Gianluca Filippa

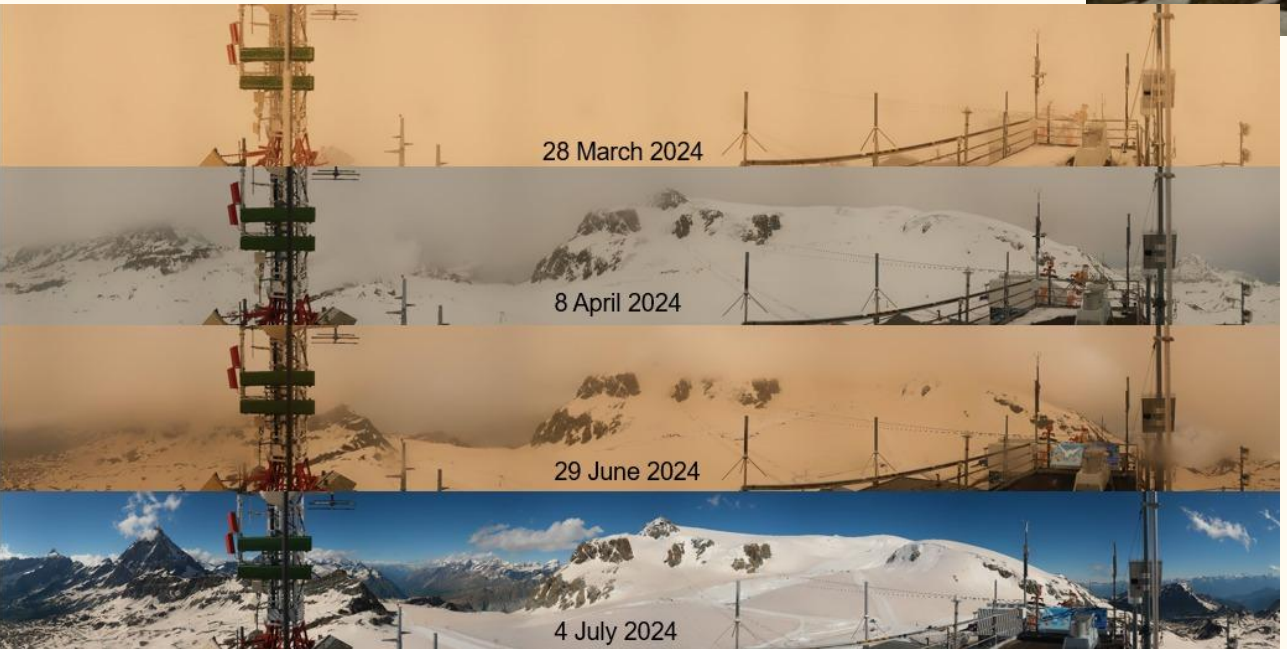
ARPA VdA

Cambiamenti Climatici e
sostenibilità ambientale

Neve rossa
Effetti sulla fusione del manto nevoso

Light absorbing particles

Black carbon



Sabbia sahariana

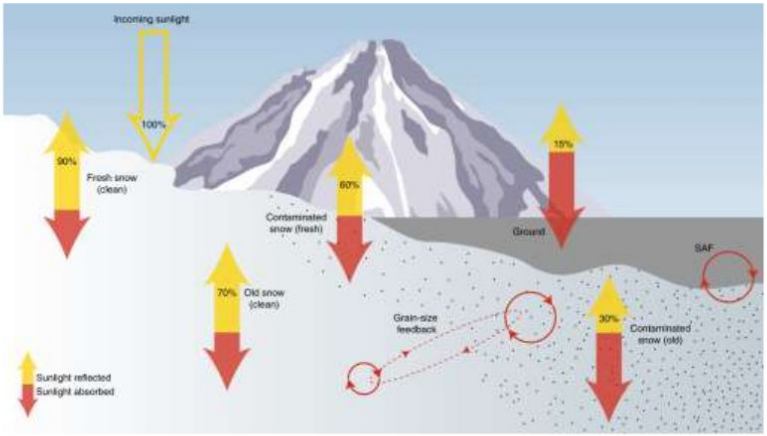
Credits: Biagio Di Mauro

Snow/ice-albedo feedback

Fresh snow (α~0.9)

Melting snow (α~0.5)

Bare ice (α~0.2)



Skiles et al. 2018 *Nat. Clim. Change*

Credits: Biagio Di Mauro

Misure & Stime: scale e domini spazio/temporali diversi

Optical microscopy

Field spectroscopy

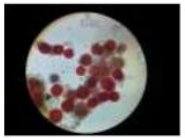
Automatic spectroscopy

Drone

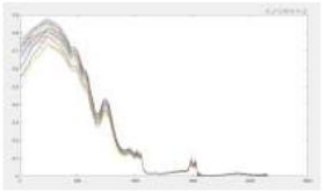
Aerial surveys

Satellite data

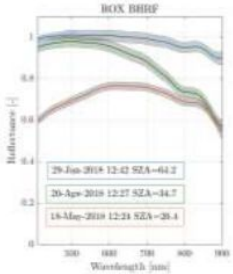
µm



cm

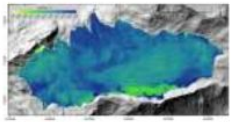


dm

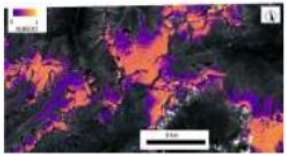


m

Km

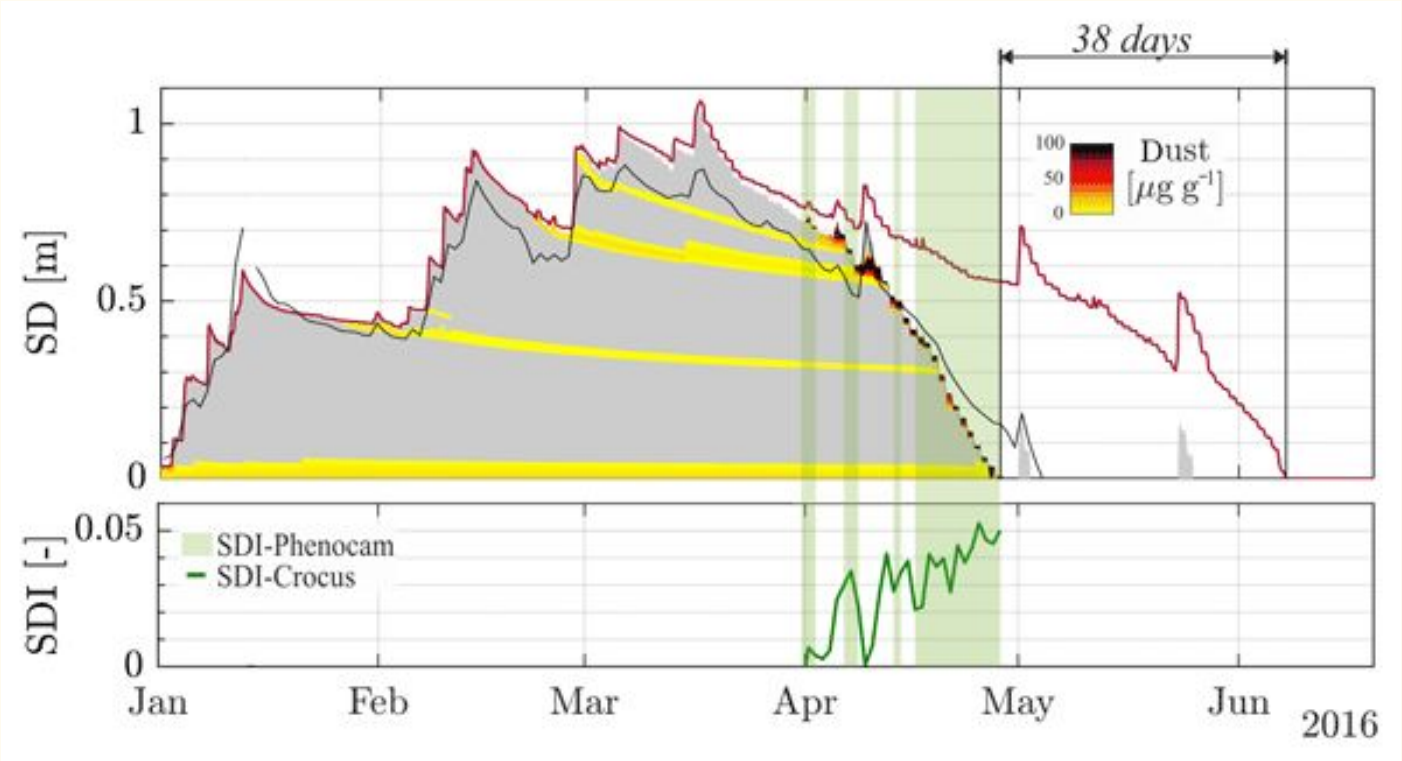


Km ++



Credits: Biagio Di Mauro

Mesoscala: Sito ICOS di Torgnon (2100 m slm, anno 2016)

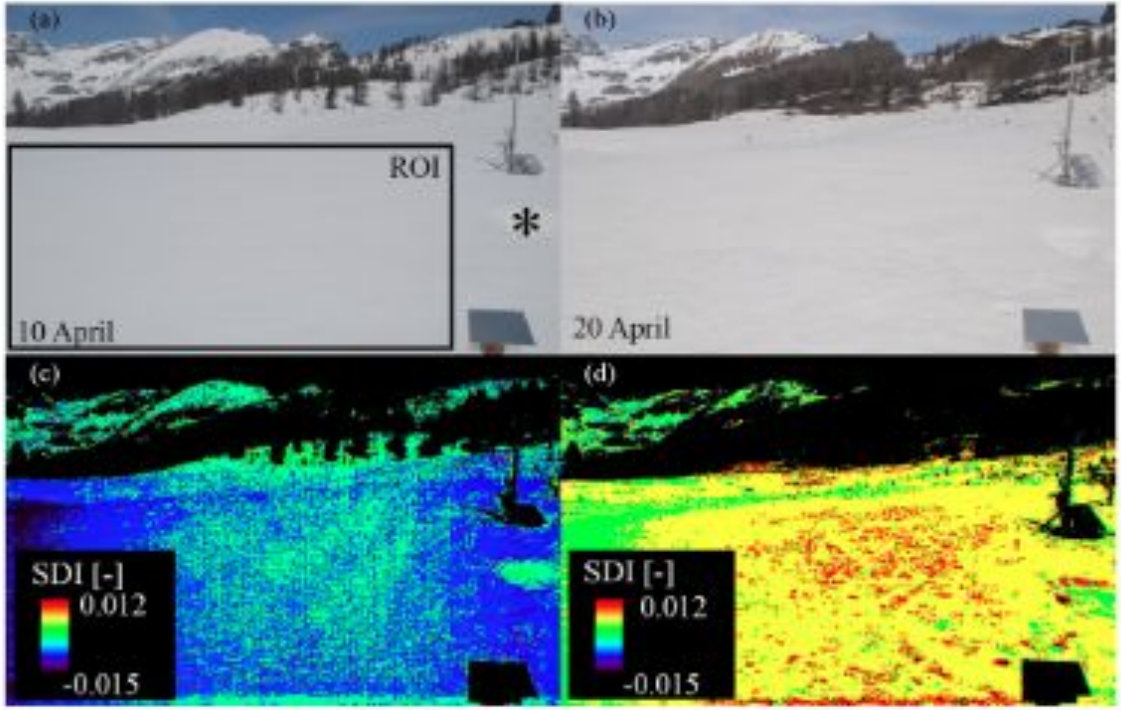


Deposizione di dust + black carbon: ALADIN

Snowpack dynamics:
Crocus (linea rossa)
Crocus + dust

Di Mauro et al. 2019, *The Cryosphere*

Torgnon (2100 m ASL) ICOS Site



Snow darkening index

$$SDI = \frac{DN_{Red} - DN_{Green}}{DN_{Red} + DN_{Green}}.$$

821 snow webcam nelle Alpi

Di Mauro et al. 2019, *The Cryosphere*

Remote sensing

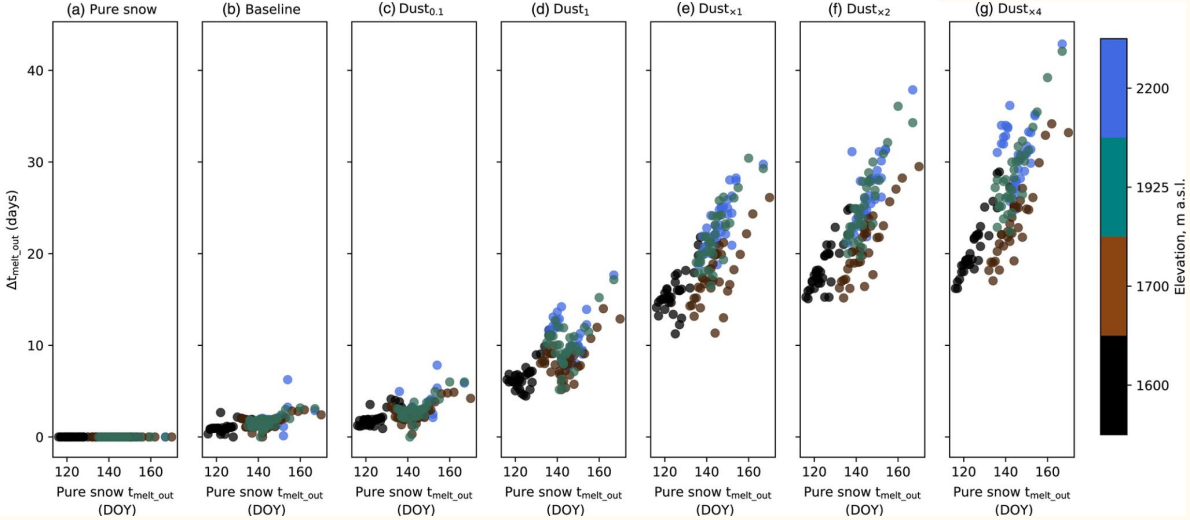
JGR Earth Surface

Research Article | Free Access

Accelerated Snow Melt in the Russian Caucasus Mountains After the Saharan Dust Outbreak in March 2018

M. Dumont, F. Tuzet, S. Gascoin, G. Picard, S. Kutuzov, M. Lafaysse, B. Cluzet, R. Nheili, T. H. Painter

First published: 22 August 2020 | https://doi.org/10.1029/2020JF005641 | Citations: 22



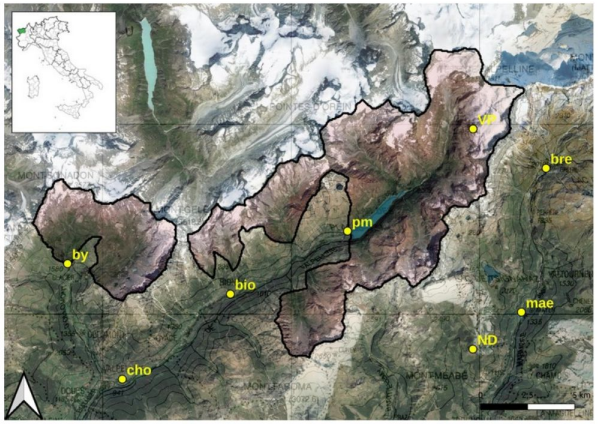
Indice da S2 (20m, 4 gg), algoritmo che calcola direttamente la concentrazione di dust + CROCUS

\+ dust → melt anticipato

\+ quota → melt anticipato

Remote sensing e modelli

Assimilazione EO

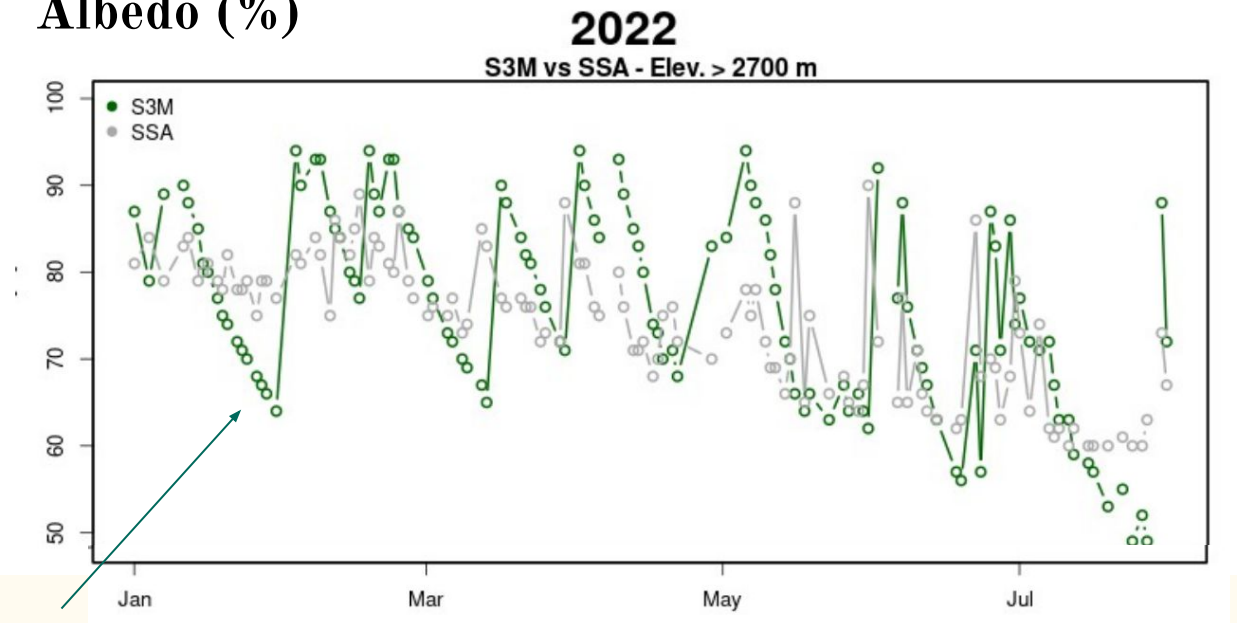


Place Moulin

Modello idro - crio S3M
Silvestro et al. 2021

Snow Surface Albedo
Sentinel-3 OLCI (300 m)

Albedo (%)



Snow aging

Scenari futuri

Article | Open access | Published: 02 February 2023

The projected future degradation in air quality is caused by more abundant natural aerosols in a warmer world

James Gomez, Robert J. Allen ✉, Steven T. Turnock, Larry W. Horowitz, Kostas Tsigaridis, Susanne E. Bauer, Dirk Olivié, Erik S. Thomson & Paul Ginoux

Communications Earth & Environment **4**, Article number: 22 (2023) | Cite this article

7712 Accesses | **14** Citations | **213** Altmetric | Metrics

Alterazione della circolazione in W Africa + aumento di VOC determinano incremento di aerosol

nature > npj climate and atmospheric science > articles > article

Article | Open access | Published: 02 January 2024

Historical footprints and future projections of global dust burden from bias-corrected CMIP6 models

Jun Liu, Xiaofan Wang, Dongyou Wu, Hailun Wei, Yu Li ✉ & Mingxia Ji ✉

npj Climate and Atmospheric Science **7**, Article number: 1 (2024) | Cite this article

2255 Accesses | **5** Citations | **2** Altmetric | Metrics

Ci si attende un incremento di trasporto di polveri tra Nord Africa, Regioni Atlantiche e Mediterraneo nel periodo 2080-2100

Conclusioni

- Lo snow darkening è determinato da diversi processi

- Induce cambiamenti importanti sul timing dello snowmelt

- Dati EO devono essere assimilati nei modelli idro

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Cambiamenti Climatici e sostenibilità ambientale

Fenomeno complesso

- Elevata variabilità spaziale

- Impatto significativo sullo snowmelt

- sull'idrosfera:
  disponibilità idrica

- ... e sulla biosfera:
  fenologia
  ciclo del carbonio

→ é necessario incorporare il processo nei modelli idrologici esistenti