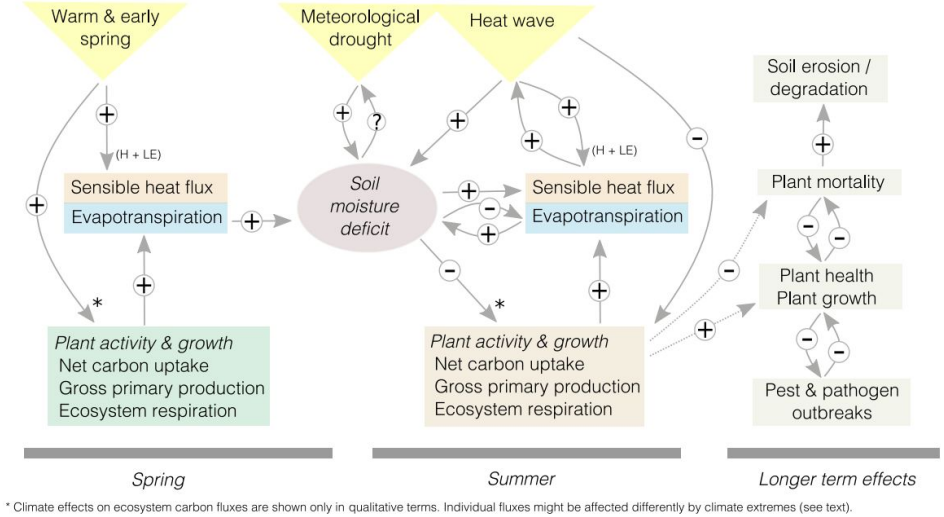
“Impatti contrastanti degli eventi climatici estremi sull'assorbimento di CO_2 di pascoli e foreste in montagna”

Marta Galvagno[1], Ludovica Oddi[2], Gianluca Filippa[1], Mirco Migliavacca[3], Consolata Siniscalco[2], Edoardo Cremonese[1]

1) Environmental Protection Agency of Aosta Valley | Italy
2) University of Torino | Italy
3) European Commission, Joint Research Center | Italy

1. Introduzione

- Secondo gli scenari climatici gli **eventi climatici estremi** aumenteranno di frequenza e intensità
- I diversi usi del suolo (**LULUCF**) hanno diversi potenziali di assorbimento di CO_2



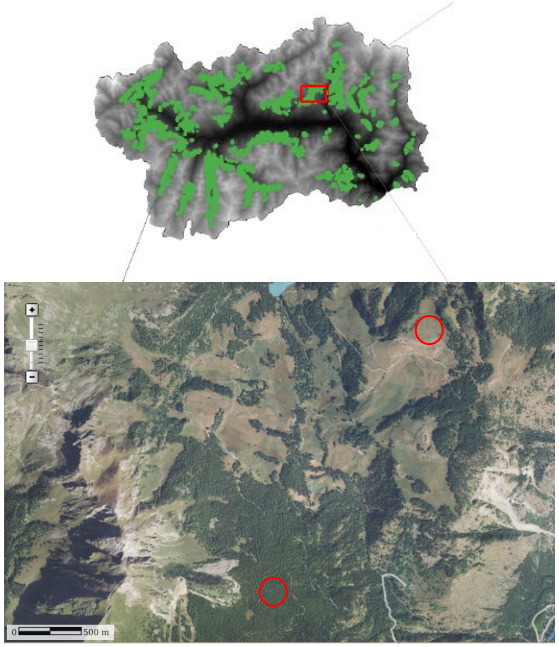
Sippel et al. (2016) Proceedings of the National Academy of Sciences

- Sulle **Alpi**, **temperatura**, **neve**, **umidità** *drivers* principali, insieme a cambiamenti **socioeconomici** e di uso del suolo
- Ruolo del **timing** e della **fenologia**

2. Siti di studio e metodi

PRATERIA: *Nardus stricta*
(IT-Tor ICOS, LTER)

Torgnon, Valle d'Aosta (2100 m)



FORESTA: *Larix decidua*
(IT-Trf FLUXNET, LTER)

2. Siti di studio e metodi: FORESTA

Scala ecosistemica (dal 2012):

- Eddy covariance sopra canopy (20m) e sotto canopy (2m)
- canopy development (NDVI)

Osservazioni a scala di pianta (2015-2017):

- Durata e entità dell'accrescimento
- Osservazioni fenologiche dirette
- Tratti funzionali

Dati Meteorologici:

- Dati presso la stazione dal 2012
- Dati storici dal 1950 al 2022

Periodo di studio: 2012-2022

2. Siti di studio e metodi

PRATERIA

Scala ecosistemica (dal 2008):

- Eddy covariance
- canopy development (NDVI, …)
- Biomassa

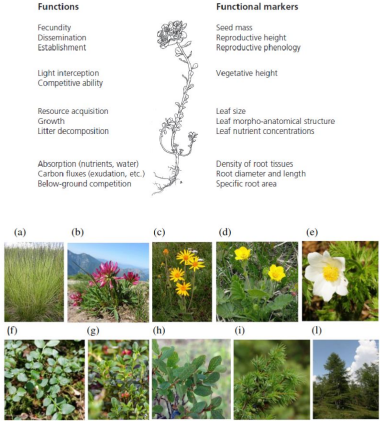
Osservazioni a scala di pianta

- Tratti funzionali
- Rilievi floristici

Dati Meteorologici:

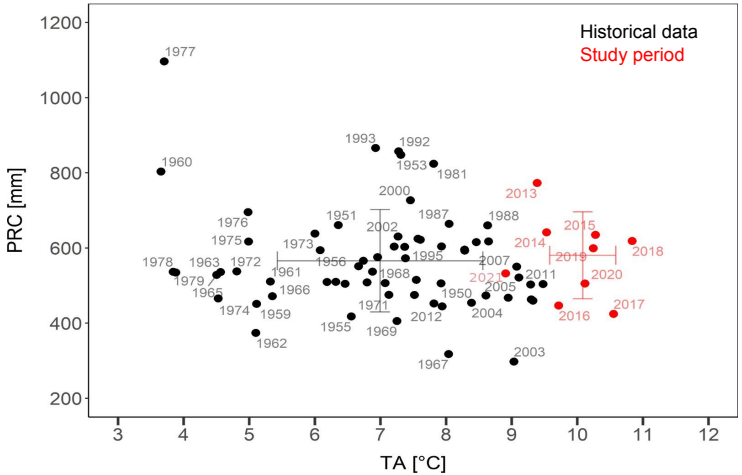
- Dati presso la stazione dal 2008
- Dati storici dal 1950 al 2022

Periodo di studio: 2008-2022



2. Siti di studio e metodi
METEO

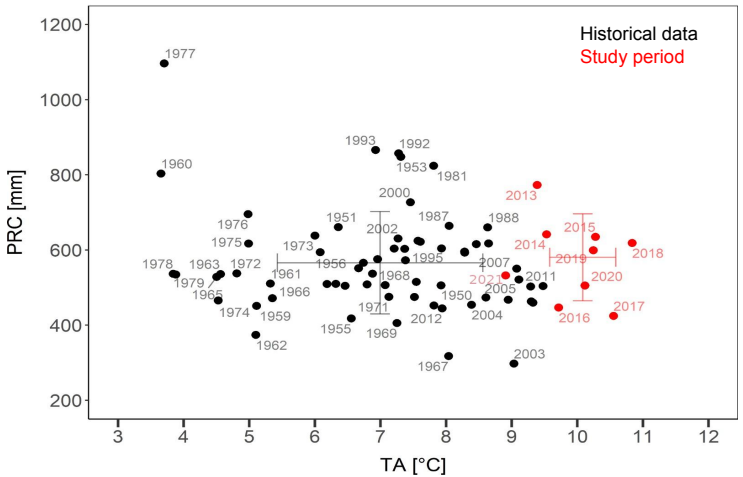
1950 - 2022 -> Increasing air temperature



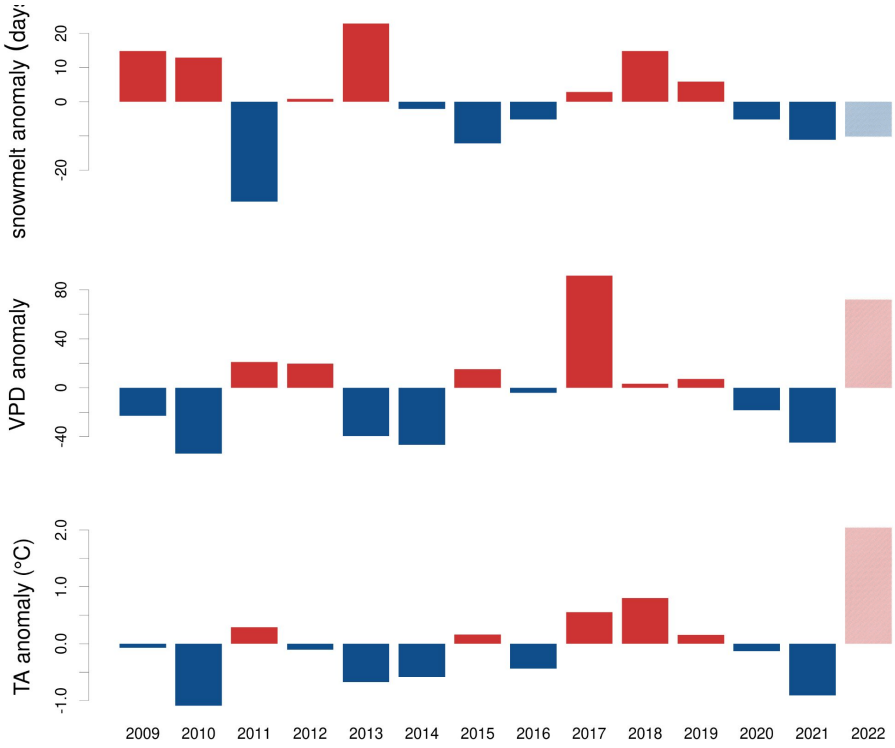
Tutti i dati mostrati sono calcolati nella **growing season** (Apr - Ott)

2. Siti di studio e metodi
METEO

1950 - 2022 -> Increasing air temperature

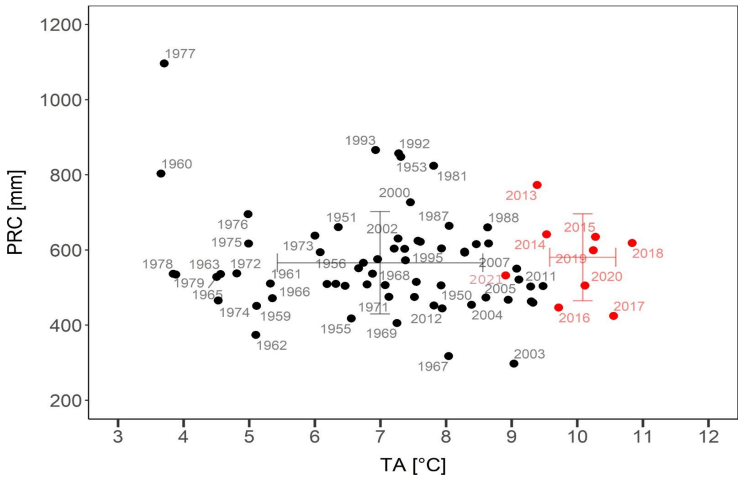


Tutti i dati mostrati sono calcolati nella **growing season** (Apr - Ott)

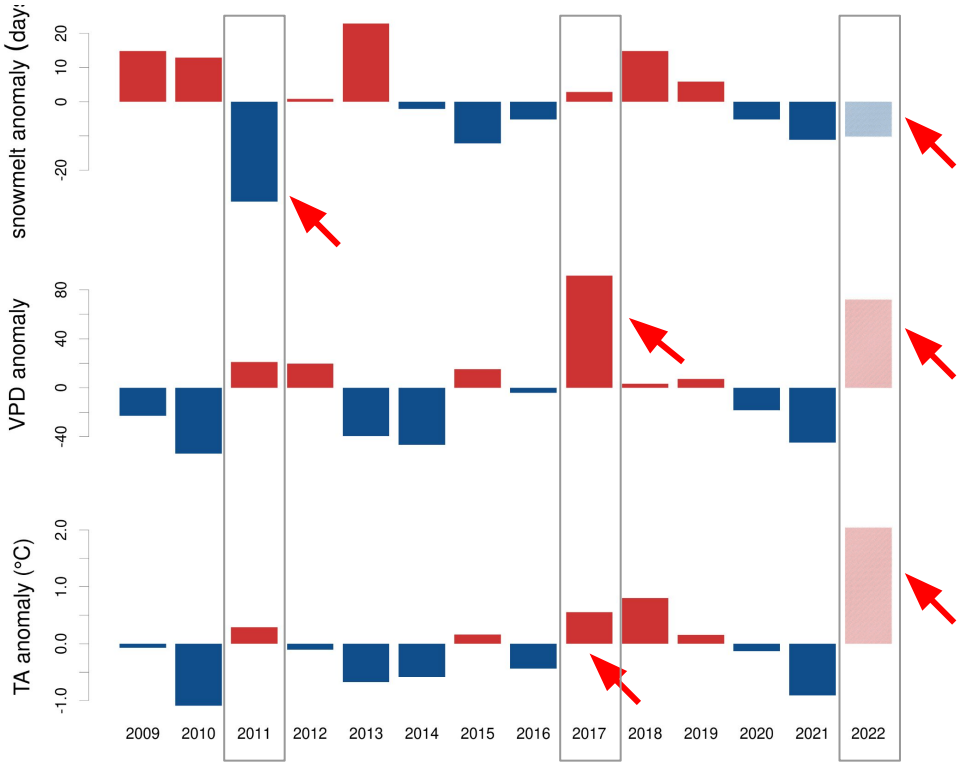


2. Siti di studio e metodi
METEO

1950 - 2022 -> Increasing air temperature



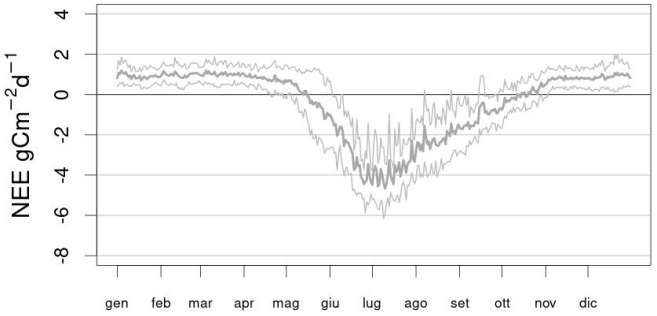
Tutti i dati mostrati sono calcolati nella **growing season** (Apr - Ott)

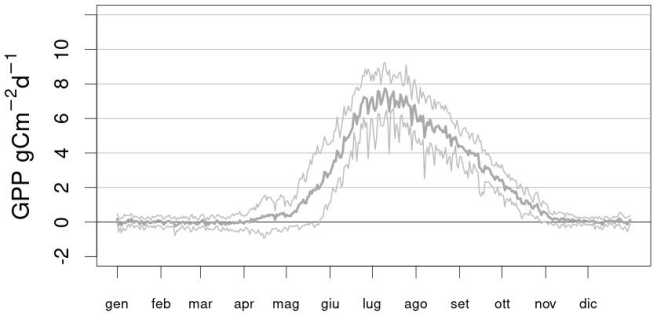


Focus su **2011, 2017, 2022**

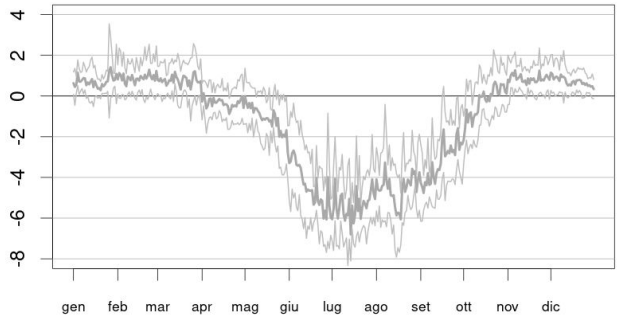
3. Risultati: fenologia dei flussi di CO_2

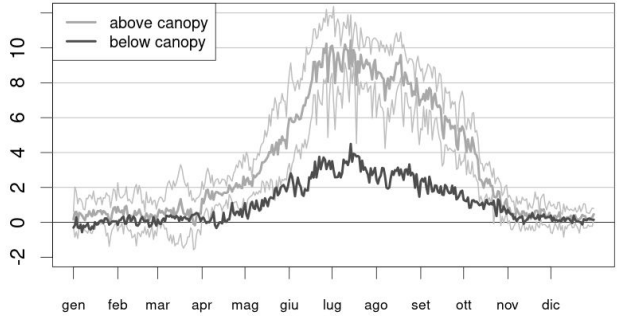
PRATERIA



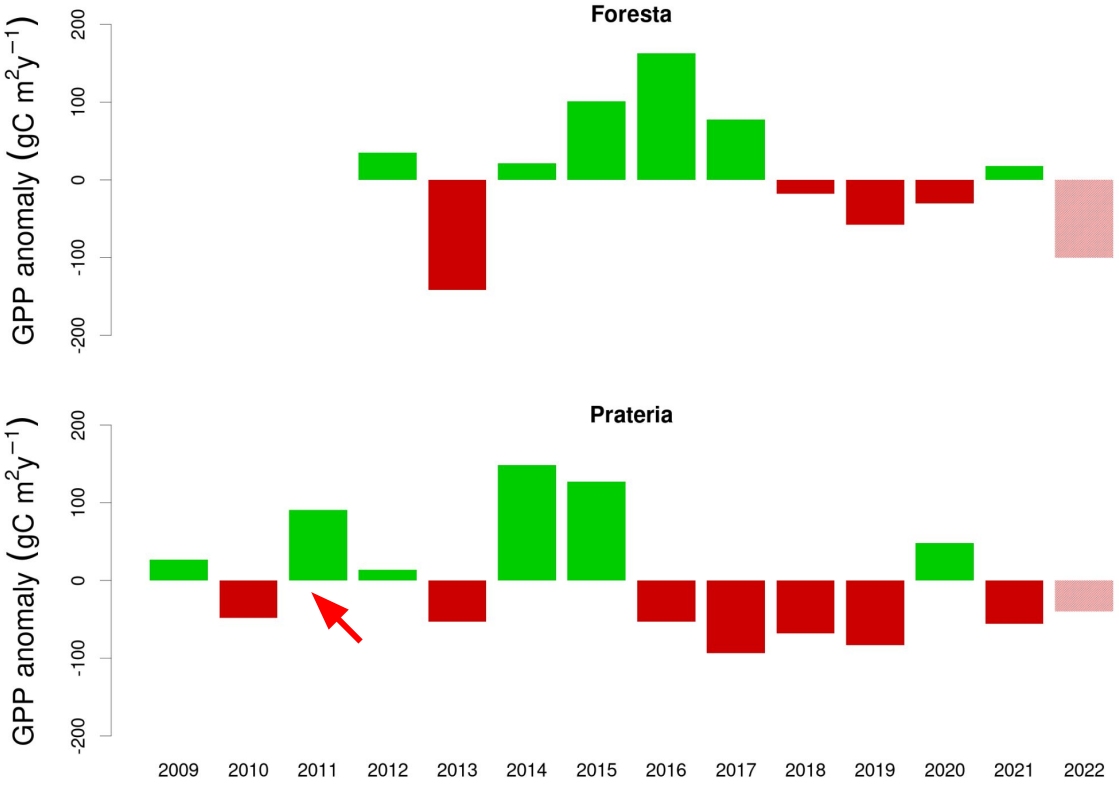


FORESTA



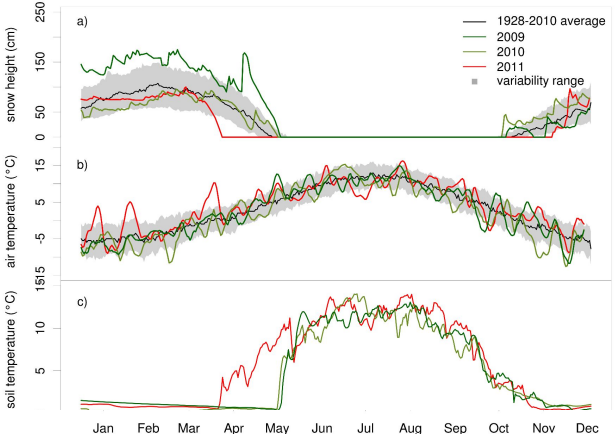


3. Risultati: FOCUS SNOWMELT ANTICIPATO (2011)



SNOWMELT ANTICIPATO: 33 GIORNI

3. Risultati: FOCUS SNOWMELT ANTICIPATO (2011)

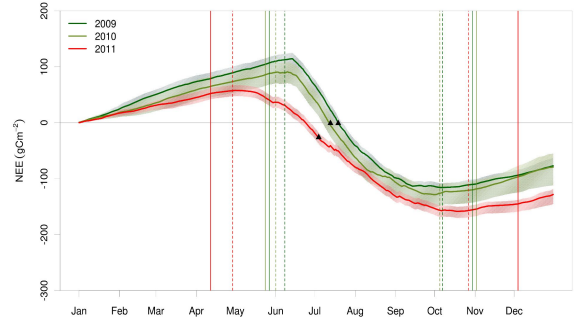


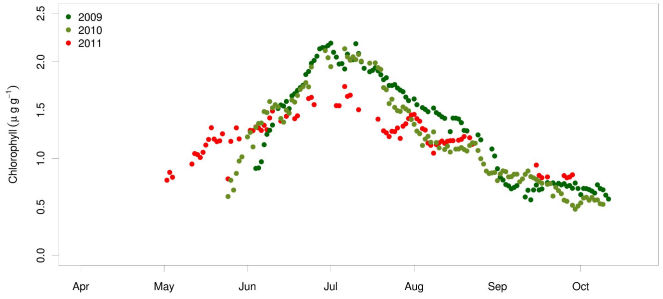
OPEN ACCESS
IOP PUBLISHING
ENVIRONMENTAL RESEARCH LETTERS
Environ. Res. Lett. 8 (2013) 025008 (10pp)
doi:10.1088/1748-9326/8/2/025008

Phenology and carbon dioxide source/sink strength of a subalpine grassland in response to an exceptionally short snow season

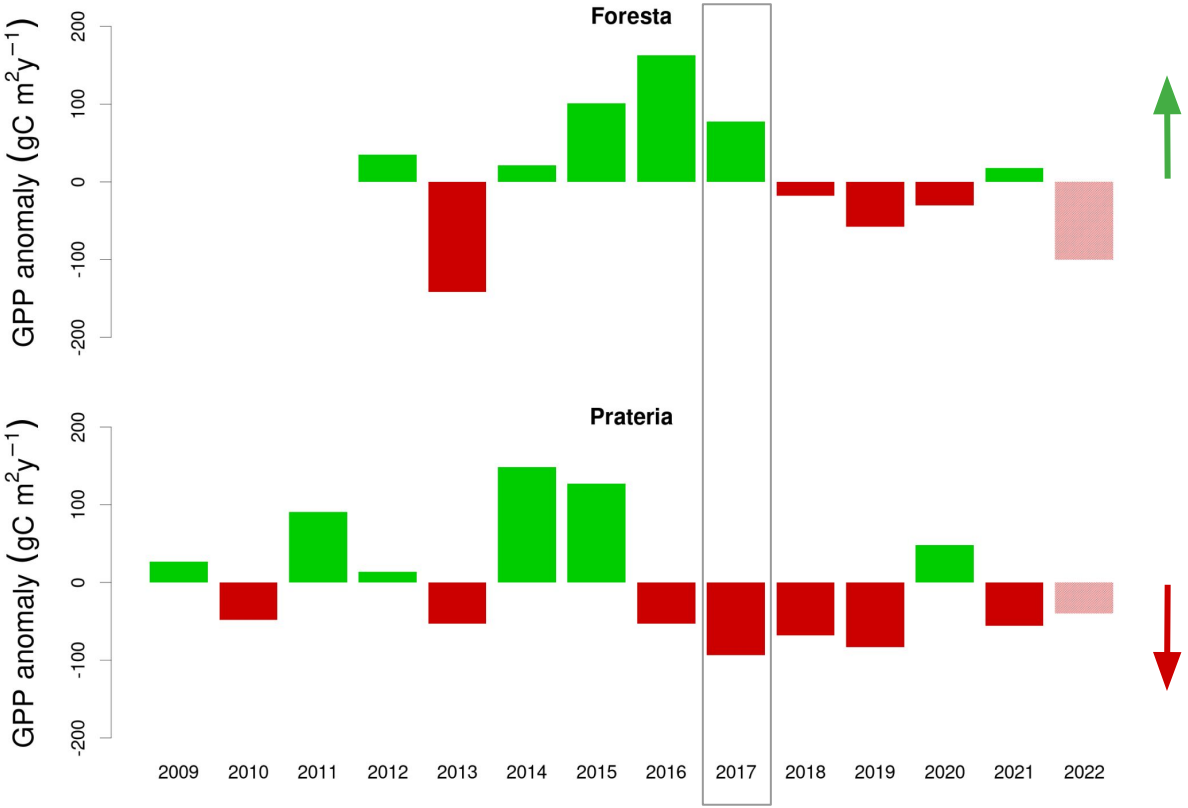
M Galvagno[1], G Wohlfahrt[2], E Cremonese[1], M Rossini[3], R Colombo[3], G Filippa[1], T Julitta[3], G Manca[4], C Siniscalco[5], U Morra di Cella[1] and M Migliavacca[6]

SNOWMELT ANTICIPATO: 33 GIORNI



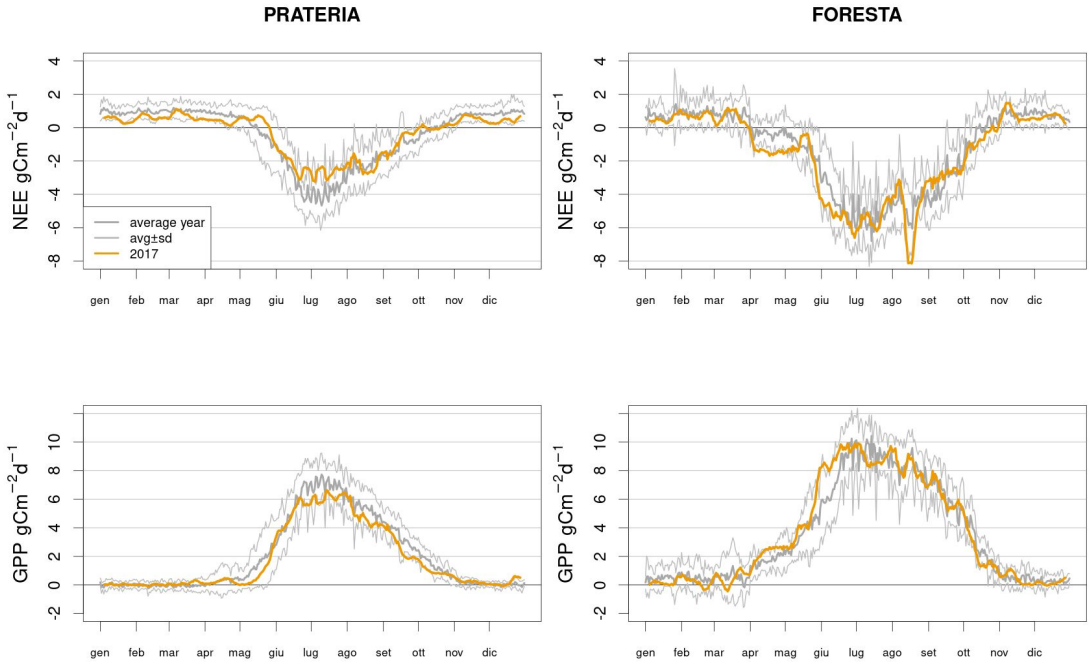


3. Risultati: FOCUS DROUGHT (2017)



DROUGHT 2017
VPD + 25 %
TA + 9.5 %

3. Risultati: FOCUS DROUGHT (2017)

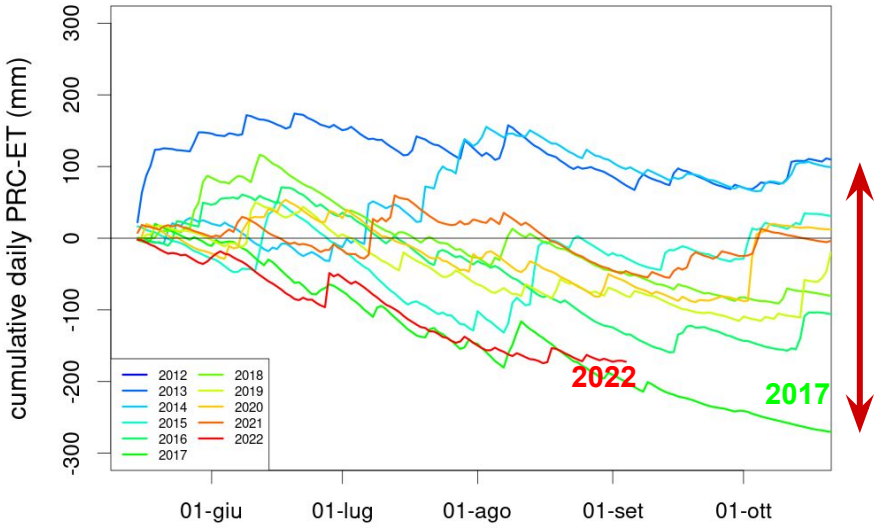


DROUGHT 2017
VPD + 25 %
TA + 9.5 %

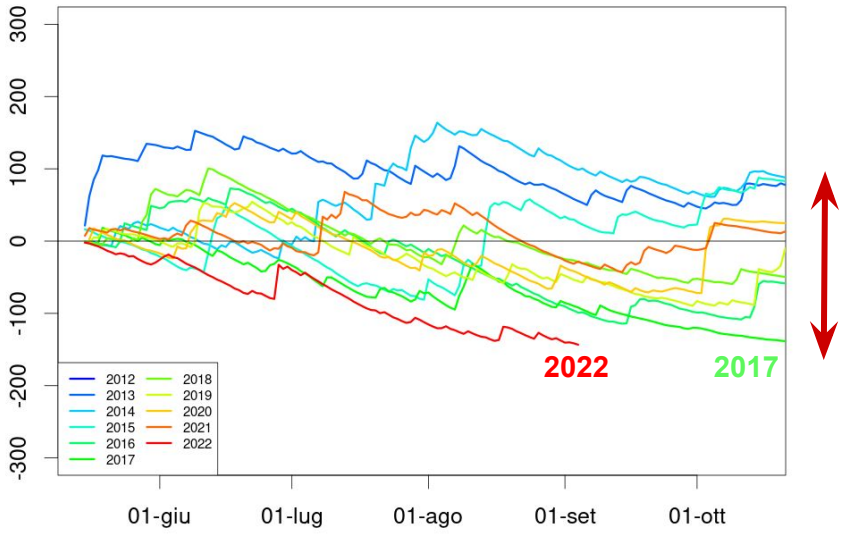
3. Risultati: FOCUS DROUGHT (2017)

ICOS National Network Italy

PRATERIA

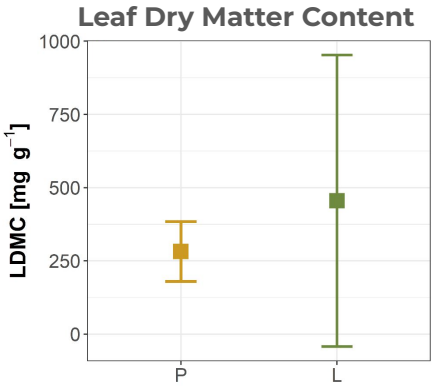


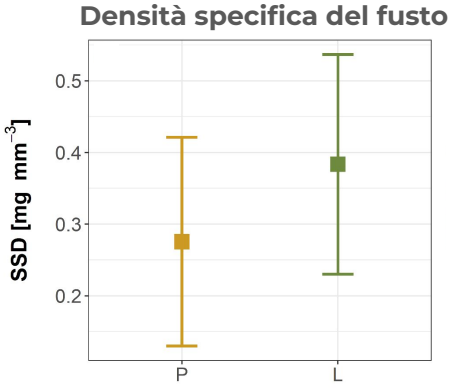
FORESTA



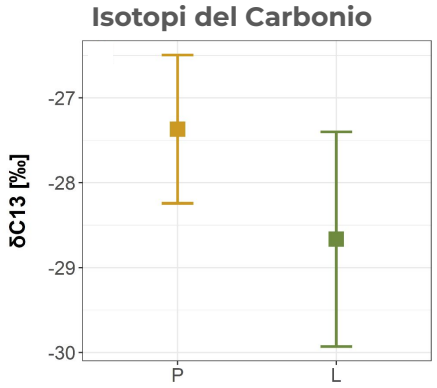
3. Risultati: FOCUS DROUGHT (2017)

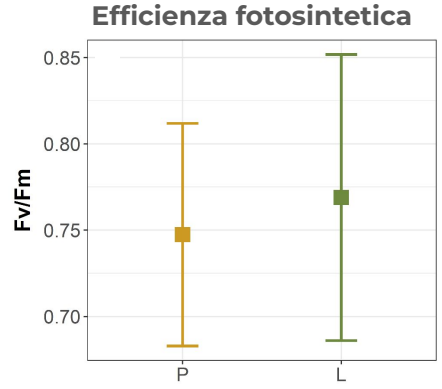
ANALISI DEI TRATTI FUNZIONALI





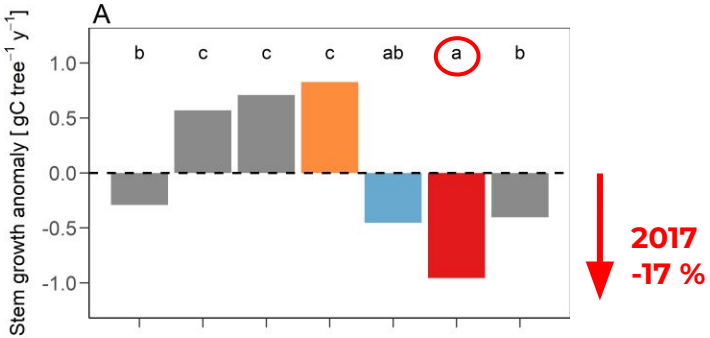
Foresta:
Valori più alti e maggior dispersione dei **tratti strutturali** legati alla **resistenza idraulica**



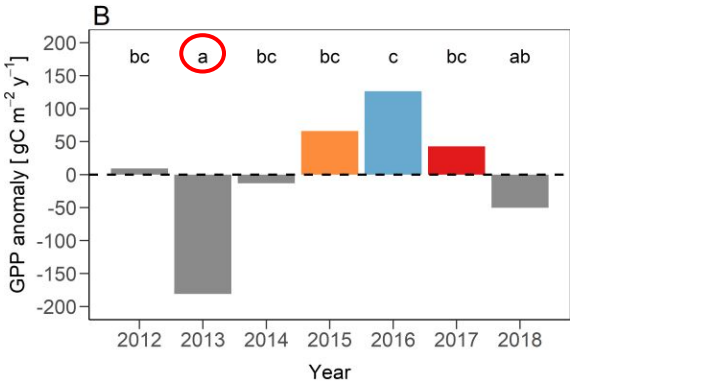


Prateria:
Maggior **stress** della vegetazione indicato dai **tratti fisiologici**

3. Risultati: FOCUS DROUGHT (2017)



2017
-17 %



IOP Publishing Environ. Res. Lett. 17 (2022) 045015 https://doi.org/10.1088/1748-9326/ac5b3a

ENVIRONMENTAL RESEARCH
LETTERS

CrossMark

LETTER

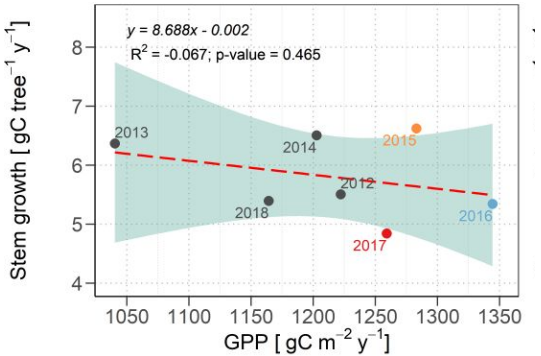
OPEN ACCESS

RECEIVED
21 October 2021

REVISED

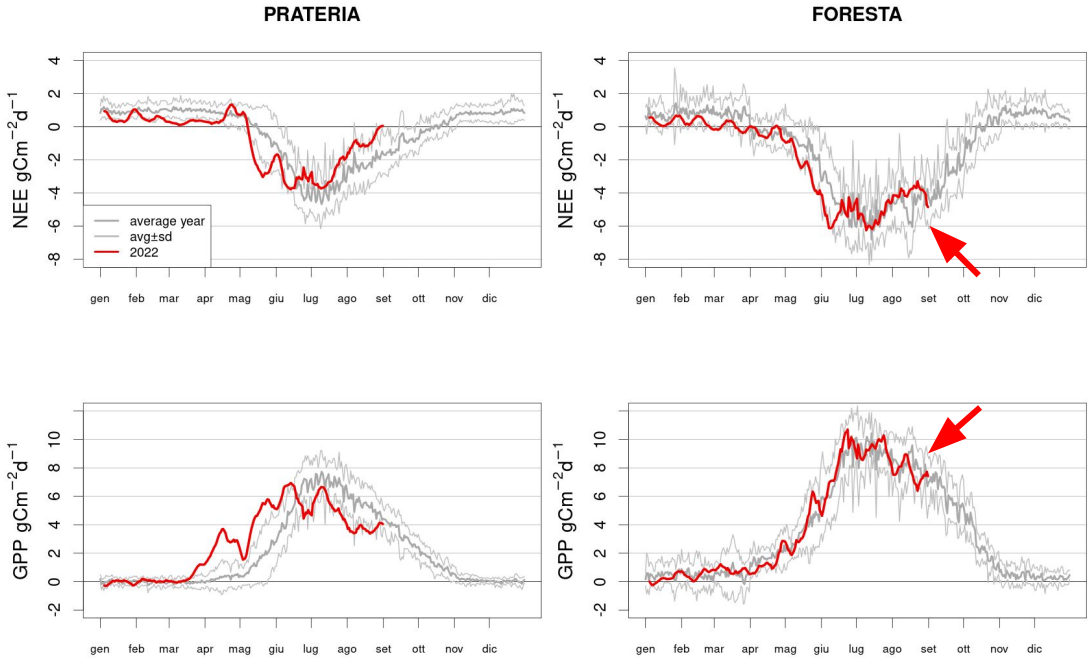
Contrasting responses of forest growth and carbon sequestration to heat and drought in the Alps

Ludovica Oddi[1], Mirco Migliavacca[2,3], Edoardo Cremonese[4], Gianluca Filippa[4], Giorgio Vacchiano[5], Consolata Siniscalco[1], Umberto Morra di Cella[4] and Marta Galvagno[4,*]



DROUGHT 2017
VPD + 25 %
TA + 9.5 %

3. RISULTATI: COSA CI ASPETTIAMO DAL 2022?

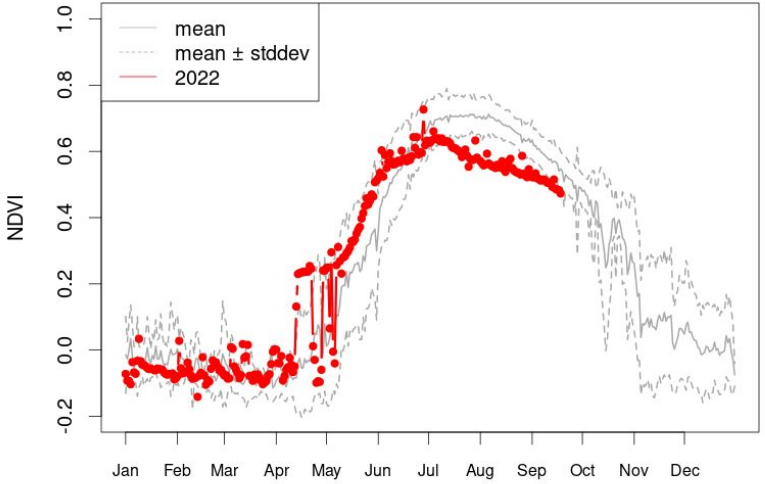


“Impatti contrastanti degli eventi climatici estremi sull'assorbimento di CO2 di pascoli e foreste in montagna” - ICOS Italy, 28 Settembre, Roma

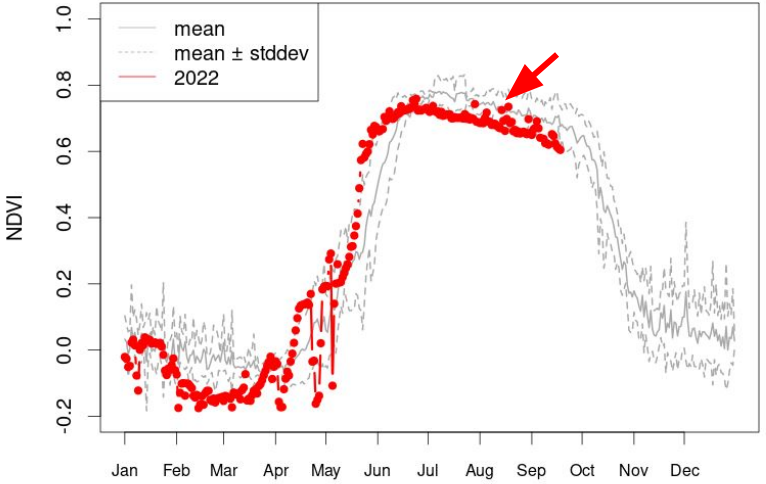
3. RISULTATI: COSA CI ASPETTIAMO DAL 2022?

ICOS National Network Italy

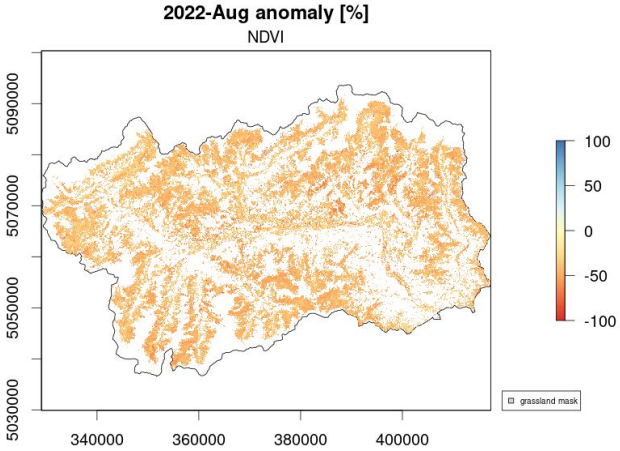
PRATERIA

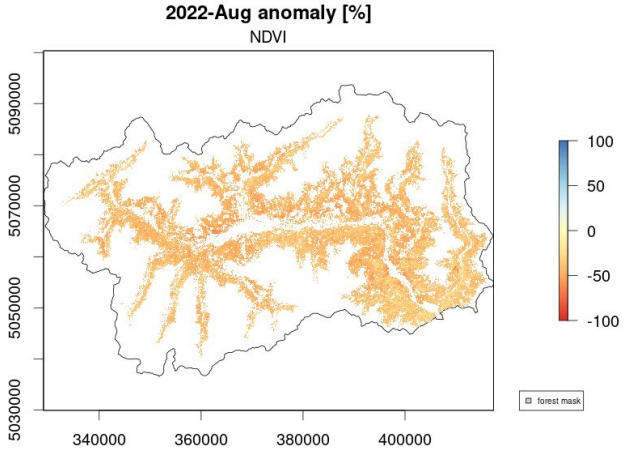


FORESTA



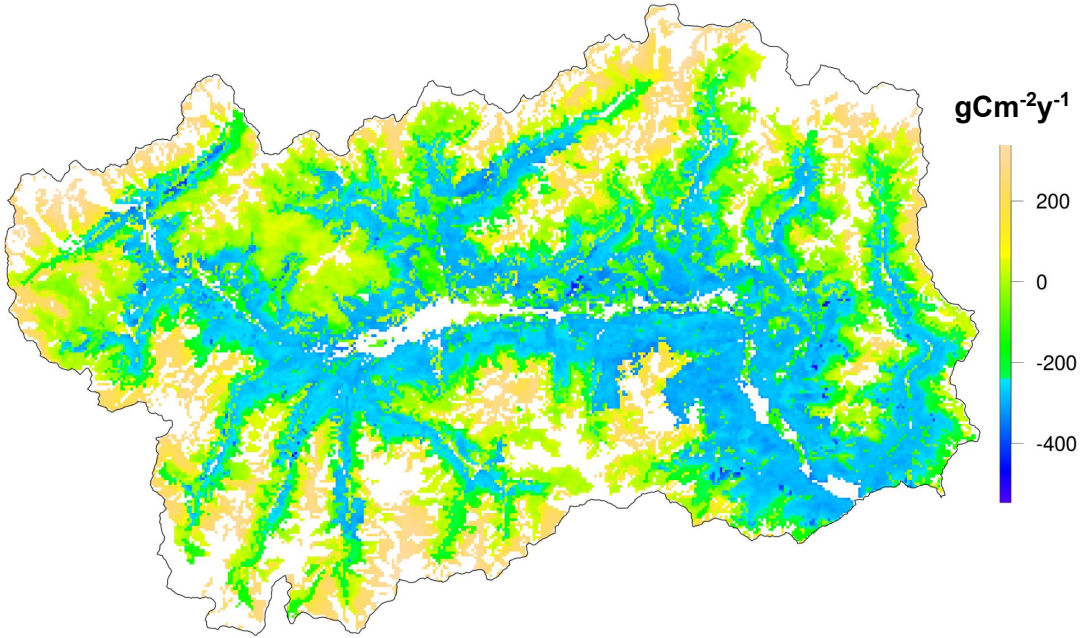
3. RISULTATI: COSA CI ASPETTIAMO DAL 2022?





4. PROSPETTIVE

Emissioni e assorbimenti di CO_2 da parte degli ecosistemi in Valle d'Aosta



Emissioni settori: ~1.145.000 tCO_2e

Bilancio vegetazione: ~860.000 tCO_2

Fonti:
"Bilancio delle emissioni dei gas ad effetto serra per l'intero territorio della valle d'aosta. Anno di riferimento: 2017"

"Roadmap per una Valle d'Aosta Fossil fuel free al 2040, linee guida per la decarbonizzazione"

GRAZIE...

Mi casa es su casa

m.galvagno@arpa.vda.it
ludovica.oddi@unito.it

Poster session:

- Dalmonech D, Galvagno M, Saponaro V, Trotta C, Collalti A. ***Simulazione dell'accoppiamento tra assimilazione del carbonio ed accrescimenti in quattro siti forestali eddy-covariance***

- Leolini L, Costafreda-Aumedes S, Brilli L, Bellini E, Argenti G, Bindi M, Dibari C, Filippa G, Cremonese E, Galvagno M, Staglianò N, Moriondo M. ***Un approccio modellistico integrato per stimare l'accumulo di biomassa, il sequestro e le emissioni di carbonio negli ecosistemi pascolivi***