

6 Novembre 2019

Il dataset di rianalisi meteorologica MERIDA

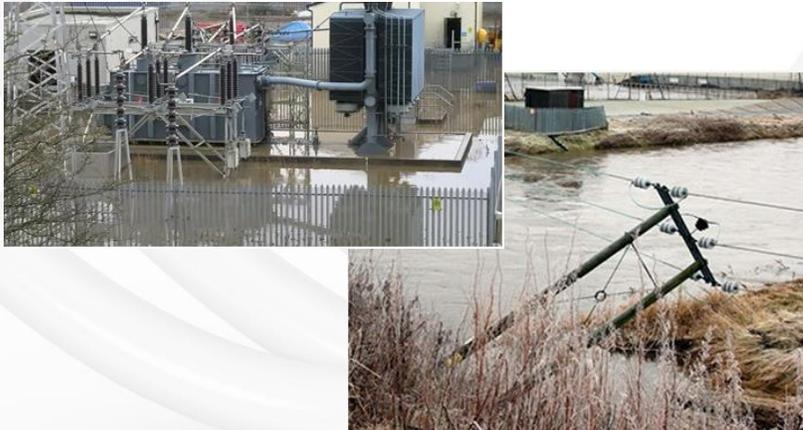
Riccardo Bonanno, Matteo Lacavalla, Simone Sperati



Perché la rianalisi in *RSE*?



- Ultimi 15-20 anni  notevole incremento nella frequenza di eventi meteorologici estremi
prolungate interruzioni elettriche sulle reti di trasmissione/distribuzione
- ARERA (Aprile 2016): tavolo tecnico, migliorare la resilienza del sistema elettrico.
 - Necessità di rispondere alla crescente richiesta di dati meteo ad alta risoluzione spaziale/temporale, necessari per individuare le minacce/fattori di stress per il sistema elettrico e attuare strategie di adattamento per fronteggiare gli eventi meteo estremi (alluvioni, nevicate umide, onde di calore...)
 - Necessità di sviluppare in tempi brevi un dataset di rianalisi meteo ad alta risoluzione



Quarterly Journal of the Royal Meteorological Society

RESEARCH ARTICLE

A new high-resolution MEteorological Reanalysis Italian DATaset: MERIDA

Riccardo Bonanno ✉, Matteo Lacavalla, Simone Sperati

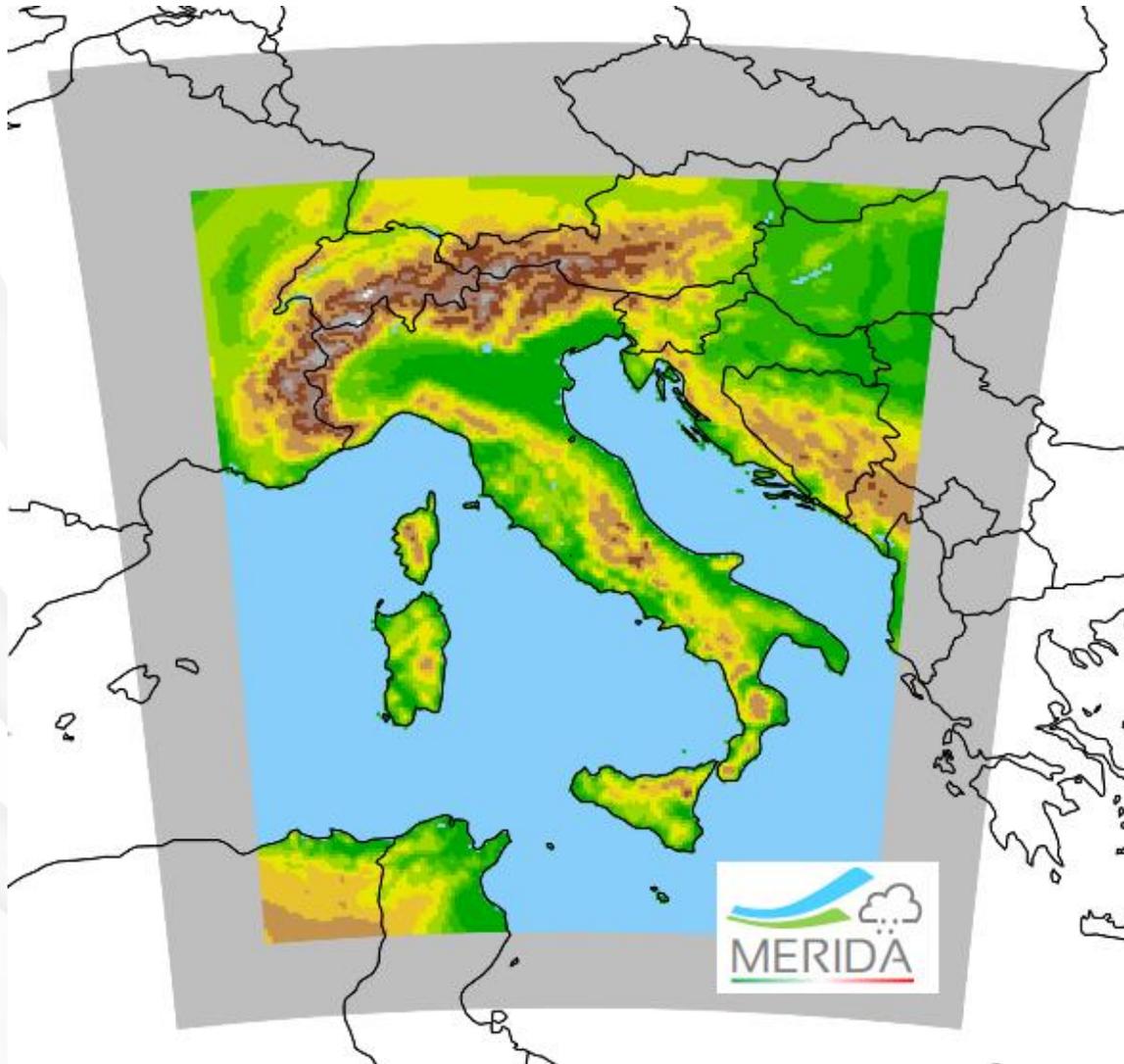
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Bonanno, R, Lacavalla, M, Sperati, S. *A new high-resolution Meteorological Reanalysis Italian Dataset: MERIDA.* Q J R Meteorol Soc. 2019; 145: 1756- 1779. <https://doi.org/10.1002/qj.3530>

Configurazione di MERIDA

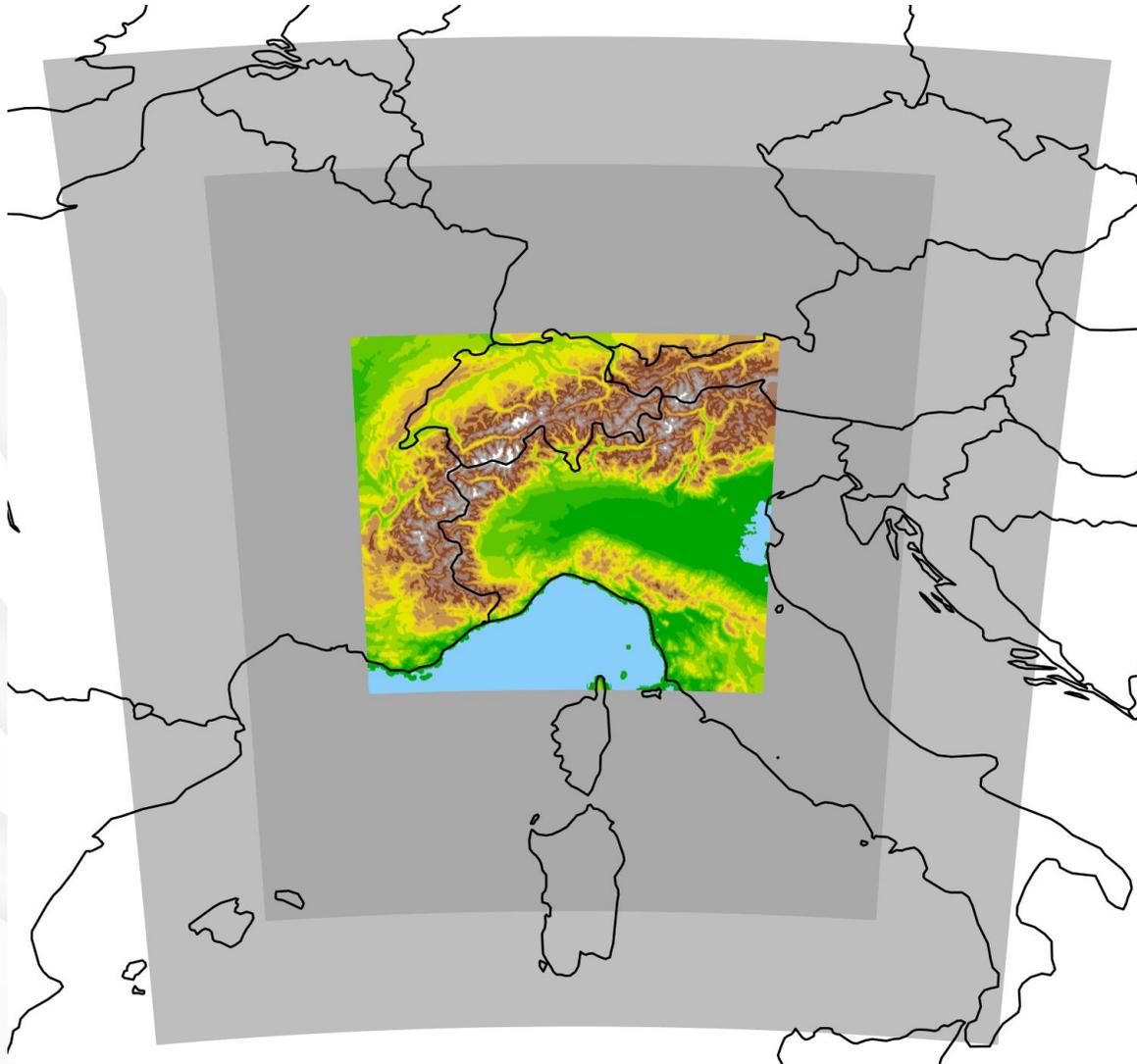


WRF-ARW v3.9

- IC/BC: ECMWF ERA5 (0.25°, 3h)
- 2 griglie 21 km - 7 km, 40 livelli verticali
- Periodo: 1990 - 2018, passo orario
- Obs nudging (SYNOP temperatura 2m)
- Spectral nudging (U,V,T,Q)

Physics options	Parameterization scheme
Microphysics	Thompson <i>et al.</i> , 2008
Longwave radiation	RRTMG (Iacono <i>et al.</i> , 2008)
Shortwave radiation	RRTMG (Iacono <i>et al.</i> , 2008)
Surface layer	Mellor-Yamada Janjic (Janjic, 1994)
PBL	Mellor-Yamada Janjic (Janjic, 1994)
Land surface	NOAH (Ek <i>et al.</i> , 2003)
Landuse	USGS 21 category
Soil categories	FAO/UNESCO soil type
Cumulus	New Tiedtke (Zhang <i>et al.</i> , 2011)

Configurazione MERIDA 1km per Alluvione Piemonte 1994



WRF-ARW v3.9

- IC/BC: ECMWF ERA5 (0.25°, 1h)
- 3 griglie -> 9 km - 3 km - 1km, 50 livelli verticali
- Periodo: 2 - 8 Novembre 1994, passo orario
- Obs nudging (SYNOP temperatura 2m)
- Spectral nudging (U,V,T,Q)

Physics options	Parameterization scheme
Microphysics	Thompson <i>et al.</i> , 2008
Longwave radiation	RRTMG (Iacono <i>et al.</i> , 2008)
Shortwave radiation	RRTMG (Iacono <i>et al.</i> , 2008)
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Land surface	NOAH (Ek <i>et al.</i> , 2003)
Landuse	USGS 21 category
Soil categories	FAO/UNESCO soil type
Cumulus	New Tiedtke: 9 km - Explicit: 3km 1 km

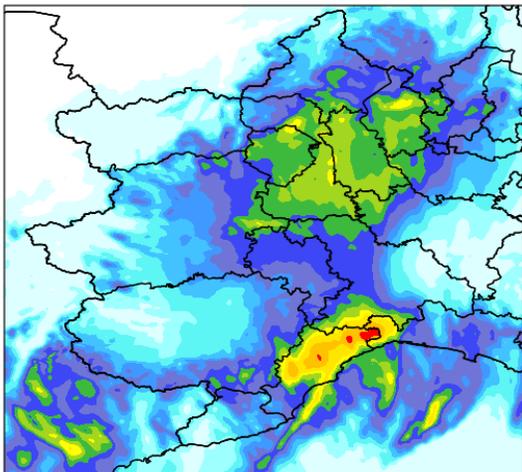
Confronto con osservazioni

- Cumulate giornaliere e su evento
- Serie temporali di precipitazione su alcuni punti significativi

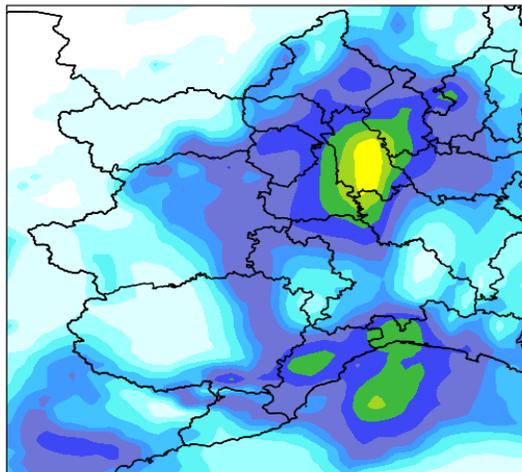
Dati utilizzati

- ERA5
- UERRA HARMONIE V1
- MERIDA 7 km
- MERIDA 1 km
- PLUVIOMETRI DA RETE ARPA PIEMONTE

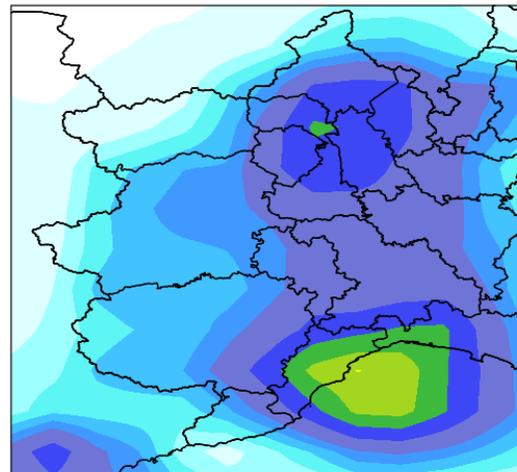
MERIDA 1 km



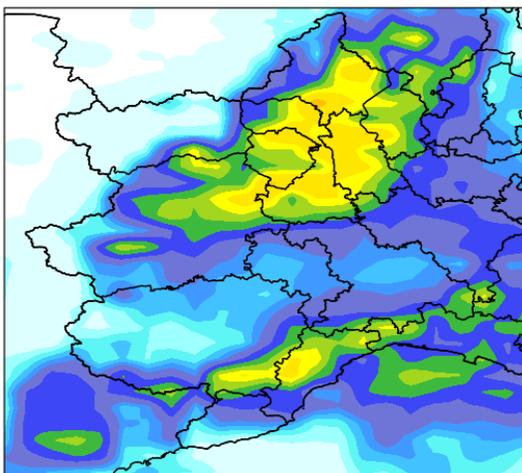
MERIDA 7 km



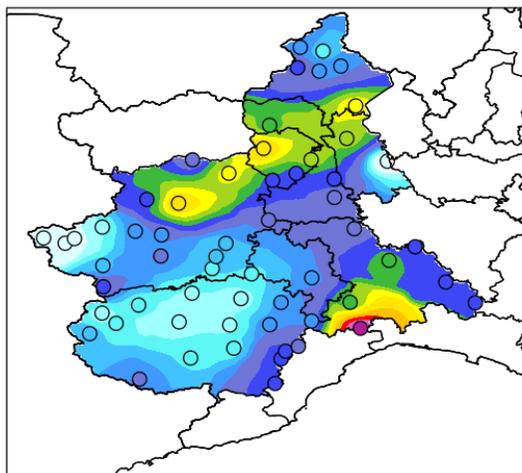
ERA5



UERRA HARMONIE



STAZIONI + INTERP

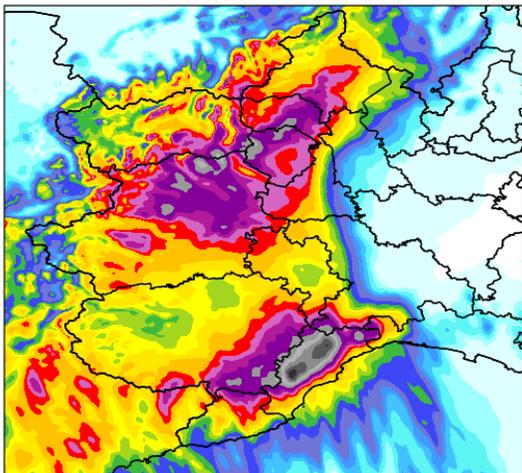


4 Novembre

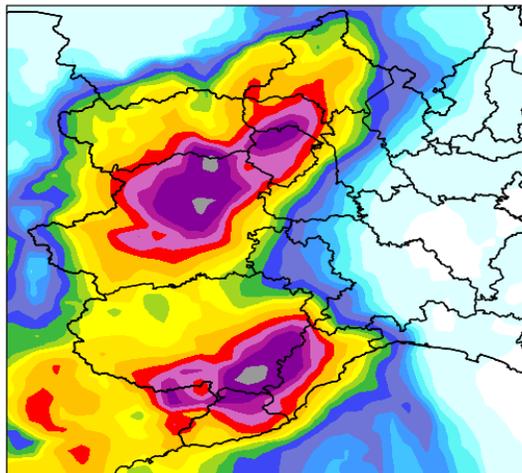
- Sottostima sulla parte settentrionale per MERIDA 1 - 7km e ERA5
- Area appenninica descritta bene da MERIDA 1km



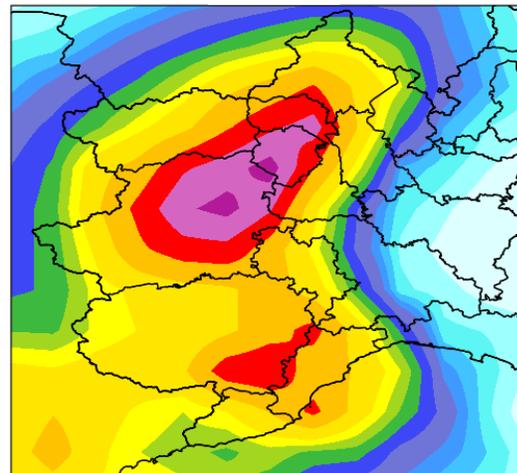
MERIDA 1 km



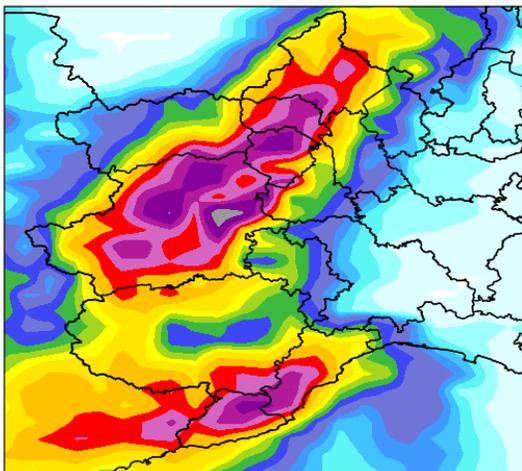
MERIDA 7 km



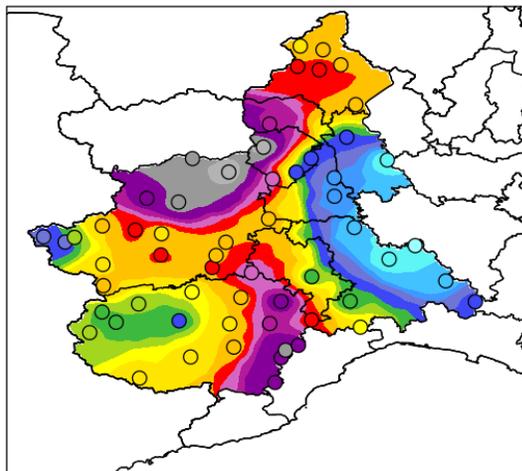
ERA5



UERRA HARMONIE



STAZIONI + INTERP

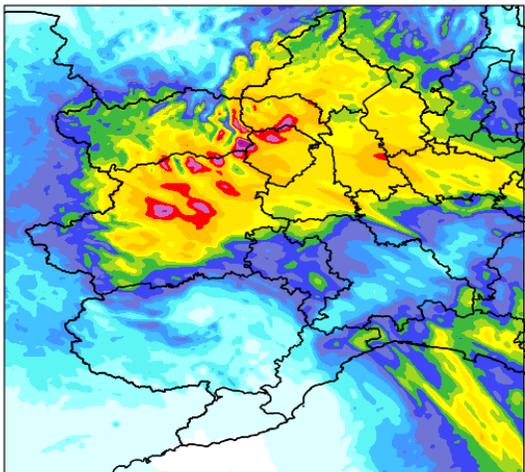


5 Novembre

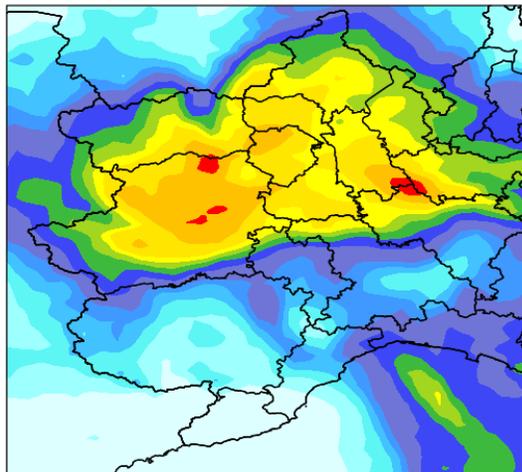
MERIDA 1km e 7km
individuano meglio
pattern e quantitativi



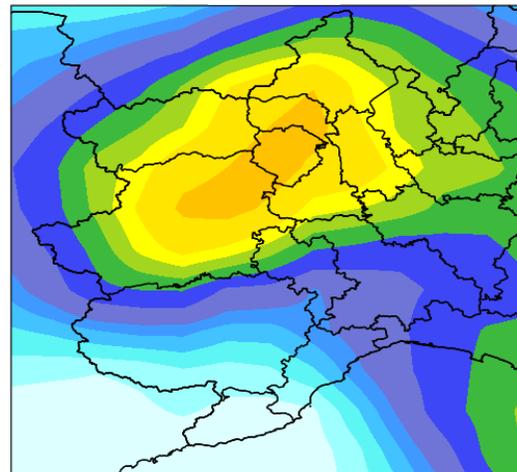
MERIDA 1 km



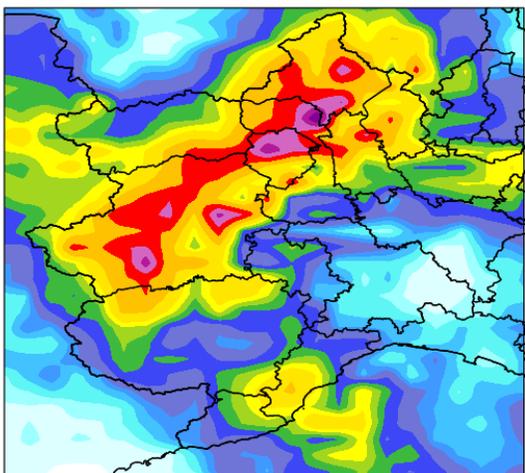
MERIDA 7 km



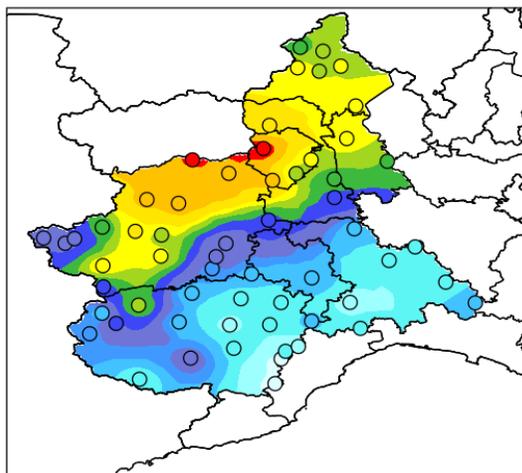
ERA5



UERRA HARMONIE

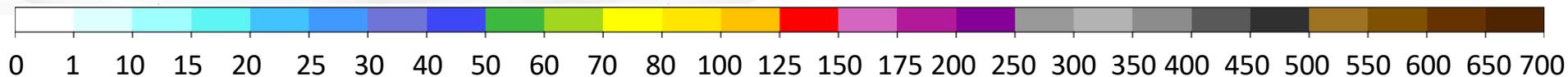


STAZIONI + INTERP

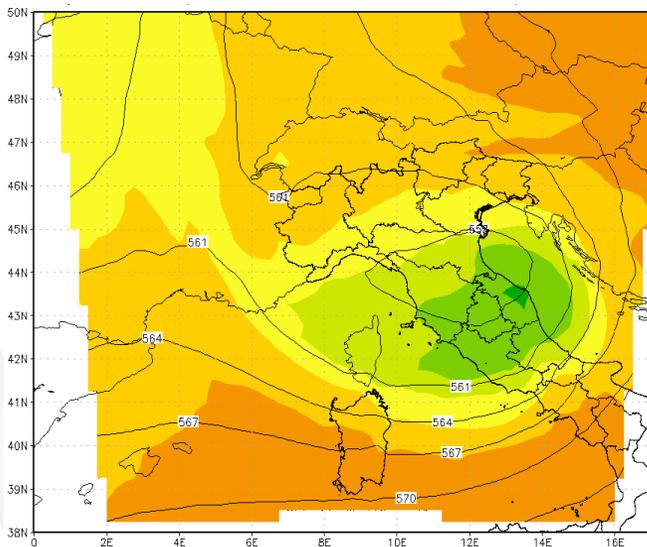


6 Novembre

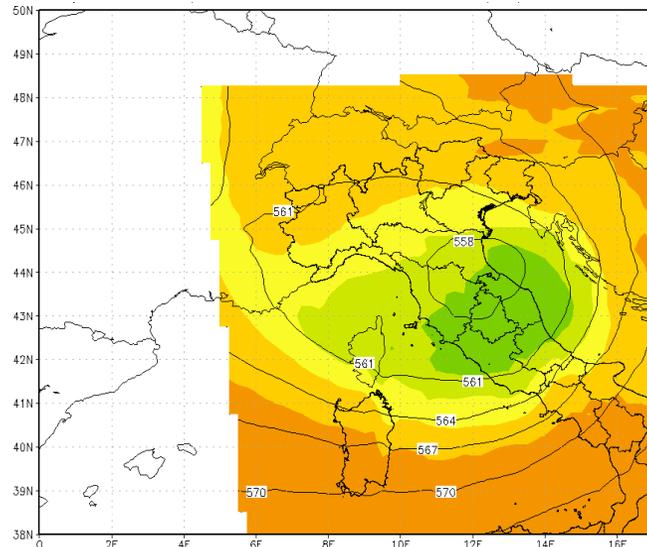
Buona descrizione dei pattern e
dei quantitativi
ad eccezione di HARMONIE



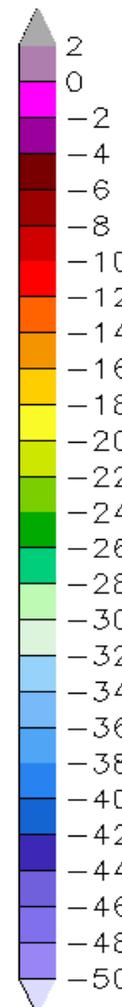
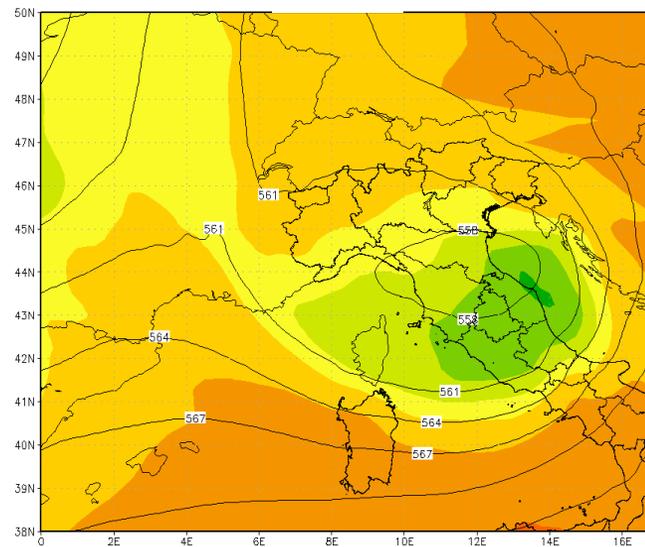
MERIDA 1 km



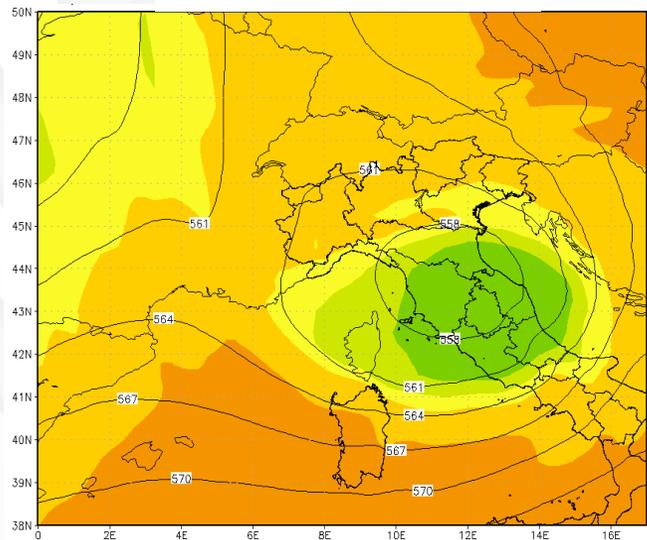
MERIDA 7 km



ERA5

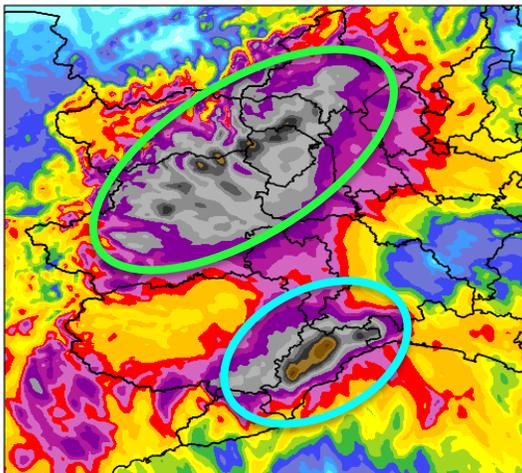


UERRA HARMONIE

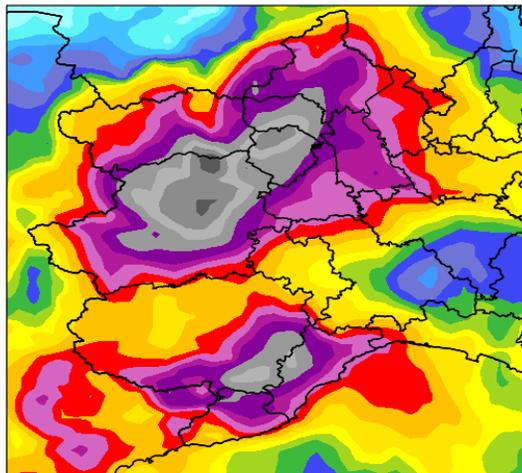


Geopotenziale (dam) e
 Temperatura (°C) a 500 hPa
 6 Novembre 18UTC

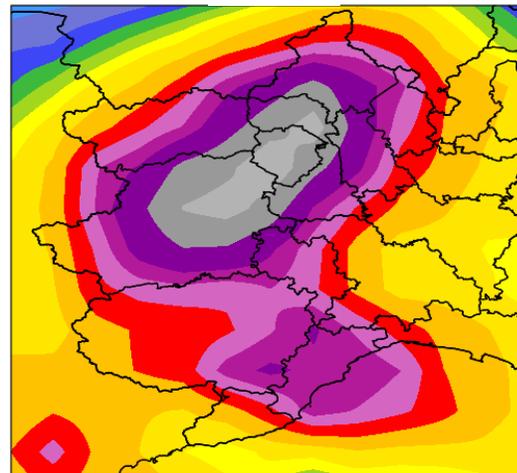
MERIDA 1 km



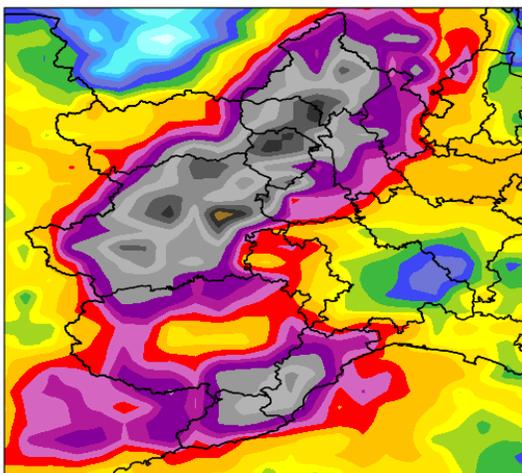
MERIDA 7 km



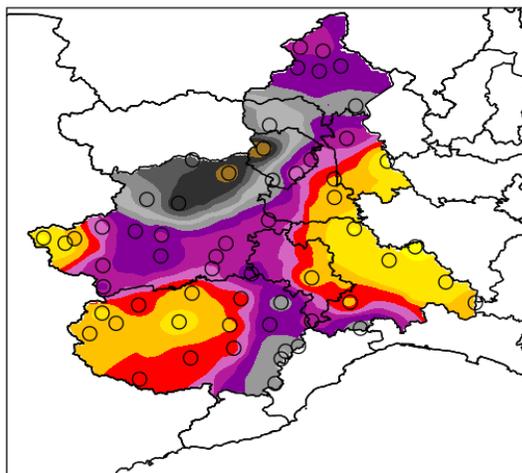
ERA5



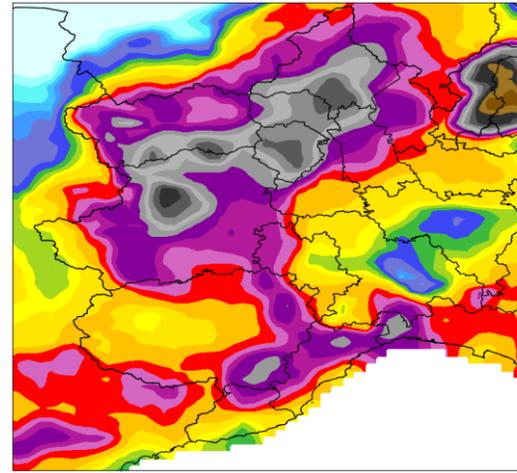
UERRA HARMONIE



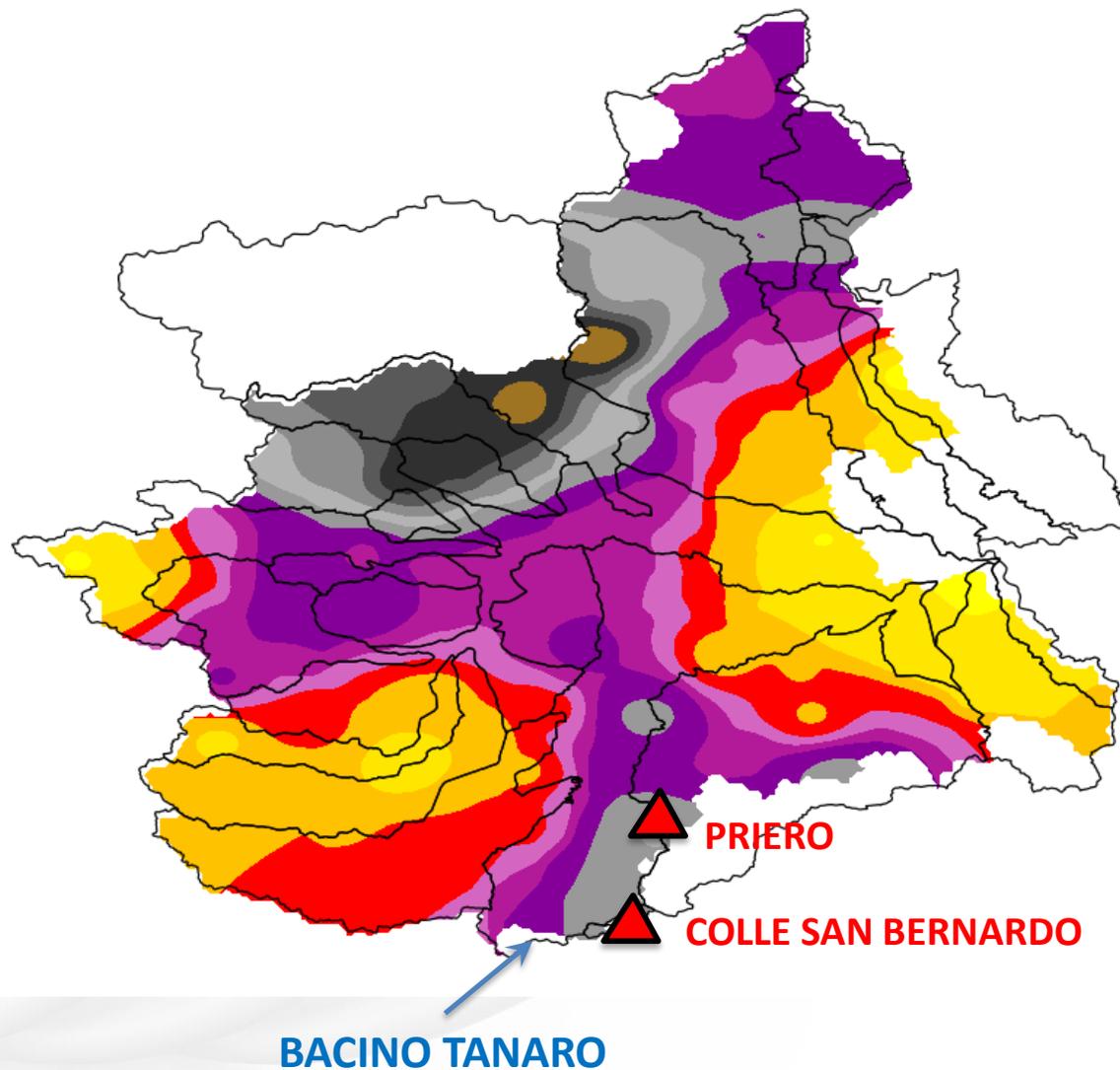
STAZIONI + INTERP



APGD – EURO4M

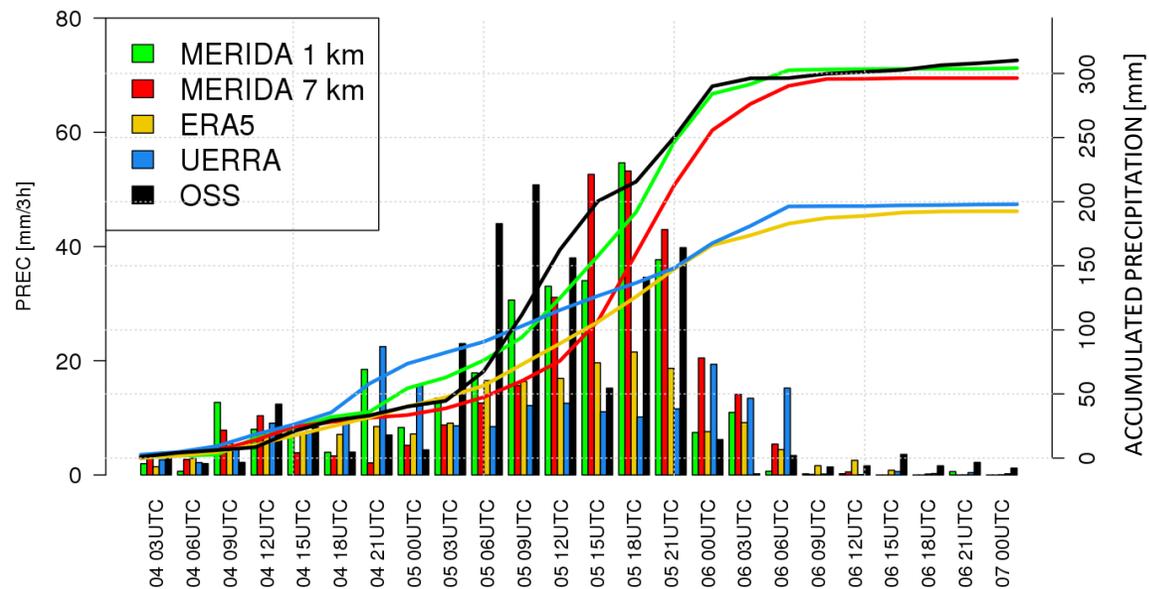


Cumulata osservata evento

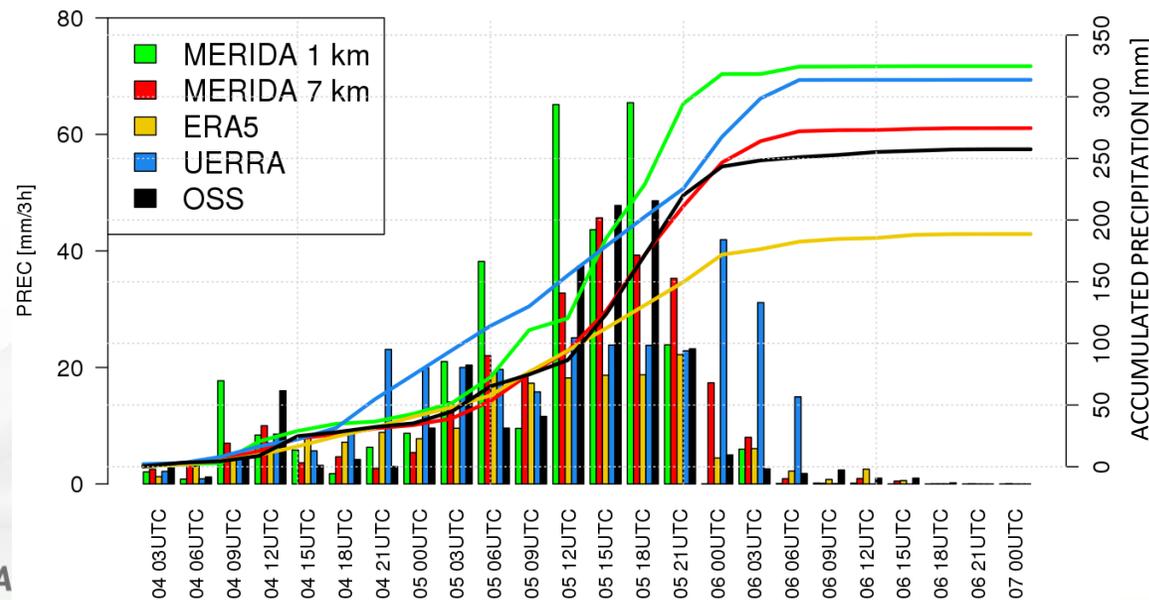


4 - 6 Novembre

PRIERO – BACINO TANARO



COLLE SAN BERNARDO – BACINO TANARO



- MERIDA 7km in generale buona stima dei quantitativi su evento
- MERIDA 1km locale sovrastima

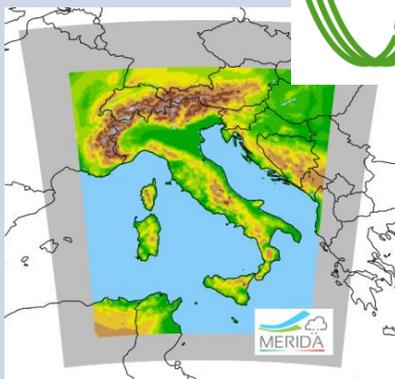
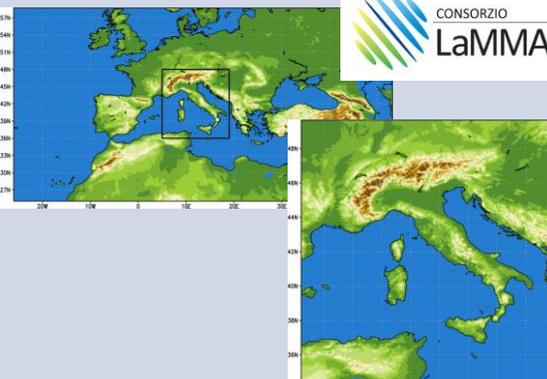
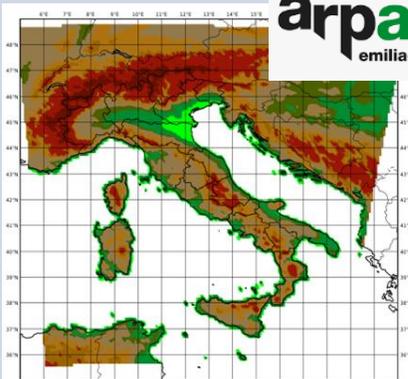
Conclusioni

- ERA5: generale sottostima delle precipitazioni legata alla bassa risoluzione spaziale
- UERRA HARMONIE V1: spesso errata localizzazione dei pattern di precipitazione e della tempistica.
- MERIDA 7 km: buona localizzazione delle precipitazioni, sottostima sulla fascia pedemontana alpina NW. Tempistica localmente imprecisa in sede appenninica (in particolare il 5)
- MERIDA 1 km: simile a MERIDA 7 km, ma con minor bias sulla fascia pedemontana alpina NW e sovrastima su Appennino ligure.

Rianalisi ad alta risoluzione per l'Italia

Sono disponibili o in fase di sviluppo diverse rianalisi meteorologiche per l'Italia.

COmparison of Reanalysis for the ItaliaN Area (CORINA)

	MERIDA	BOLAM/MOLOCH	SPHERA
Dominio di integrazione			
NWP	WRF-ARW v3.9	BOLAM (idrostatico) + MOLOCH	COSMO
Risoluzione orizzontale/verticale	7 km / 40 livelli	BOLAM 7 km / 50 livelli MOLOCH 2.5 km / 50 livelli	2.2 km / 65 livelli
Estensione temporale	1990-2018	1998-2018	1995-2018

- **La rianalisi meteorologica in Italia: confronto tra i dataset disponibili.** Simone Sperati, Matteo Lacavalla, Riccardo Bonanno, Ines Cerenzia, Tiziana Paccagnella, Andrea Montani, Bernardo Gozzini, Francesco Pasi, Valerio Capecci. 2° Congresso AISAM 2019 – Napoli, 24-26 settembre 2019
- **Trends in the severe weather events simulated by SPHERA, a convection-permitting reanalysis over Italy.** Ines Cerenzia, Tiziana Paccagnella, Andrea Montani, Matteo Lacavalla, Riccardo Bonanno, Simone Sperati, Valerio Capecci. 7ª Conferenza Annuale SISC – CLIMRISK19 – Trento, 23-25 Ottobre 2019

Grazie per l'attenzione

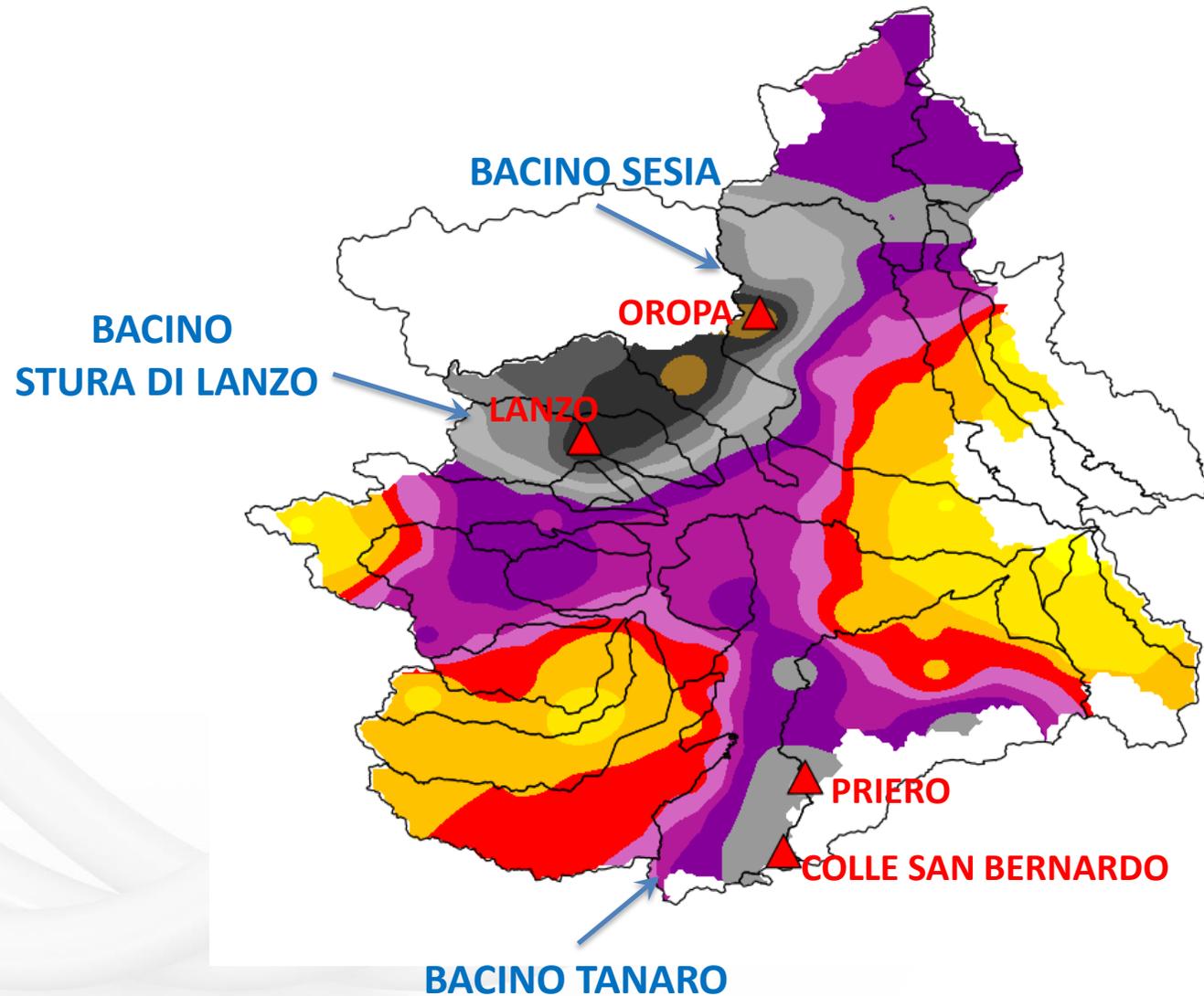
riccardo.bonanno@rse-web.it



- Bonanno, R., Lacavalla, M., Sperati, S. 2019. A new high-resolution Meteorological Reanalysis Italian Dataset: MERIDA. Q J R Meteorol Soc. 145: 1756-1779. <https://doi.org/10.1002/qj.3530>
- Bonanno, R., Lacavalla, M., Sperati, S. 2019. MERIDA - MEteorological Reanalysis Italian DATaset (Version 1) [Data set]. Quarterly Journal of Royal Meteorological Society. Zenodo. <http://doi.org/10.5281/zenodo.2677593>

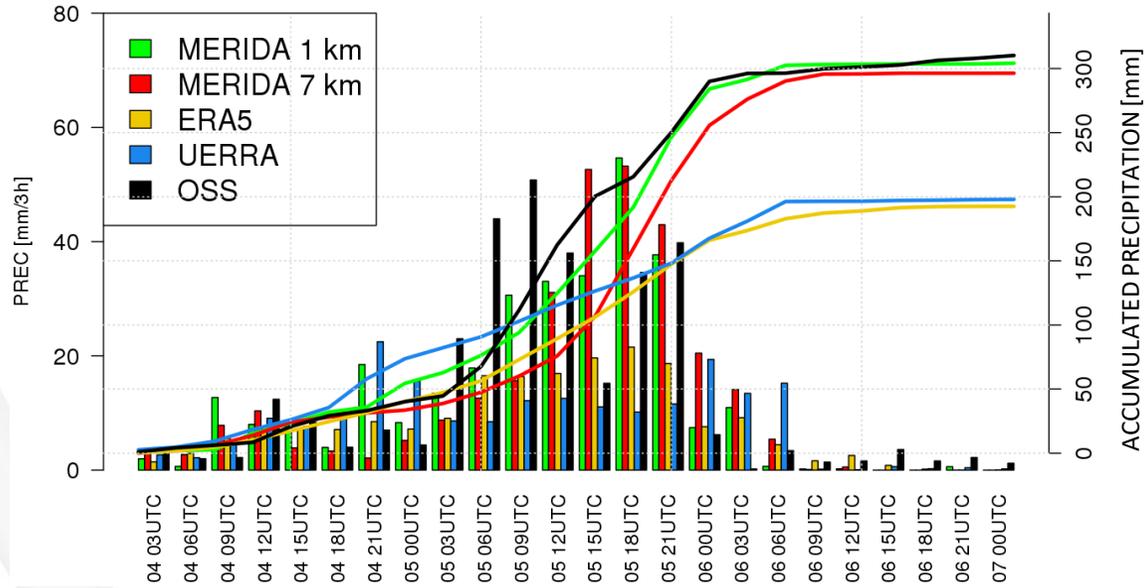
Questo lavoro è stato finanziato dal Fondo di Ricerca per il Sistema Elettrico in ottemperanza al Decreto del Ministro dello Sviluppo Economico 16 aprile 2018

Cumulata osservata evento

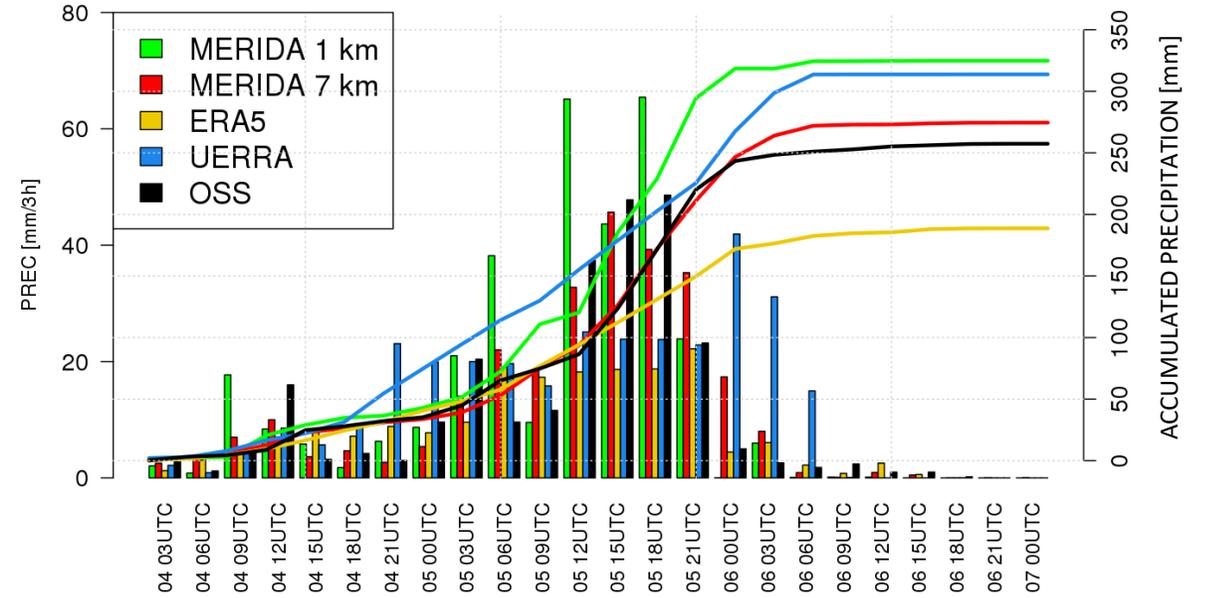


4 - 6 Novembre

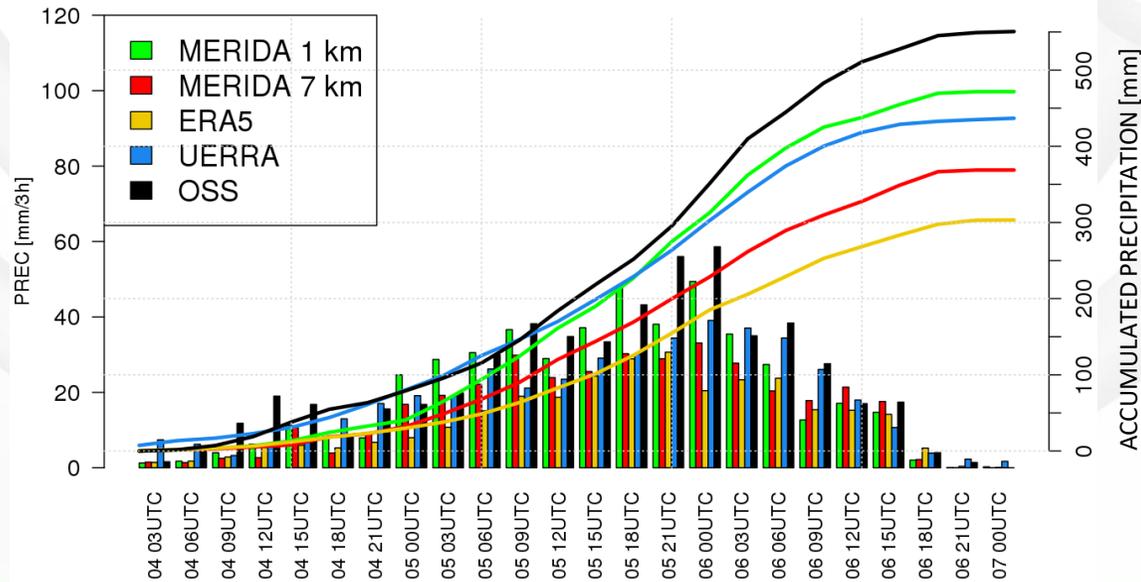
PRIERO – BACINO TANARO



COLLE SAN BERNARDO – BACINO TANARO



OROPA – BACINO SESIA



LANZO – BACINO STURA DI LANZO

