

Albedo feedback in tropical glaciers: a possible role of Light-Absorbing Particles?

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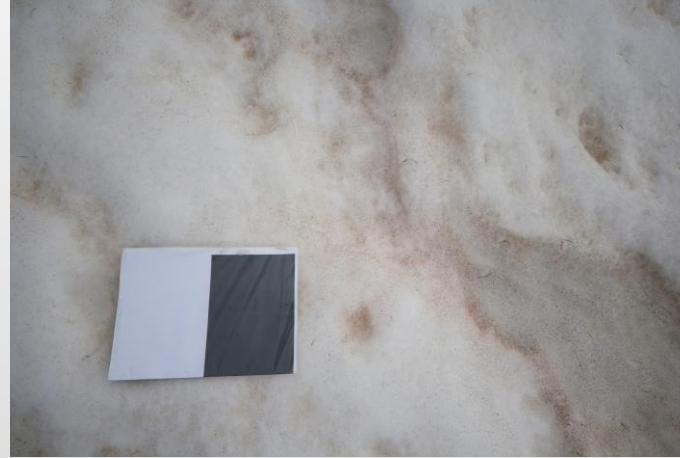


Roma, 22 – 24 settembre 2021

Snow-albedo feedback



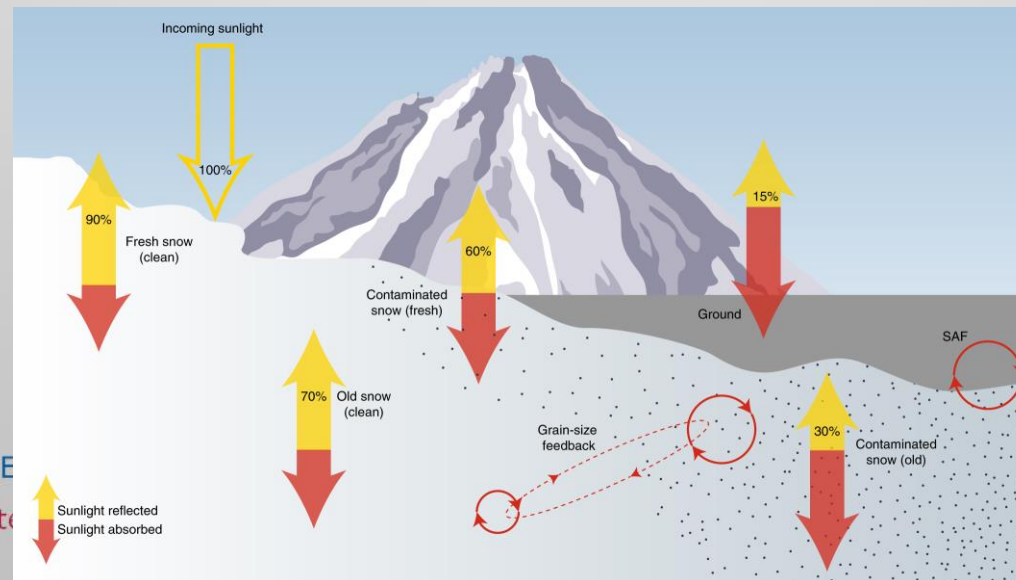
Fresh snow ($\alpha \sim 1$)



Melting snow ($\alpha \sim 0.5$)

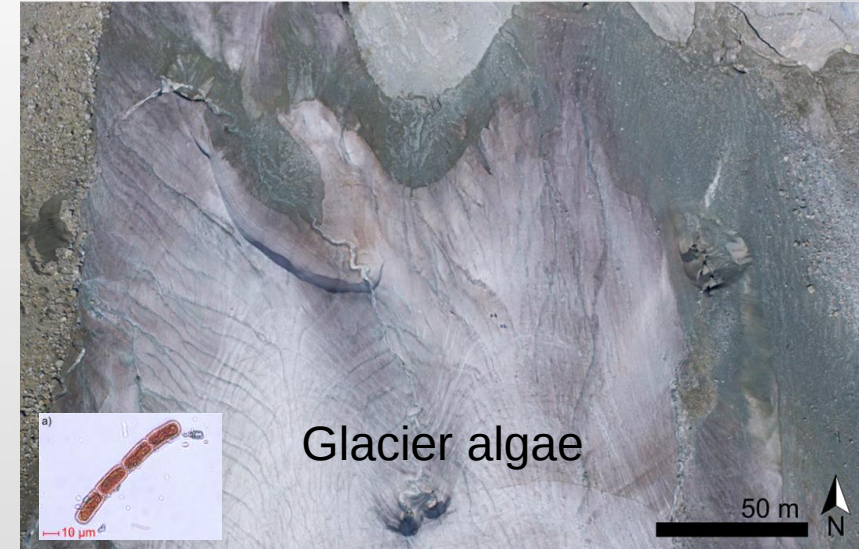


Bare ice ($\alpha \sim 0.2$)

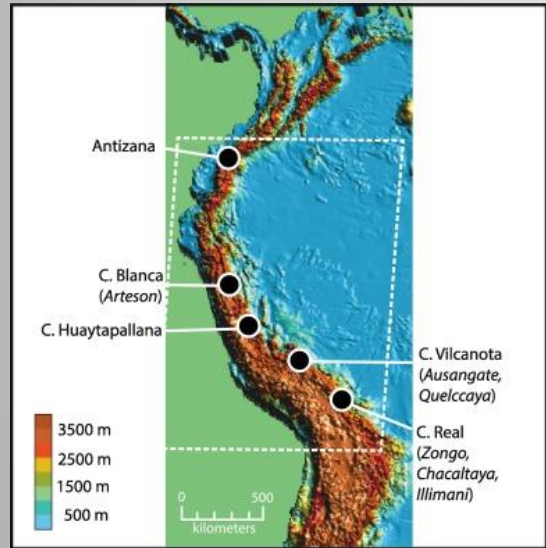


Skiles et al. 2018 *Nature Climate Change*

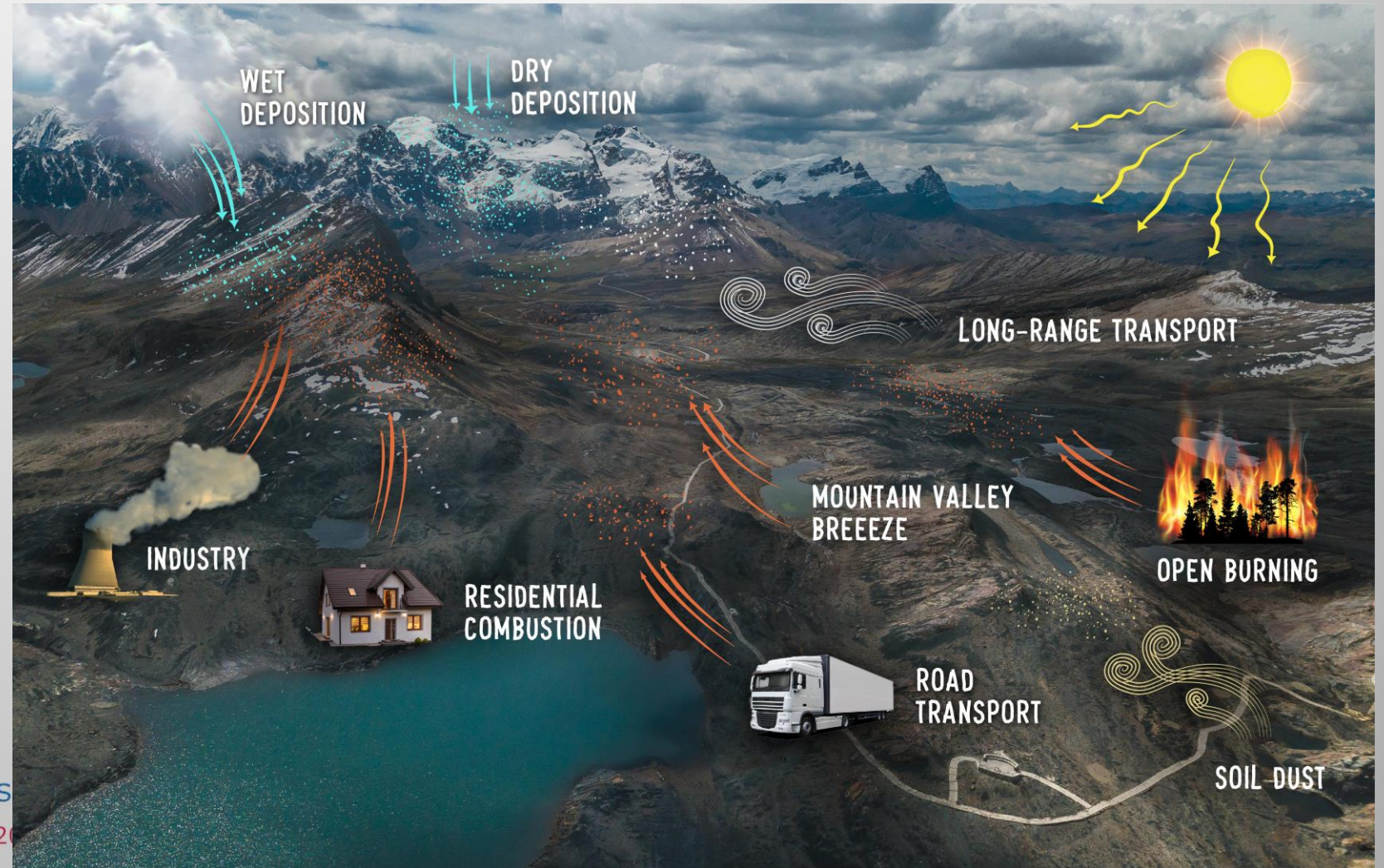
Light-absorbing particles in the global cryosphere



Atmosphere-cryosphere interactions in tropical Andes



Vuille et al. 2018 ESR

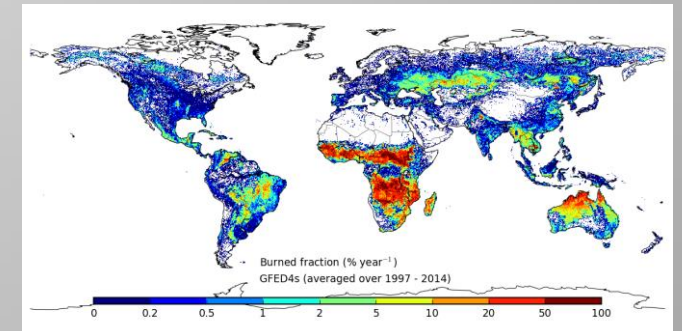
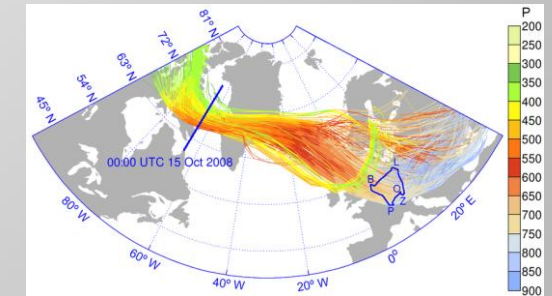
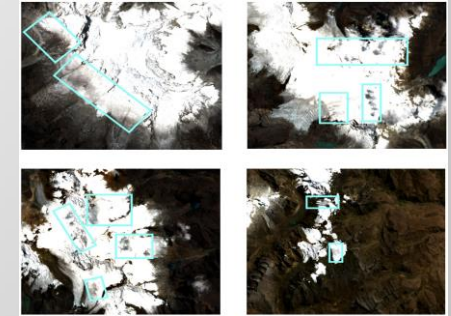


Aim of the research

To integrate **satellite optical data** and **back-trajectories** to assess the possible impact of LAPs on the optical properties of **tropical glaciers**

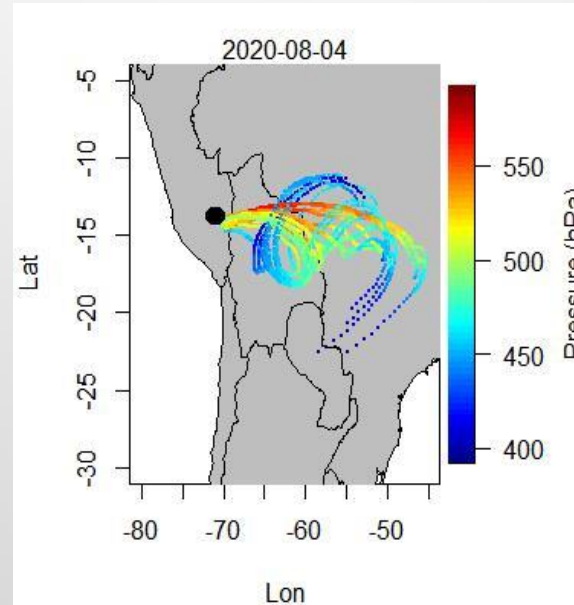
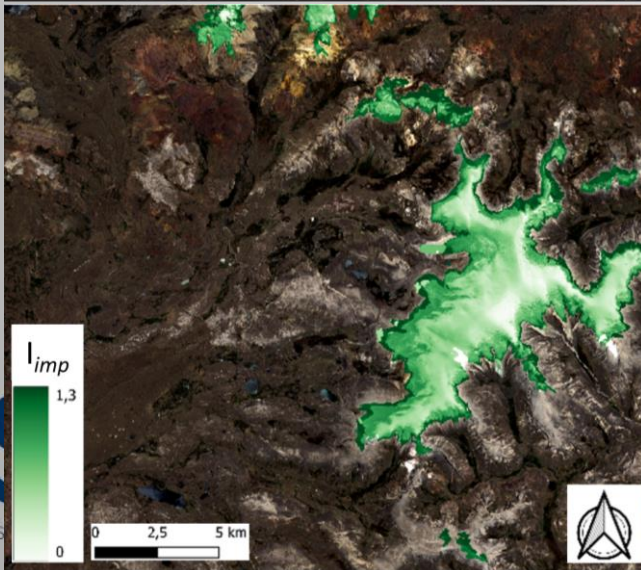
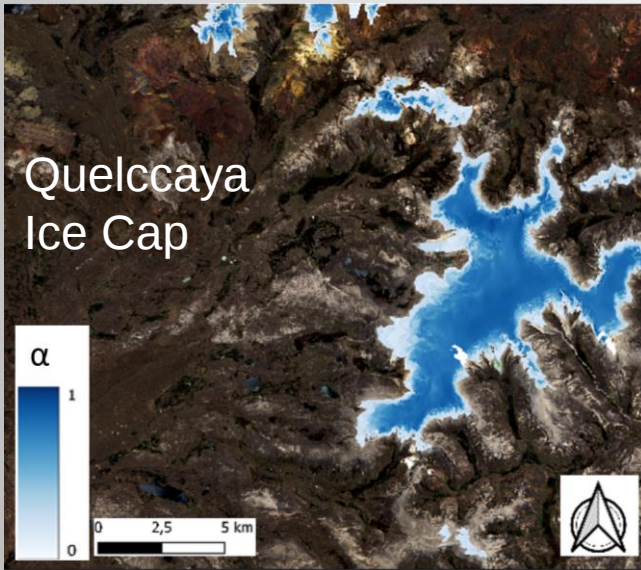
Data and methods

- **Sentinel-2 (ESA)** satellite images collected in the Cordillera Blanca and Cordillera Vilcanota during the dry season (2017-2020). Cloud-free scenes were selected for each season, and surface reflectance was used to produce maps of **broadband albedo** (α) and **impurity index** (I_{imp}).
- Lagrangian analysis tool (**LAGRANTO**) model simulations were used to characterize the **air mass movement** in the days preceding the acquisition of the Sentinel-2 data.
- Particulate matter emissions were evaluated using the **Global Fire Emissions Database** (GFED 4.1).

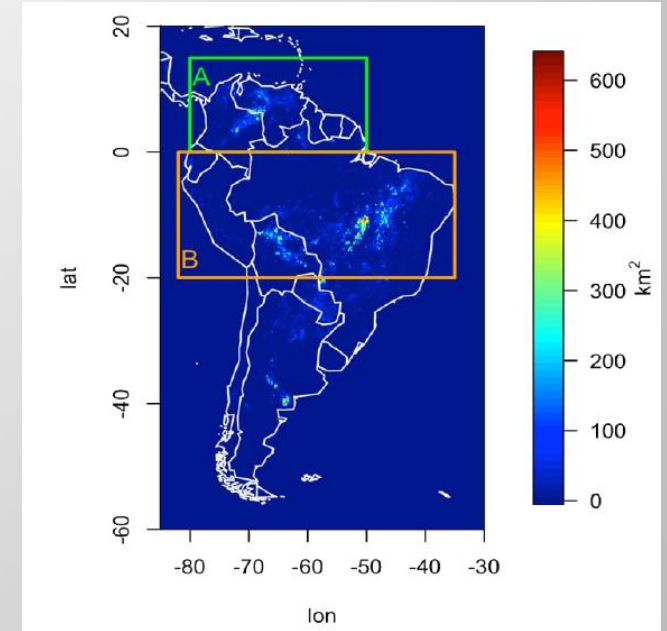


Preliminary results

Sentinel-2 data (05/11/2020)



LAGRANTO back-trajectories



GFED data

Next steps:

- to analyse the temporal dynamics of α and I_{imp} in the study area
- to compare the timing of **large aerosol deposition** on tropical glaciers and their possible impact on **surface melting**