 -1.0 -1.7 -2.2 -2.1 1.2	-0.6 -1.0 -0.7 NaN -1.3	0.3 -2.4 0.1 -1.8 -1.8	2.0 1.4 3.8 3.1 2.9 0.9 -0.2 -1.5	
0.5 0.3 -0.9 0.9	1.4 0.7 1.9 0.3	0.4 0.2 0.4 0.5 0.1 0.3 0.6 -0.3	0.6 0.2 -1.0 0.3 0.9	1.1 1.5 2.1	3.4 0.3 3.9 4.0 4.0 4.4	1.2 0.2 -0.8 NaN 1.6	1.1 0.0 1.8 1.8 2.1	-0.1 -0.1 1.7 0.7 1.0 2.0 1.0 -0.1	
1.2 3.2 2.7 4.4	0.9 1.4 1.3 2.2	1.2 1.3 1.0 0.1 0.8 0.8 2.0 2.1	3.2 1.8 0.4 2.6 3.4	3.1 5.0 4.7	4.3 4.7 4.9 5.1 4.7 3.0	2.8 2.9 0.4 NaN 3.7	2.0 3.5 2.7 4.3 3.4	0.2 0.4 2.1 0.8 1.1 2.0 1.1 0.3	
2.5 5.9 4.3 6.3	3.2 2.8 2.5 2.9	2.5 3.2 2.9 2.1 2.4 2.9 4.0 4.5	5.9 4.5 3.7 3.7 3.3	4.2 3.9 3.2	2.9 4.4 3.5 3.1 2.2 1.0	3.4 3.2 1.7 NaN 3.4	1.7 4.0 3.2 3.3 2.6	1.3 0.1 0.3 0.2 0.9 0.9 1.2 1.2	
4.2 3.8 3.8 3.5	2.2 1.5 3.4 2.7	3.3 3.5 3.3 4.3 3.9 3.7 4.2 3.7	4.2 4.1 3.7 2.9 1.9	2.3 1.8 0.1	0.3 2.1 1.1 1.1 1.8 0.1	2.7 2.3 1.7 NaN 3.4	1.3 0.3 1.6 0.5 2.1	1.5 1.9 2.3 1.3 1.8 2.1 1.4 0.8	
3.7 1.7 0.6 1.4	2.7 1.8 3.0 2.4	1.5 1.9 2.2 3.3 2.5 1.9 2.1 1.7	3.5 2.2 1.9 1.6 2.0	3.1 3.4 2.7	4.2 1.8 4.8 4.3 3.5 1.8	3.3 3.1 2.4 NaN 3.9	3.0 1.0 2.6 3.5 4.0	2.7 2.4 3.2 2.5 3.7 4.1 3.5 2.8	
3.9 2.8 1.5 3.0	2.3 2.6 3.2 3.6	2.5 3.2 2.4 3.9 3.6 3.4 3.2 2.5	2.9 2.0 1.9 1.8 3.4	3.1 5.7 5.5	5.0 4.4 5.3 4.8 4.2 2.6	3.6 3.6 2.0 NaN 4.4	2.1 2.7 3.1 4.6 3.6	3.2 2.7 2.9 2.7 3.8 4.2 3.5 2.9	
4.3 3.7 3.9 3.7	1.9 2.3 1.9 2.3	3.0 3.5 3.7 4.3 3.8 3.1 4.1 5.4	6.4 6.2 6.3 6.8 6.7	3.5 6.4 5.9	5.1 6.8 4.6 3.5 2.7 0.3	3.9 4.4 2.1 NaN 5.1	2.7 5.5 5.6 4.2 4.3	2.5 2.5 1.2 2.6 3.2 2.5 2.9 3.4	
2.2 3.7 2.5 4.7	4.2 4.0 2.9 2.5	1.3 2.0 1.3 3.5 1.4 1.6 2.7 6.9	6.6 10.1 9.4 6.2 4.7	3.4 5.3 4.5	4.3 5.3 4.1 3.3 1.5 0.7	4.1 3.8 2.4 NaN 4.2	2.3 5.9 6.1 4.0 2.5	2.0 1.6 0.0 1.9 1.5 0.6 0.9 1.8	
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3.9 6.0 5.7 7.3	3.6 4.2 3.9 3.9	2.7 3.2 2.9 3.9 2.7 3.2 4.4 5.1	6.6 6.1 3.7 4.2 4.6	3.9 7.0 6.2	5.2 6.2 6.2 5.2 4.7 4.1	4.7 4.7 2.2 NaN 6.0	2.9 4.8 3.8 5.9 4.3	3.0 3.1 4.1 3.2 3.4 3.8 3.1 2.6	
3.3 5.9 5.5 7.0	3.3 4.1 3.9 3.3	2.2 2.7 2.2 4.0 2.5 2.3 5.0 8.6	6.6 10.6 10.0 7.5 6.7	4.6 5.7 4.5	4.7 6.4 4.9 3.6 2.3 -0.9	3.0 3.8 1.5 NaN 4.5	2.0 7.1 5.4 4.5 2.5	3.1 2.2 1.8 2.8 3.2 3.0 2.5 1.7	
3.5 5.8 3.6 5.4	3.1 4.5 3.5 2.4	1.9 3.0 2.3 3.0 2.1 2.2 5.2 7.9	6.6 9.2 9.2 7.1 5.5	3.0 5.4 5.1	3.9 5.9 3.5 2.1 0.9 -1.0	3.4 4.6 3.6 NaN 4.7	1.6 5.5 4.1 3.5 1.8	2.5 1.7 0.6 1.4 2.0 2.2 2.7 2.4	
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3.4 4.8 2.5 4.8	1.9 3.1 3.3 1.7	1.1 2.2 1.5 2.6 1.3 1.5 3.2 3.5	3.3 3.9 0.5 2.7 3.1	2.2 4.6 4.6	3.9 4.1 4.2 3.6 3.5 4.7	2.3 2.5 1.1 NaN 3.6	1.6 2.3 3.3 3.8 2.9	1.5 1.6 3.0 2.4 2.5 3.1 3.0 3.2	
4.5 4.6 1.7 4.1	2.8 3.6 4.7 2.7	2.4 2.2 2.3 4.0 2.7 2.1 3.3 2.4	2.0 0.9 0.6 2.2 3.2	4.3 3.9 3.5	5.0 2.5 3.4 3.0 3.6 5.4	2.6 2.6 1.2 NaN 3.5	2.6 2.1 3.1 4.1 3.9	2.2 2.4 4.3 2.3 3.5 3.9 3.4 3.0	
3.3 2.4 1.0 2.3	1.8 2.7 3.3 1.4	0.8 1.0 0.9 1.9 0.8 0.7 1.3 0.5	1.7 0.6 0.7 1.1 3.6	3.5 3.8 4.9	5.3 3.5 5.2 5.0 4.1 4.7	2.9 2.8 1.2 NaN 3.1	2.0 1.6 2.9 3.7 3.6	2.7 3.4 4.8 2.7 3.7 4.5 3.8 3.1	
2.1 2.3 0.0 2.0	1.1 1.8 3.5 2.1	2.5 1.7 2.1 2.0 2.2 2.0 2.3 1.3	0.5 0.6 1.6 0.6 2.6	2.1 3.9 5.0	4.5 2.4 4.4 3.3 2.5 4.0	1.9 2.3 1.0 NaN 2.2	1.9 1.0 2.2 2.7 3.5	2.5 5.4 5.3 2.8 3.4 4.8 4.2 2.6	
0.9 0.6 -0.4 0.8	1.2 1.2 2.0 0.2	-0.6 0.4 -0.4 1.2 -0.3 -0.4 0.0 -0.5	-0.7 -1.3 -0.4 -0.4 1.6	1.9 4.1 3.7	4.6 0.9 3.3 1.3 0.3 2.8	0.1 -0.1 -0.6 NaN 0.0	0.3 -0.5 1.2 1.7 2.4	3.8 4.8 5.4 4.4 5.0 2.6 2.5 1.7	
0.1 -0.7 -1.8 -0.6	1.9 0.0 0.9 -0.8	-0.9 -1.5 -1.7 -1.1 -1.5 -3.0 -1.6 -2.6	-2.2 -2.8 -1.8 -2.5 -0.7	-0.7 0.6 2.0	1.8 -1.1 0.4 0.0 0.1 4.0	-1.9 -1.1 -1.2 NaN -1.6	-1.0 -2.3 -0.4 -0.7 0.7	-0.3 2.8 0.4 0.6 1.3 0.7 -0.7	
1.0 0.1 0.5 0.8	1.1 1.0 1.8 0.4	-0.2 0.4 0.4 1.0 0.1 0.5 0.3 0.5	0.3 0.0 -0.3 0.6 1.1	0.2 1.5 2.8	2.5 1.6 1.9 0.1 -0.2 2.0	0.8 2.2 1.4 NaN 0.0	1.0 -1.0 0.5 1.6 0.7	4.4 5.2 5.9 6.8 3.8 1.1 0.3 -1.1	
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2.0 -0.1 0.8 -0.9	2.3 1.9 1.5 0.3	0.7 1.9 1.2 1.4 1.9 2.3 1.7 1.3	1.6 0.2 0.8 2.6 3.7	0.9 3.2 3.4	3.0 3.2 3.2 2.5 4.2 3.6	3.0 3.3 2.1 NaN 4.4	1.5 0.8 1.9 3.6 3.4	2.7 2.2 2.1 2.8 4.4 4.4 4.7 4.6	
-2.5 -4.4 -3.2 -4.2	-1.1 -2.1 -2.4 -2.3	-2.0 -1.8 -2.3 -1.9 -2.1 -1.9 -2.9 -3.4	-3.2 -2.5 -2.0 -3.0 -4.1	-3.9 -4.8 -4.4	-4.9 -5.7 -4.5 -4.0 -1.3 -0.7	-2.4 -1.4 1.0 NaN -3.9	-0.9 -1.1 0.0 -2.7 -1.3	2.3 0.7 1.3 0.0 1.9 2.0 3.2 3.9	
-4.7 -6.4 -4.5 -5.7	-4.0 -5.4 -4.8 -4.9	-4.1 -4.7 -4.8 -4.5 -4.8 -4.7 -5.9 -6.0	-7.4 -5.5 -4.8 -5.5 -5.6	-5.8 -7.3 -5.5	-2.3 -7.3 -1.7 0.2 0.9 1.1	-2.5 -3.5 -1.0 NaN -5.6	-1.9 -2.1 -1.3 -3.3 -1.4	0.6 -1.9 0.6 -1.9 -0.8 -1.0 1.7 3.4	
-2.6 -4.2 -3.9 -5.2	-3.8 -4.6 -3.6 -3.5	-2.4 -2.9 -2.9 -1.9 -2.6 -2.3 -3.5 -3.2	-4.5 -1.9 -1.8 -3.2 -3.0	-4.3 -1.5 -2.8	-0.4 -4.3 0.4 0.6 0.5 -0.3	-0.3 -1.7 0.9 NaN -2.7	-0.9 0.5 -0.2 -0.7 -1.0	2.0 -0.5 -0.3 -0.4 0.8 0.3 2.0 3.5	
-3.3 -3.1 -3.0 -4.0	-3.7 -3.6 -3.3 -3.4	-2.9 -3.0 -3.1 -2.3 -2.8 -2.7 -3.4 -2.2	0.1 -0.9 -2.0 -3.6 -4.2	-4.4 -5.5 -6.2	-6.4 -5.8 -4.1 -3.2 -3.4 -4.8	0.1 1.0 0.4 NaN -1.2	-1.1 -0.2 -1.7 -3.6 -2.1	-0.1 -2.4 -4.0 -1.2 -0.4 -1.2 0.1 0.6	
-2.1 -1.7 -2.2 -2.3	-2.2 -1.5 -3.0 -3.8	-3.6 -2.5 -2.7 -1.5 -2.9 -3.2 -2.2 3.3	2.9 5.0 6.4	3.6 2.8	-0.8 1.4 0.3	0.8 2.3 0.9 -0.1 -1.5 -2.9	1.7 0.5 0.7 NaN 0.7	-0.2 3.3 3.1 0.1 -0.2 -0.5 -1.9 -3.2 -1.0 -0.6 -1.6 -0.8 0.2	
Mitt.	1.4 1.4 0.9 1.4	1.2 1.2 1.4 0.9	0.7 0.9 0.7 1.4 0.8 0.8 1.3 1.7	1.8 2.0 1.7 1.4 1.7	1.0 2.1 2.1	2.1 1.6 2.2 1.6 1.4 1.5	1.5 1.7 1.1 NaN 1.6	1.1 1.6 2.1 1.8 1.7	2.3 1.8 2.1 2.0 2.7 2.5 2.3 2.1
	MITT.								

Abweichung vom Temperaturmittel (°C)

November 2018

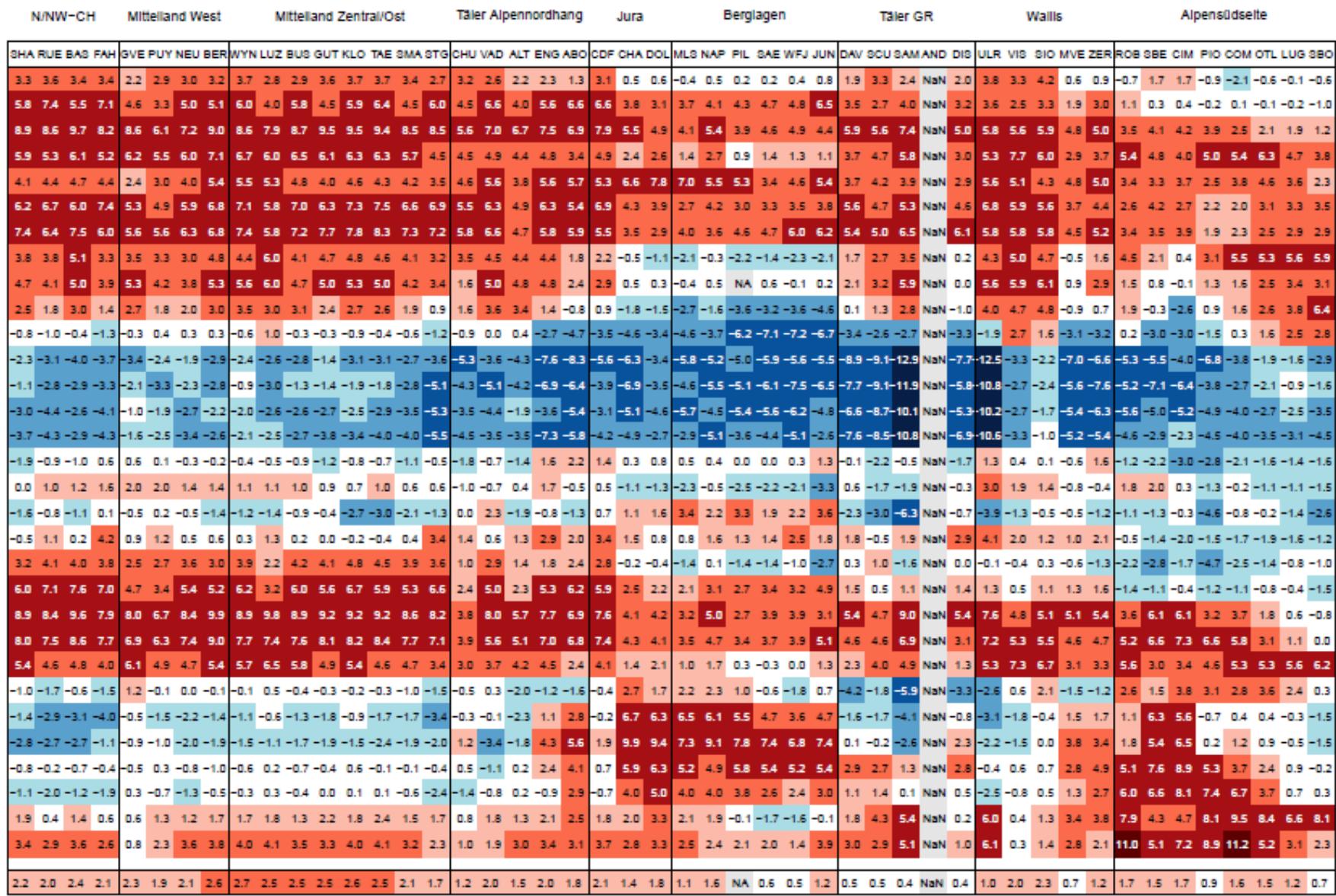
Normperiode: 1981 – 2010



Abweichung vom Temperaturmittel (°C)

Dezember 2018

Normperiode: 1981 – 2010





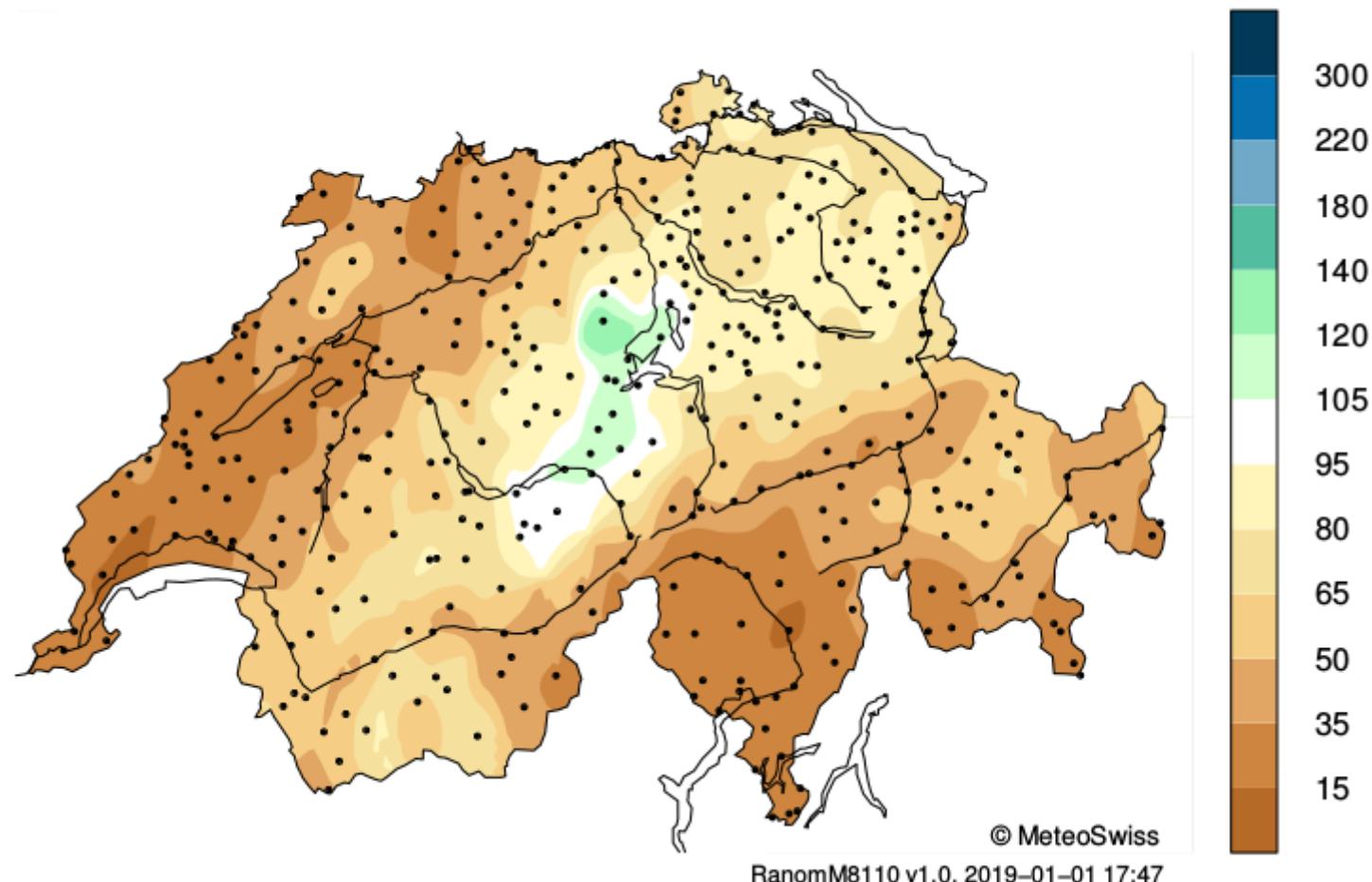
Autunno 2018

Anomalie Precipitazioni Set- Dic 2018



Settembre 2018

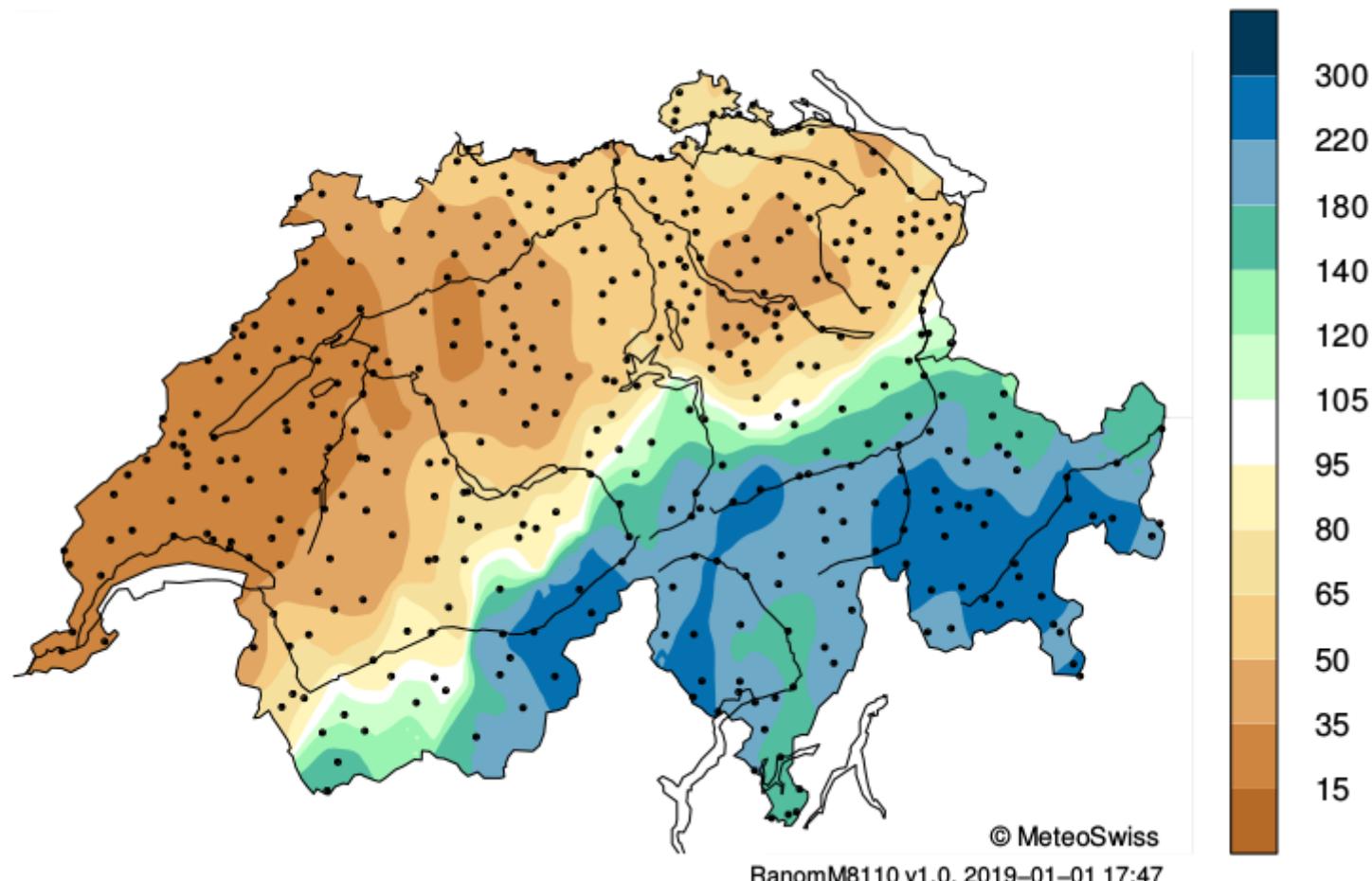
Monthly Precipitation Anomaly (%) Sep 2018 (Ref. 1981–2010)





Ottobre 2018

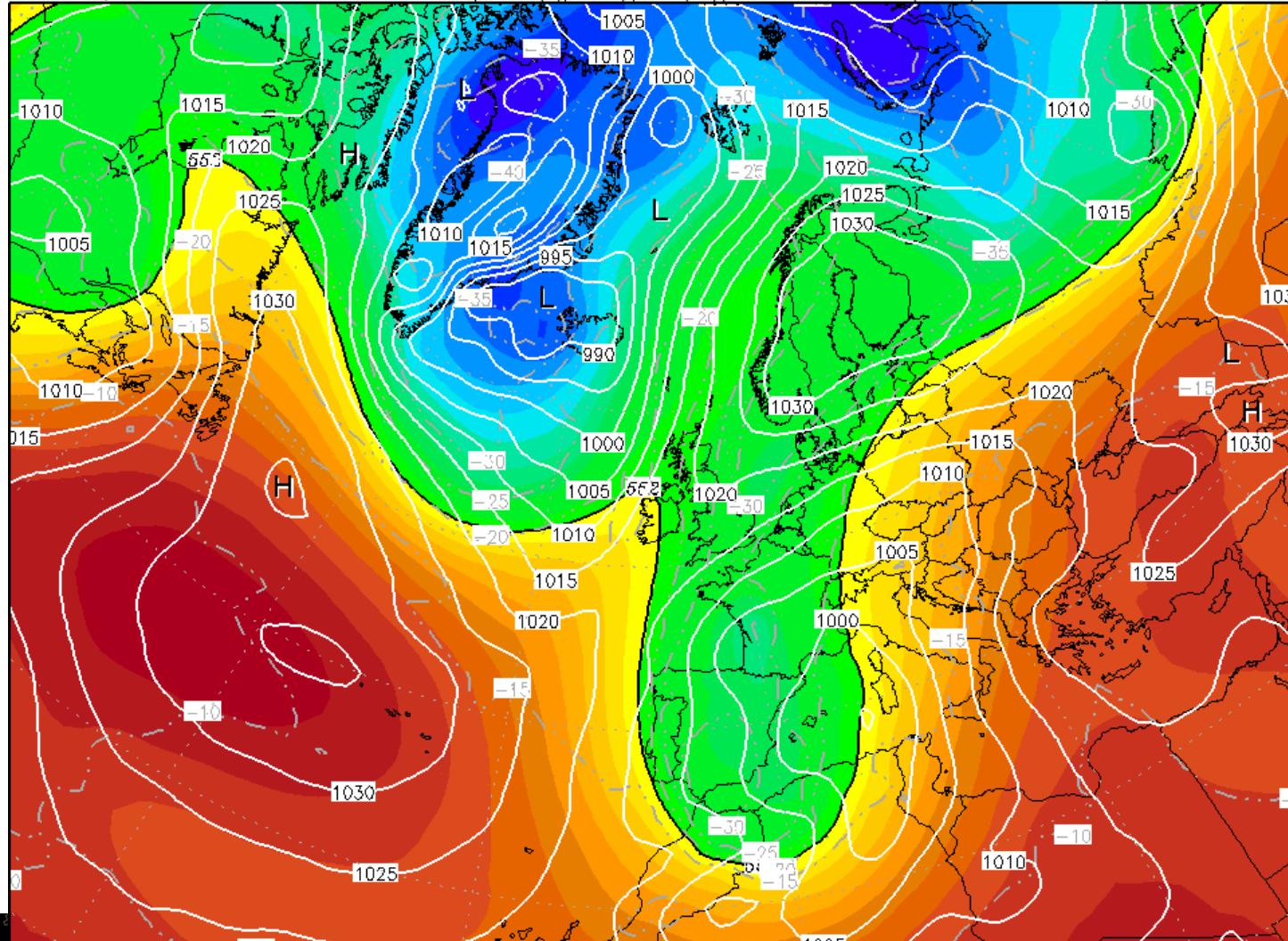
Monthly Precipitation Anomaly (%) Oct 2018 (Ref. 1981–2010)





Ottobre 2018

Init: Mon,29OCT2018 00Z 500 hPa Geopot. (gpm), T (C), Bodendruck (hPa) Valid: Mon,29OCT2018 00Z



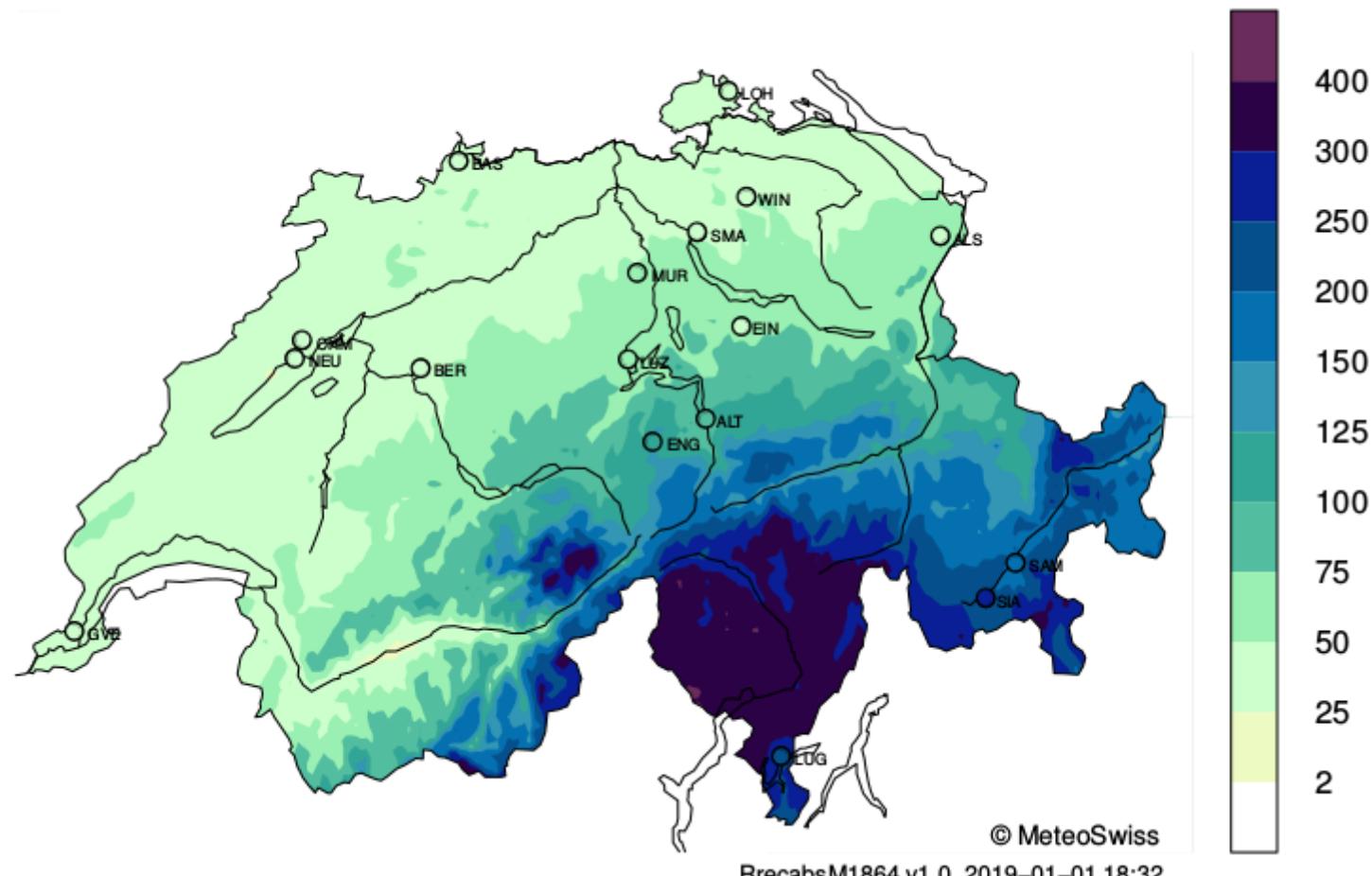
Data: GFS OPERATIONAL 0.250°
(C) Wetterzentrale
www.wetterzentrale.de





Ottobre 2018

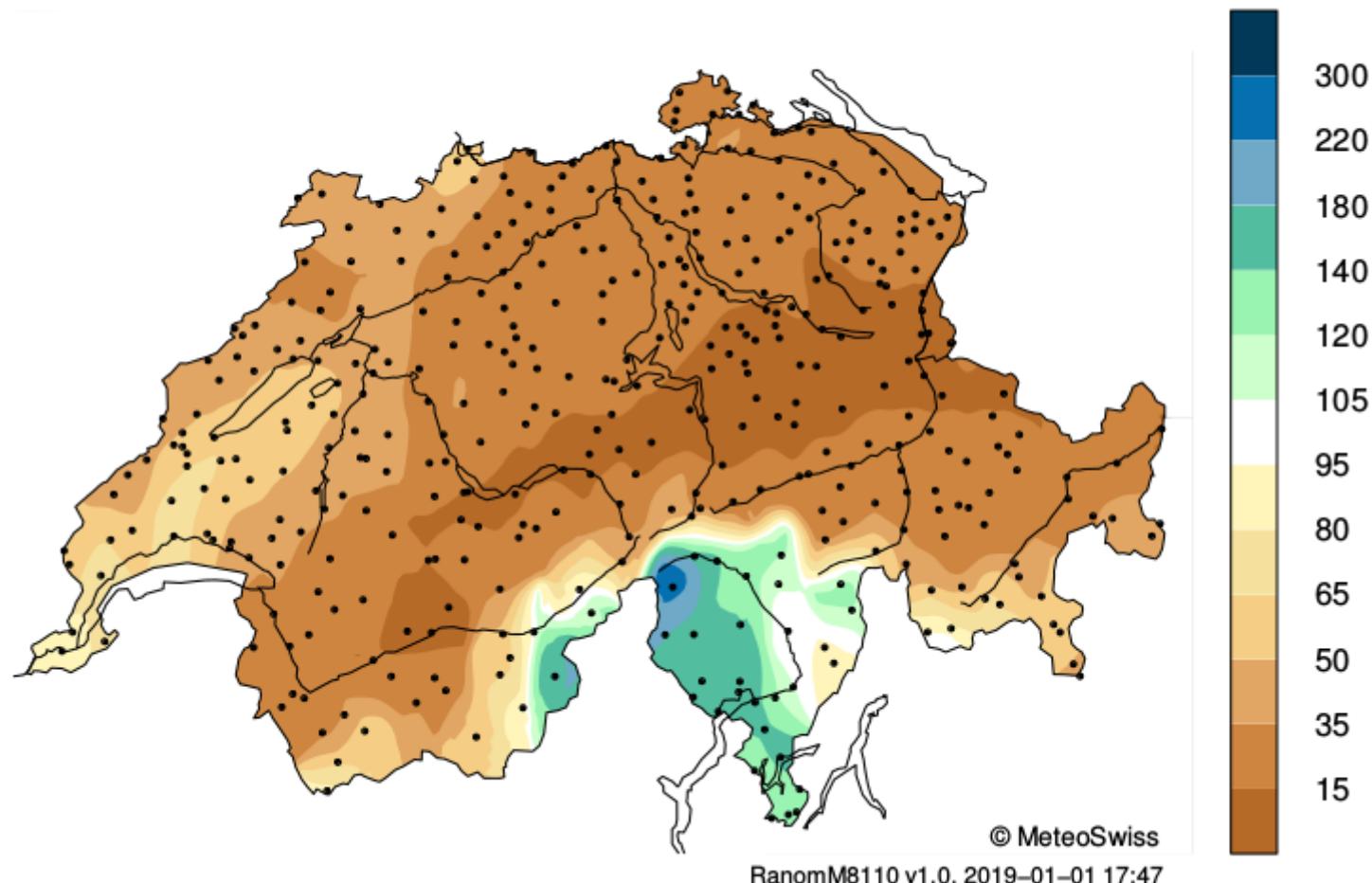
Monthly Precipitation (mm) Oct 2018 (Reconstr.)





Novembre 2018

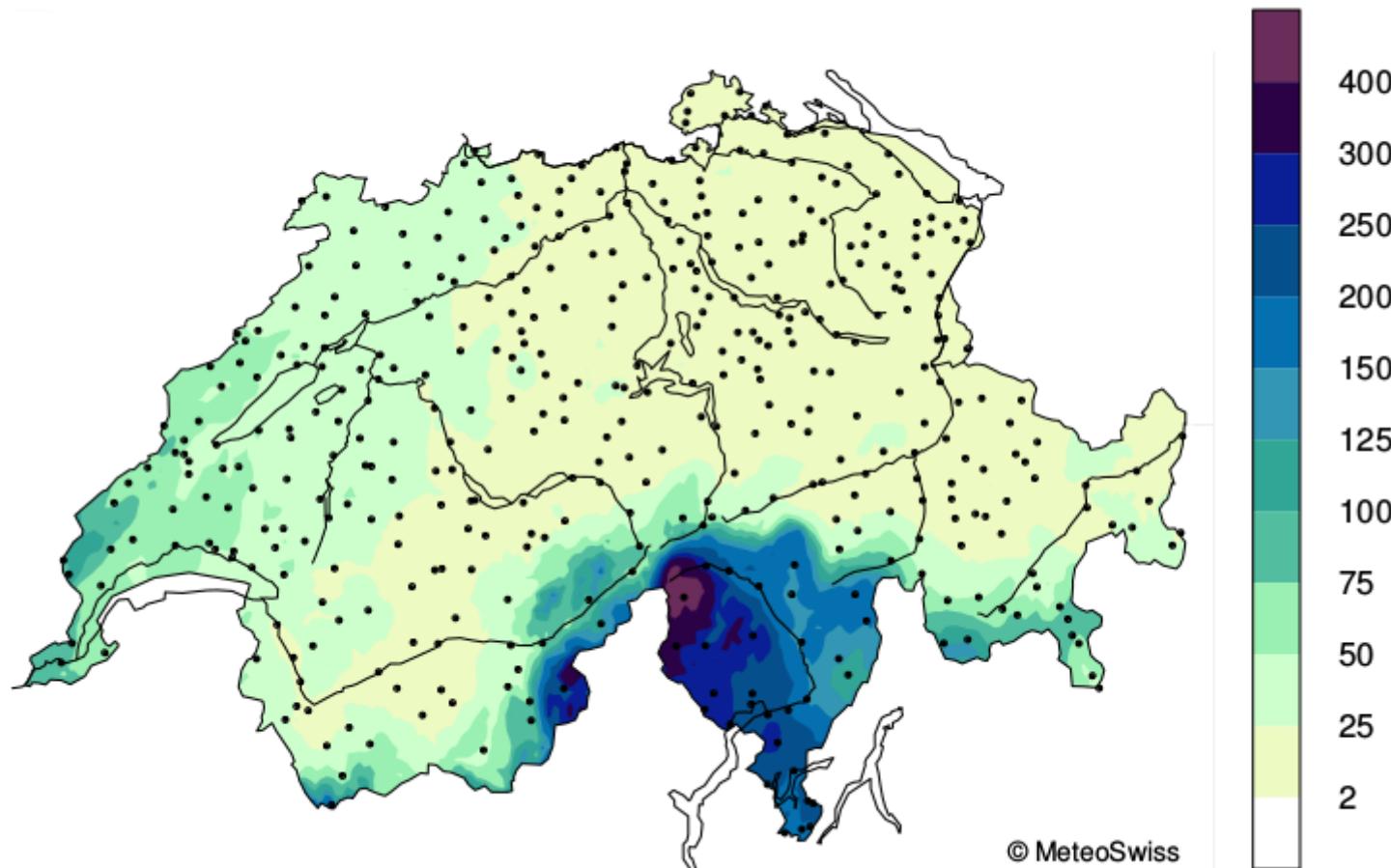
Monthly Precipitation Anomaly (%) Nov 2018 (Ref. 1981–2010)





Novembre 2018

Monthly Precipitation (mm) Nov 2018





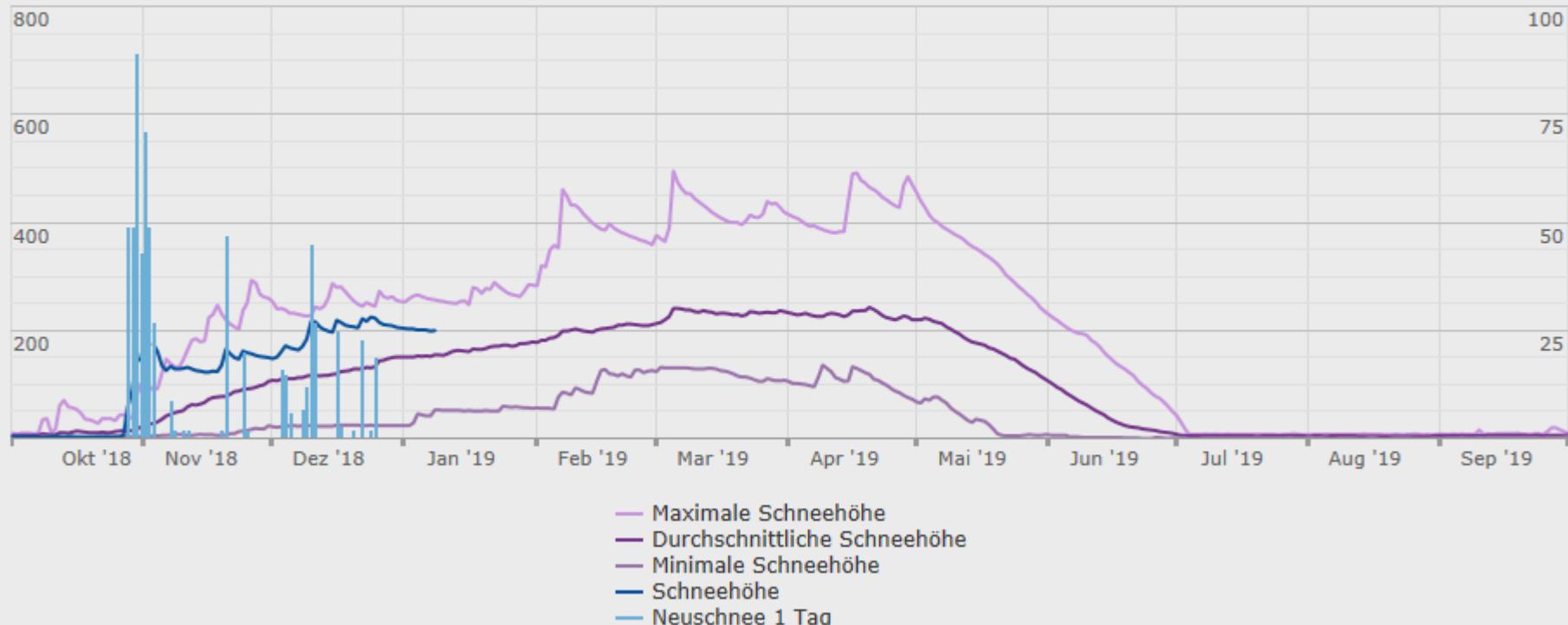
Neve a Bedretto Cassinello

Cassinello 2101 m

Schnee 3 Tage 7 Tage 1 Jahr

Schneehöhe [cm]

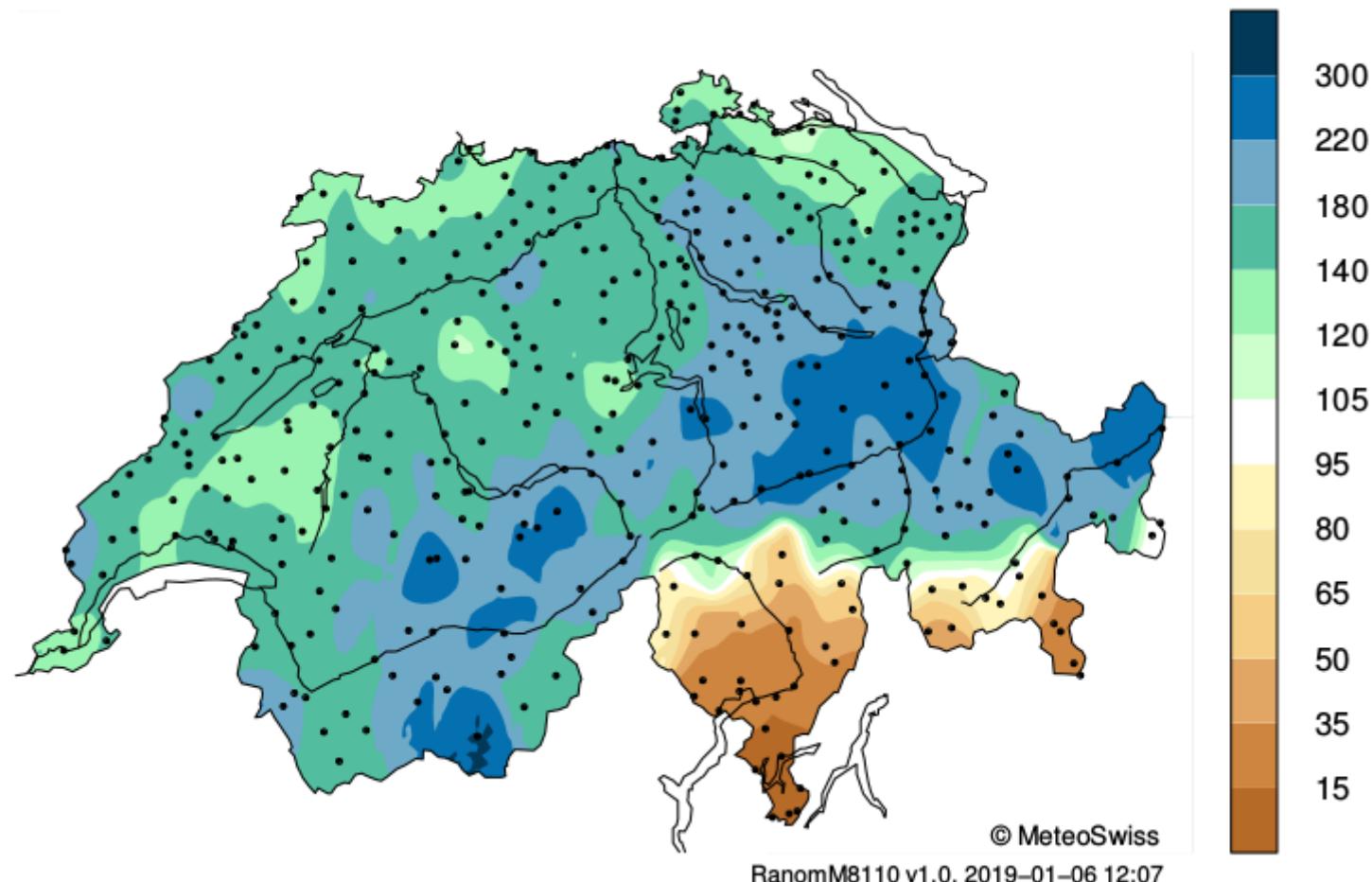
Neuschnee 1 Tag [cm]





Dicembre 2018

Monthly Precipitation Anomaly (%) Dec 2018 (Ref. 1981–2010)





Uno sguardo a gennaio 2019...



Gennaio (2017 vs 2018 vs 2019)



2017



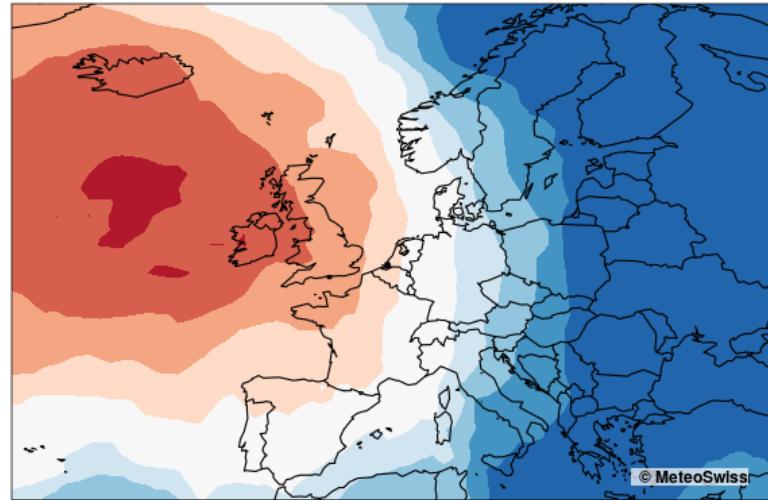
2018





Anomalia geopotenziale previste al 31.12 per giorno +8/+14

Z 500 (upper tercile)
Reference Period 1998-2017

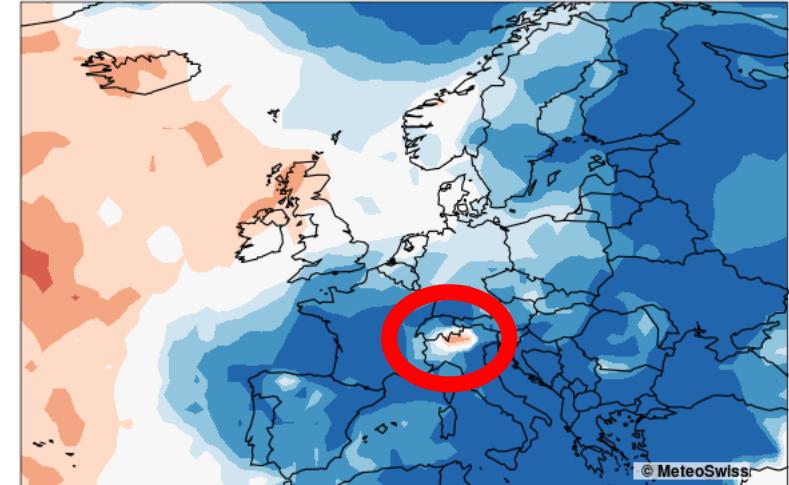


[%]

85
70
55
42
33
24
18
12
6

Temperature 2m (upper tercile)

Reference Period 1998-2017
started on 31-12-2018
Week 2: Mon 07 Jan - Sun 13 Jan

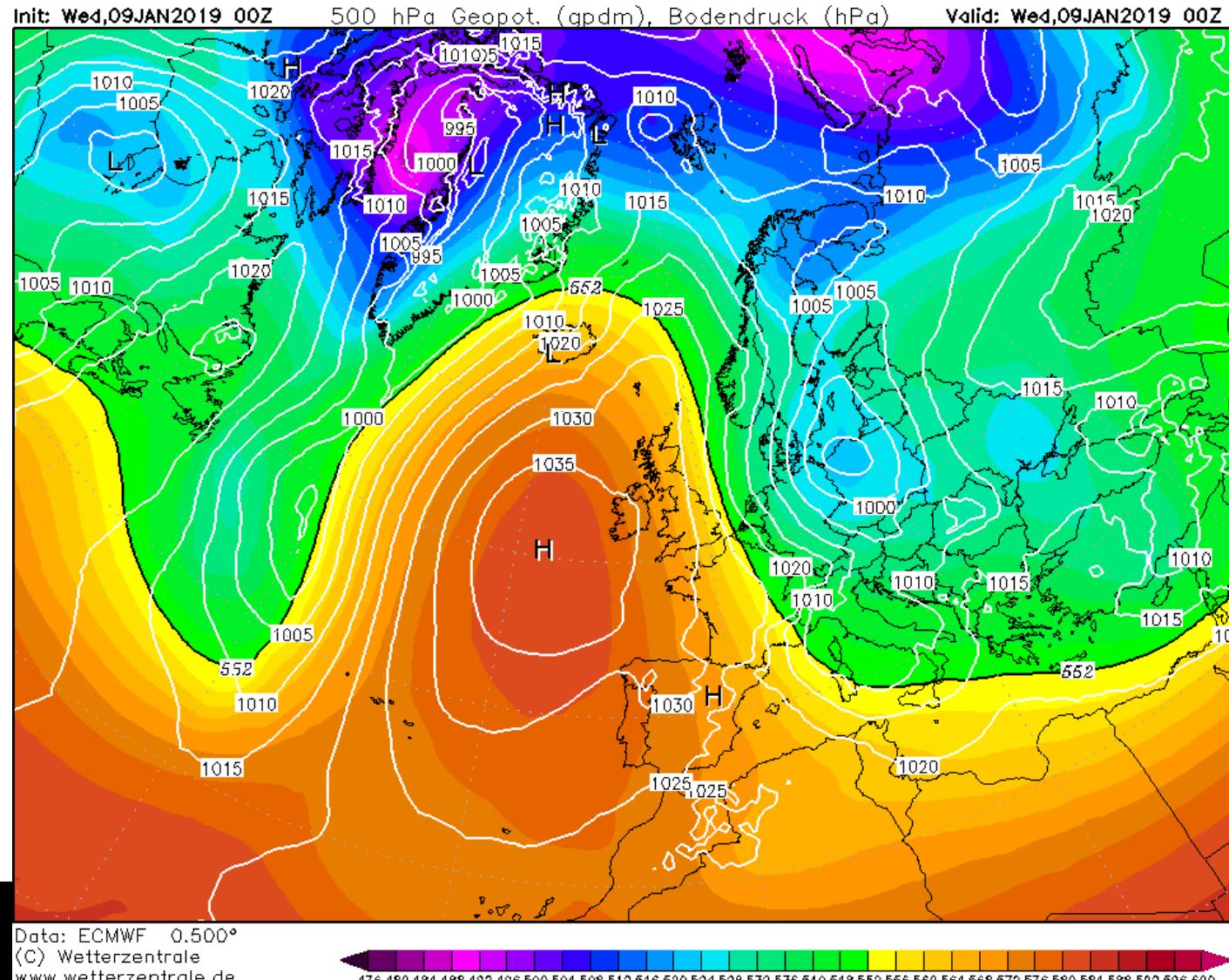


[%]

85
70
55
42
33
24
18
12
6

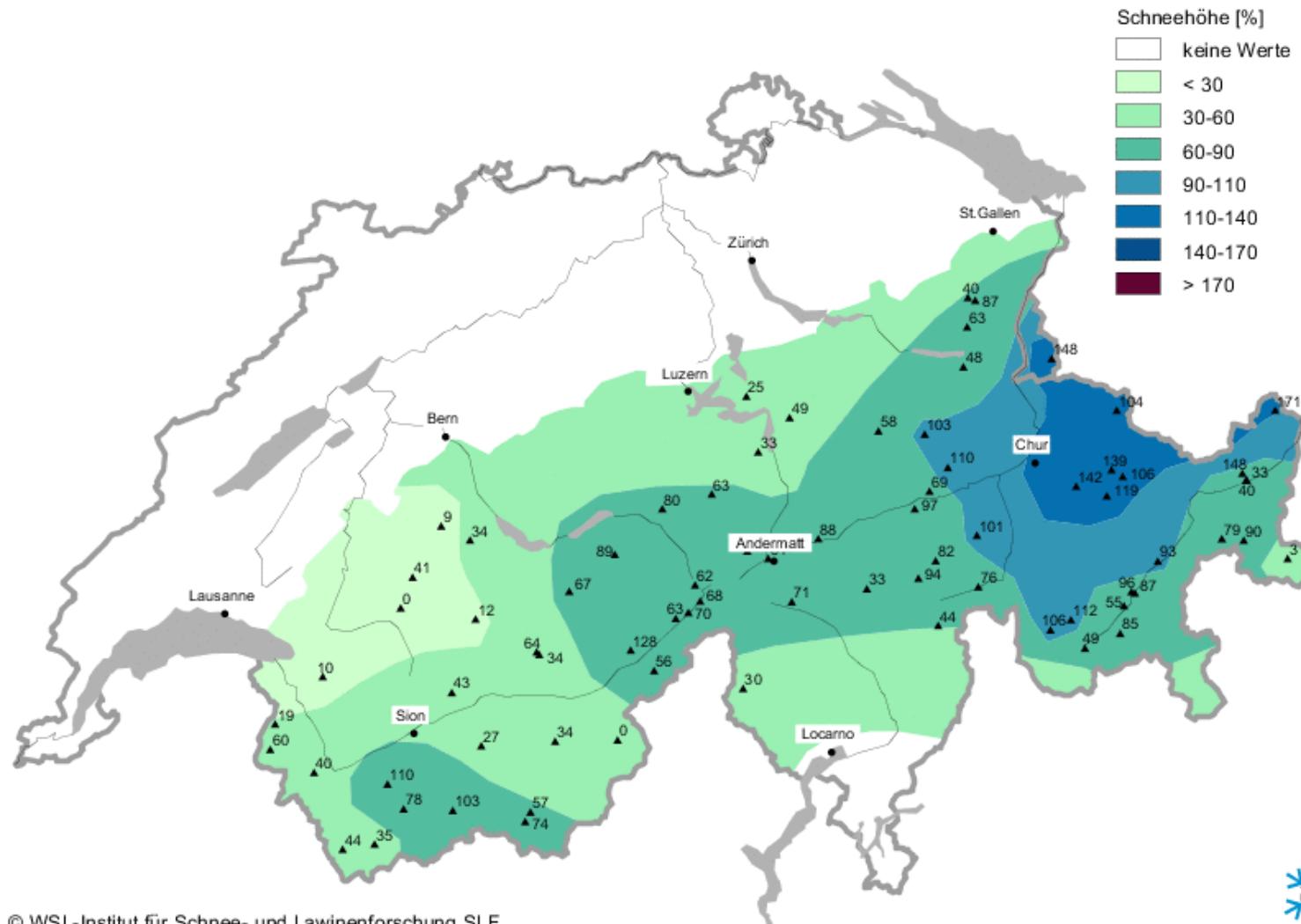


Blocco «omega» persistente





Spessore della coltre nevosa: anomalie



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Bassa di Nara 2077 m

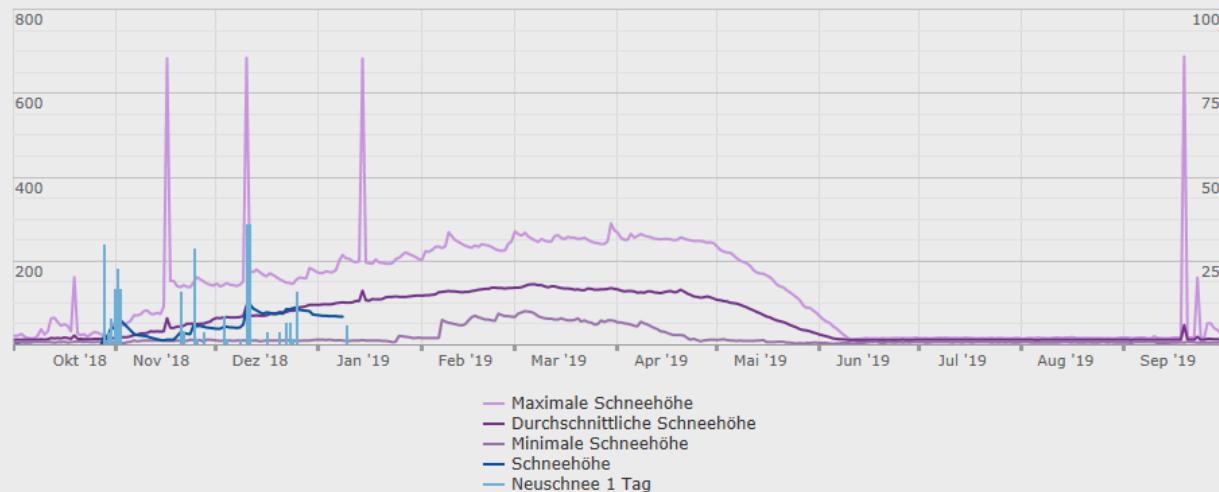
Schnee 3 Tage 7 Tage 1 Jahr

Schneehöhe [cm]

x



Neuschnee 1 Tag [cm]



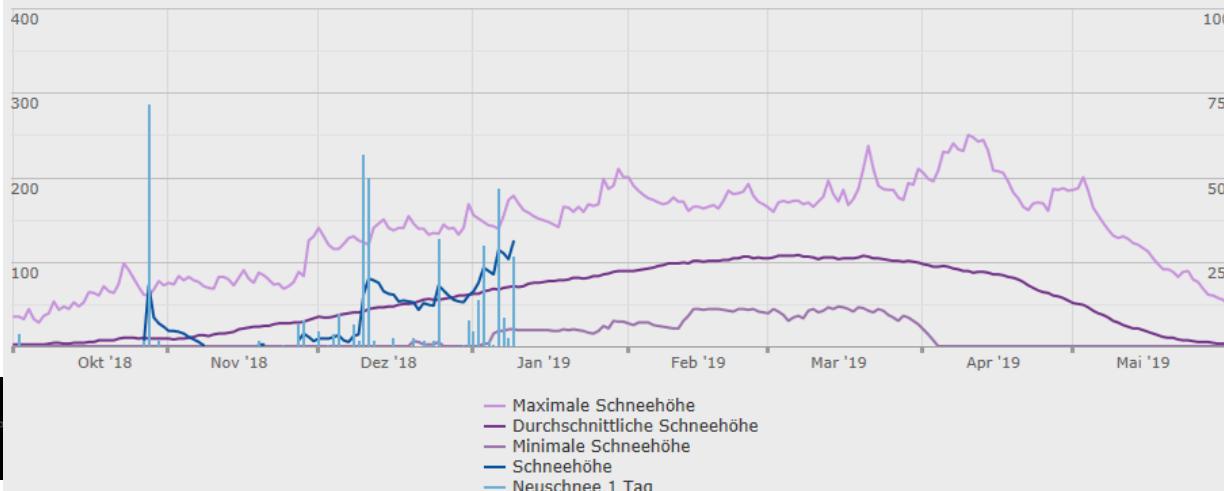
Arosa 1845 m

Schnee 3 Tage 7 Tage 1 Jahr

Schneehöhe [cm]



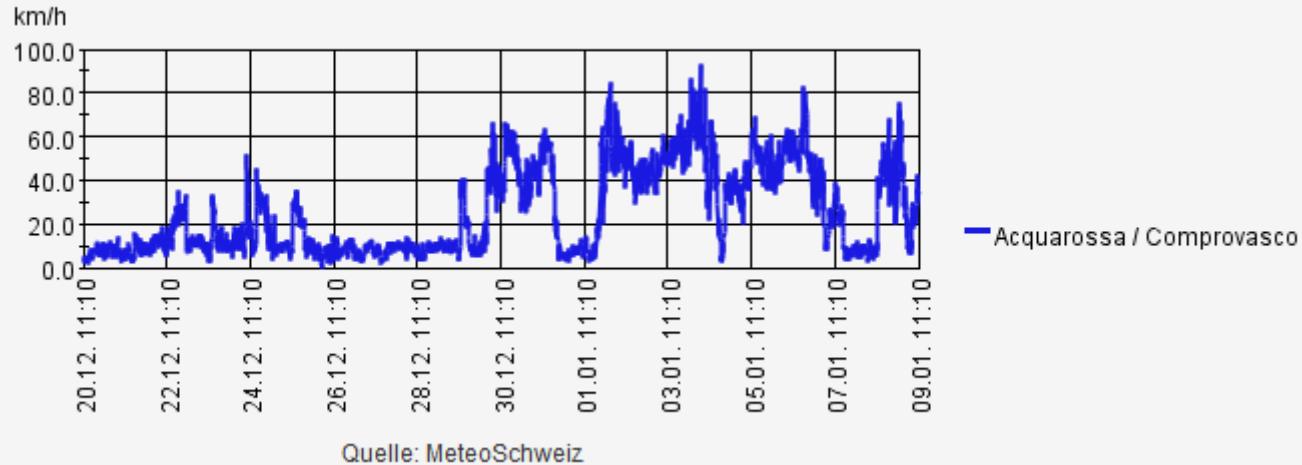
Neuschnee 1 Tag [cm]



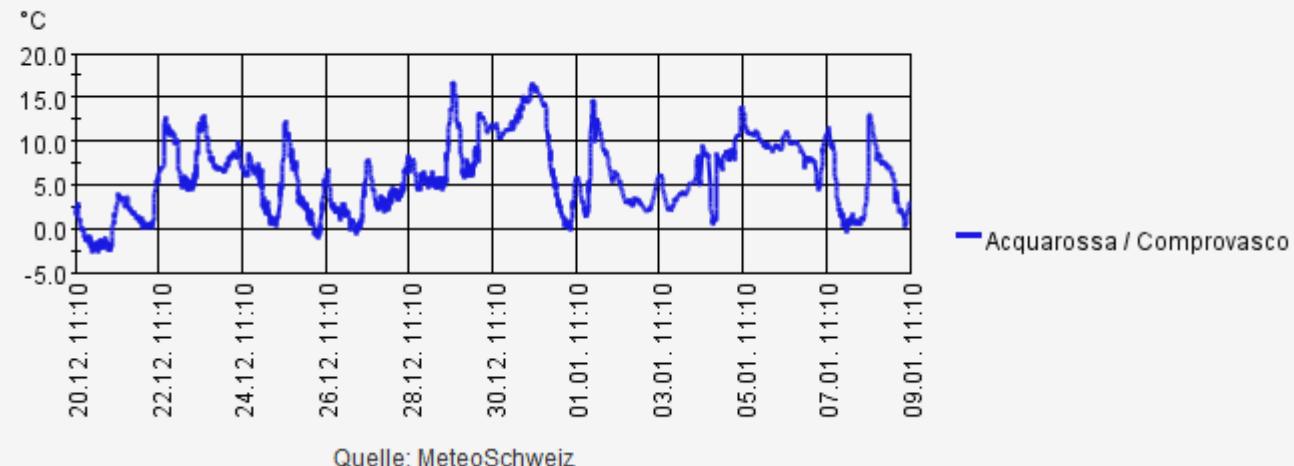


Favonio persistente

Böen spitze (Sekundenböe); Maximum [km/h] 20.12.2018 11:10 UTC - 09.01.2019 11:10 UTC



Lufttemperatur 2 m über Boden; Momentanwert [°C] 20.12.2018 11:10 UTC - 09.01.2019 11:10 UTC

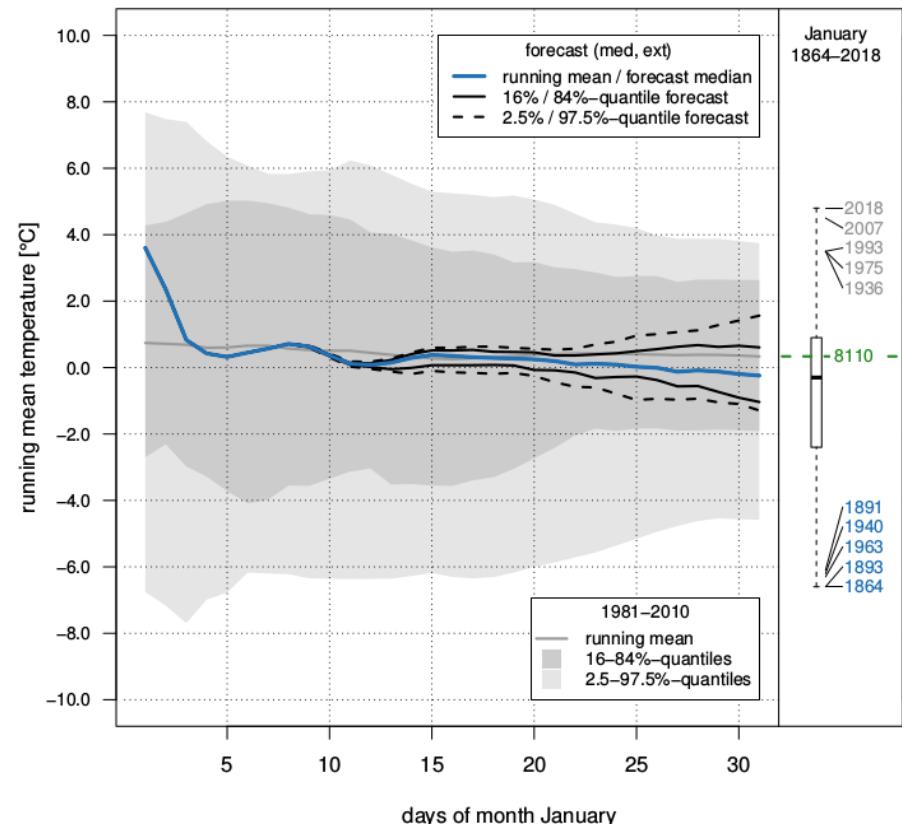




Favonio persistente

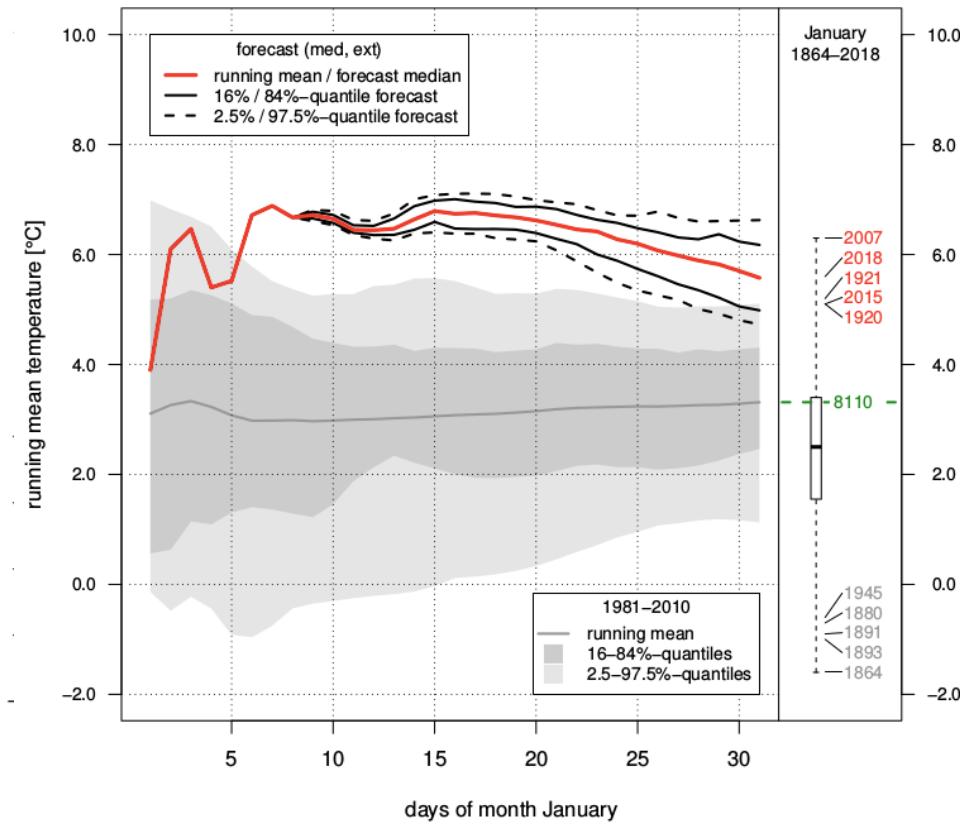
Monthly Mean Temperature Outlook

Zürich / Fluntern: January 2019



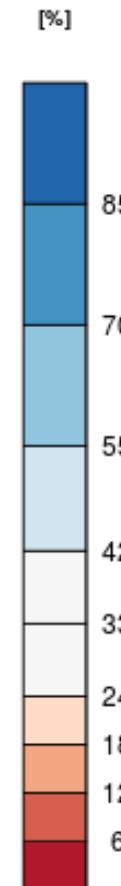
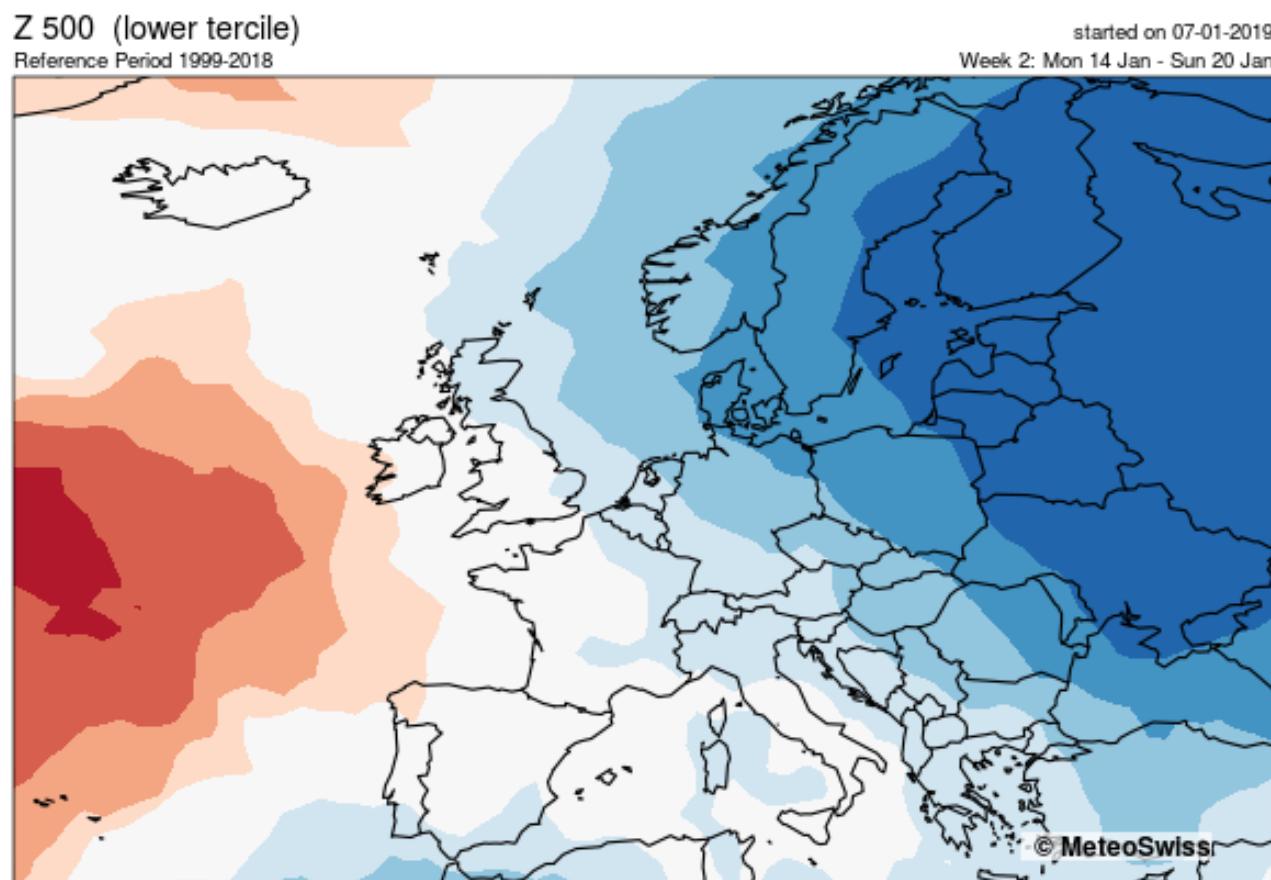
Monthly Mean Temperature Outlook

Lugano: January 2019



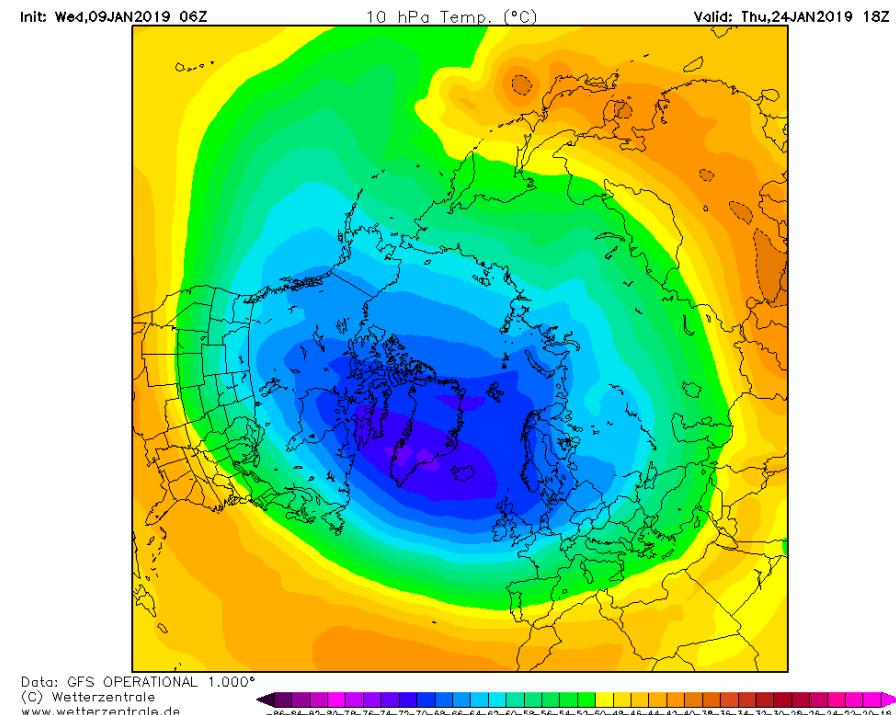
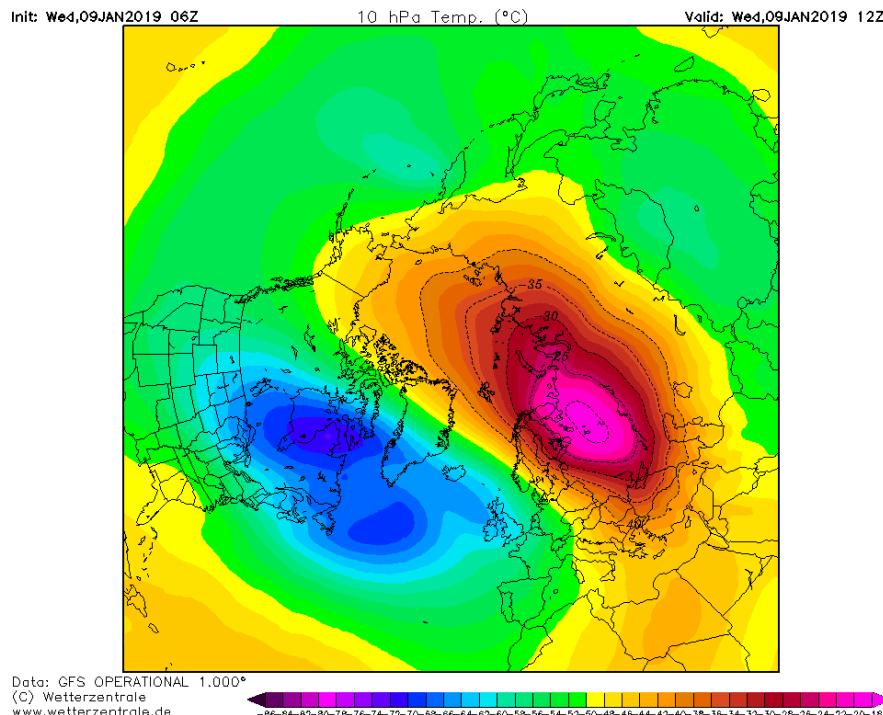


Previsione giorno +8 / +14





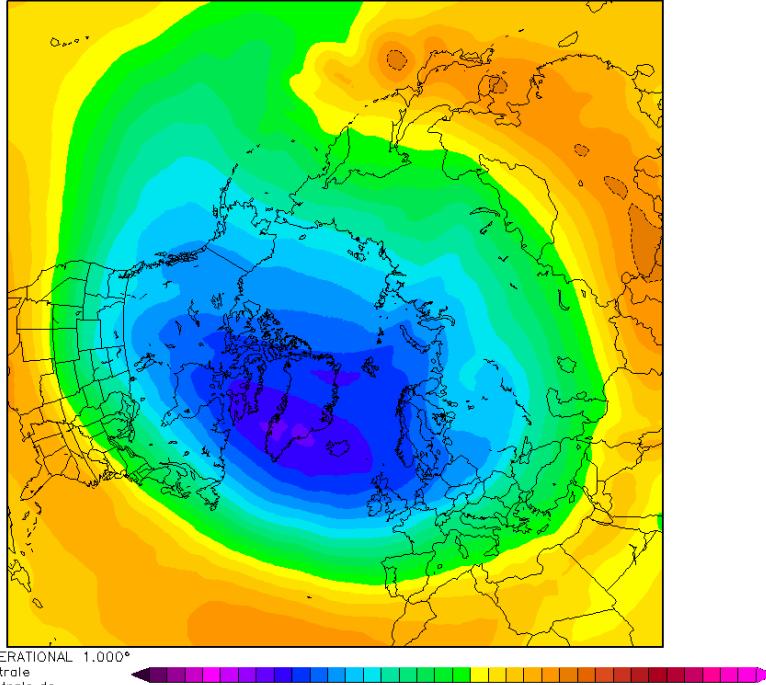
Stratospheric Warming...e i media sono subito in allerta per freddo artico su tutta l'Europa!





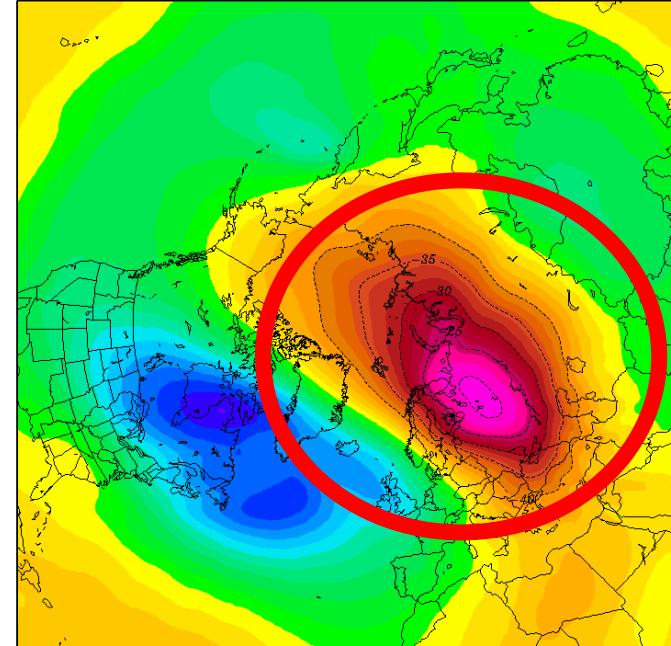
Vortice polare stratosferico «normale»

Init: Wed,09JAN2019 06Z 10 hPa Temp. (°C) Valid: Thu,24JAN2019 18Z



Vortice polare stratosferico «disturbato»

Init: Wed,09JAN2019 06Z 10 hPa Temp. (°C) Valid: Wed,09JAN2019 12Z





Stratospheric Warming

- Il riscaldamento può essere lieve, moderato o intenso (fino a 60 °C di anomalia);
- rilevabile tramite radiosondaggi atmosferici;
- si presenta in massima parte d'inverno e sembra coinvolgere in misura molto maggiore l'emisfero settentrionale piuttosto che quello meridionale;
- Le cause dello strat-warming sono ancora poco chiare nella comunità scientifica sebbene siano state avanzate ipotesi che coinvolgono l'attività solare da una parte e l'influenza delle onde planetarie dall'altra.



Stratospheric Warming

- la configurazione è stata all'origine delle più intense onde di gelo che hanno investito il continente europeo (Italia compresa) nel 1929, 1963, 1985, 2018.
- Tale configurazione atmosferica è del tutto temporanea e reversibile ed il vortice polare può ricomporsi dopo 15/20 giorni sulle latitudini di sua competenza;
- Il meccanismo esatto di influenza dello strat-warming sulla bassa troposfera non è noto ed è tuttora oggetto di studi.



Influsso sulla circolazione nella troposfera

- Vortice polare stratosferico «spostato»
- Vortice polare troposferico «spezzettato»

