UdeSantiago de Chile

Black Carbon in the Andean Cryosphere

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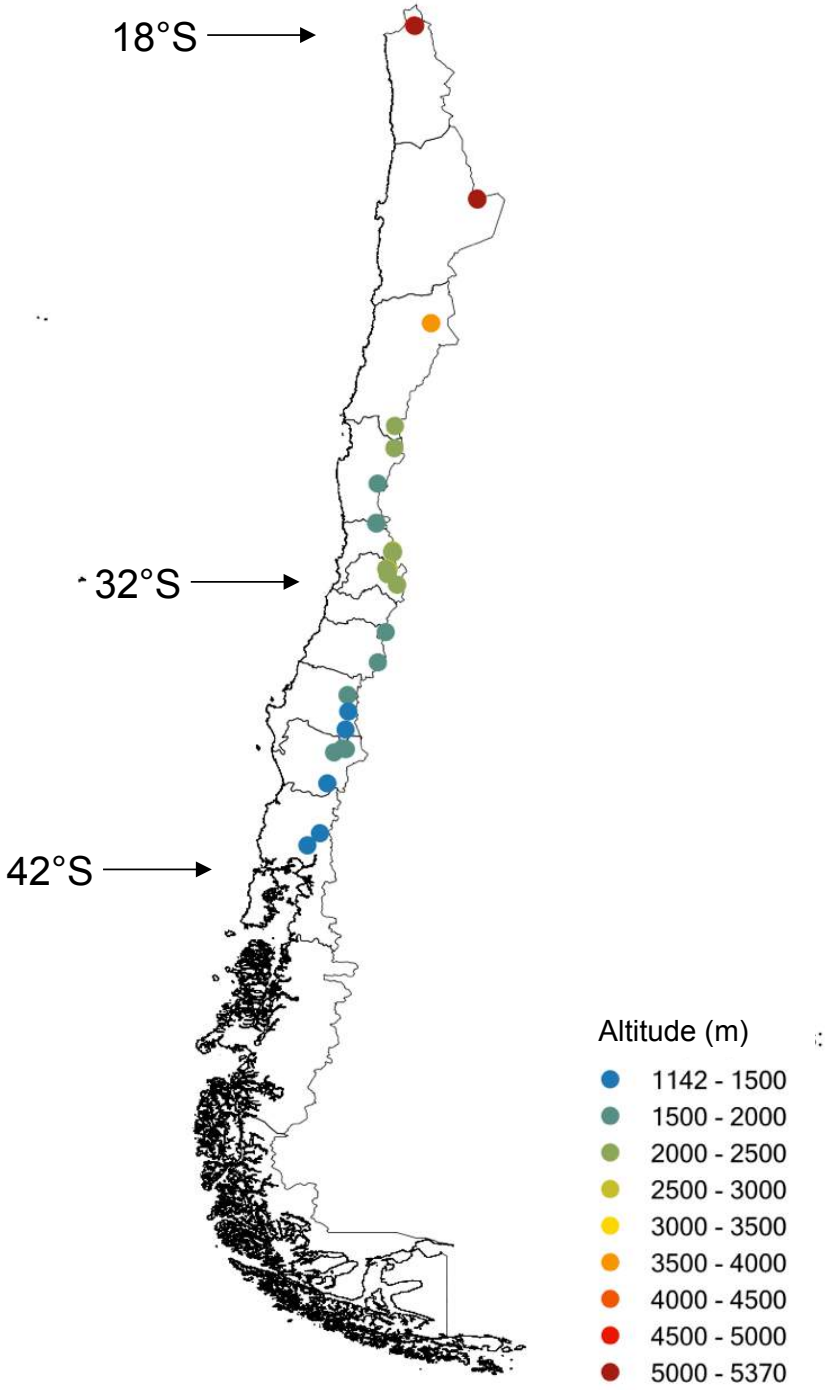
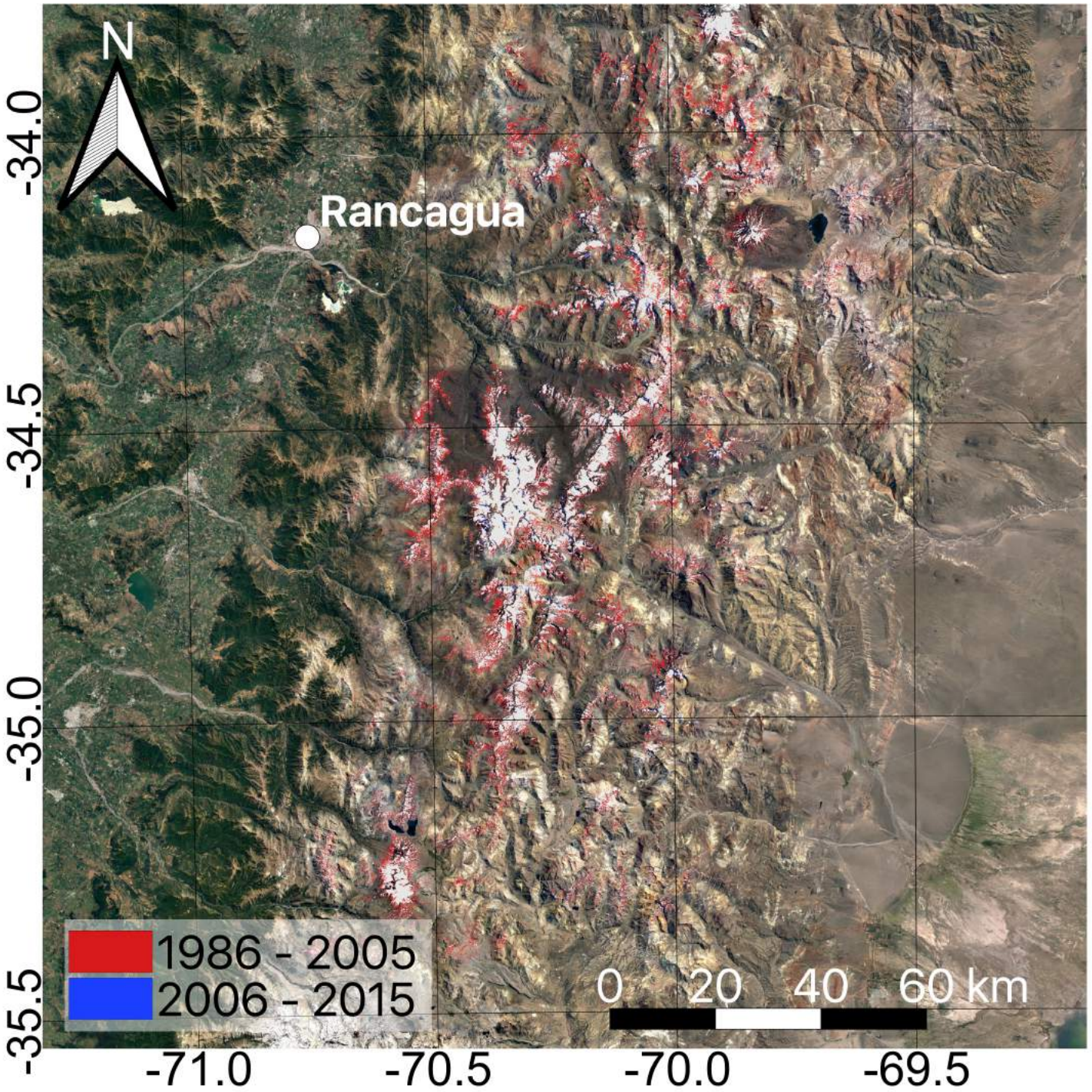
Sampling Locations

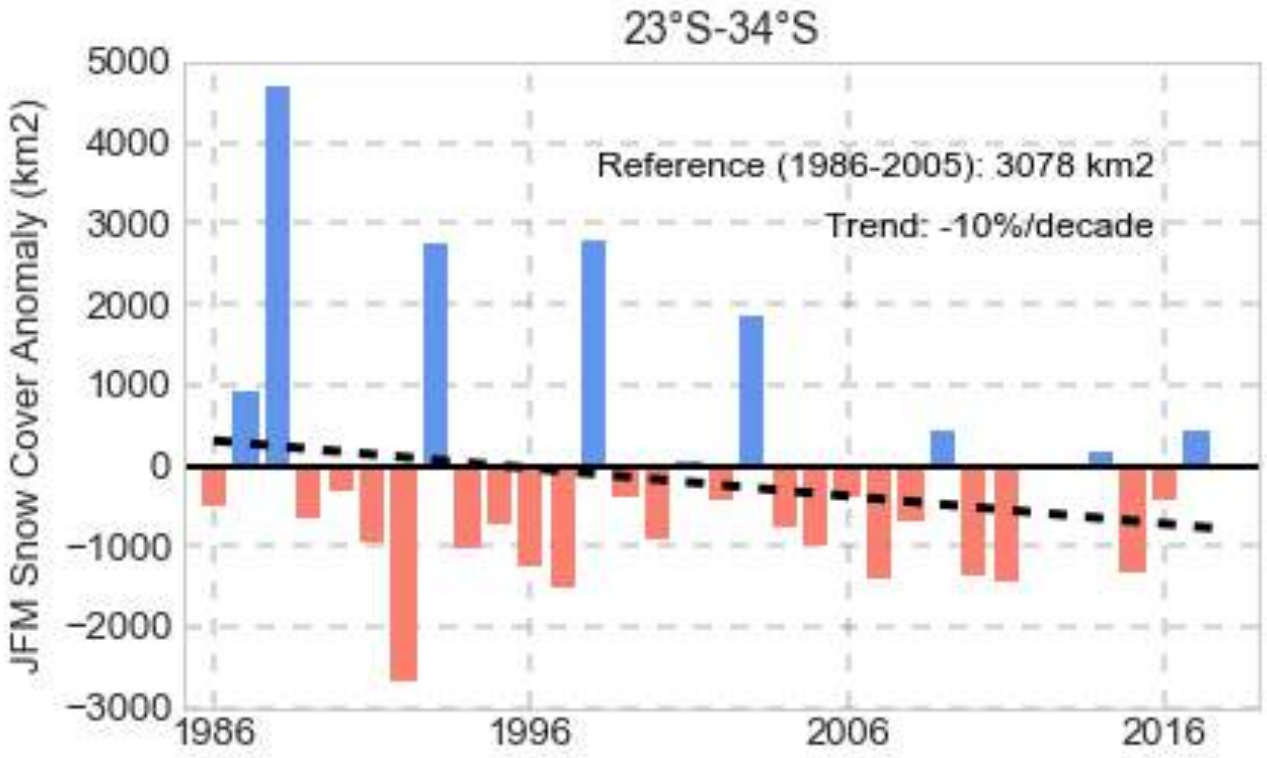




Snow Cover

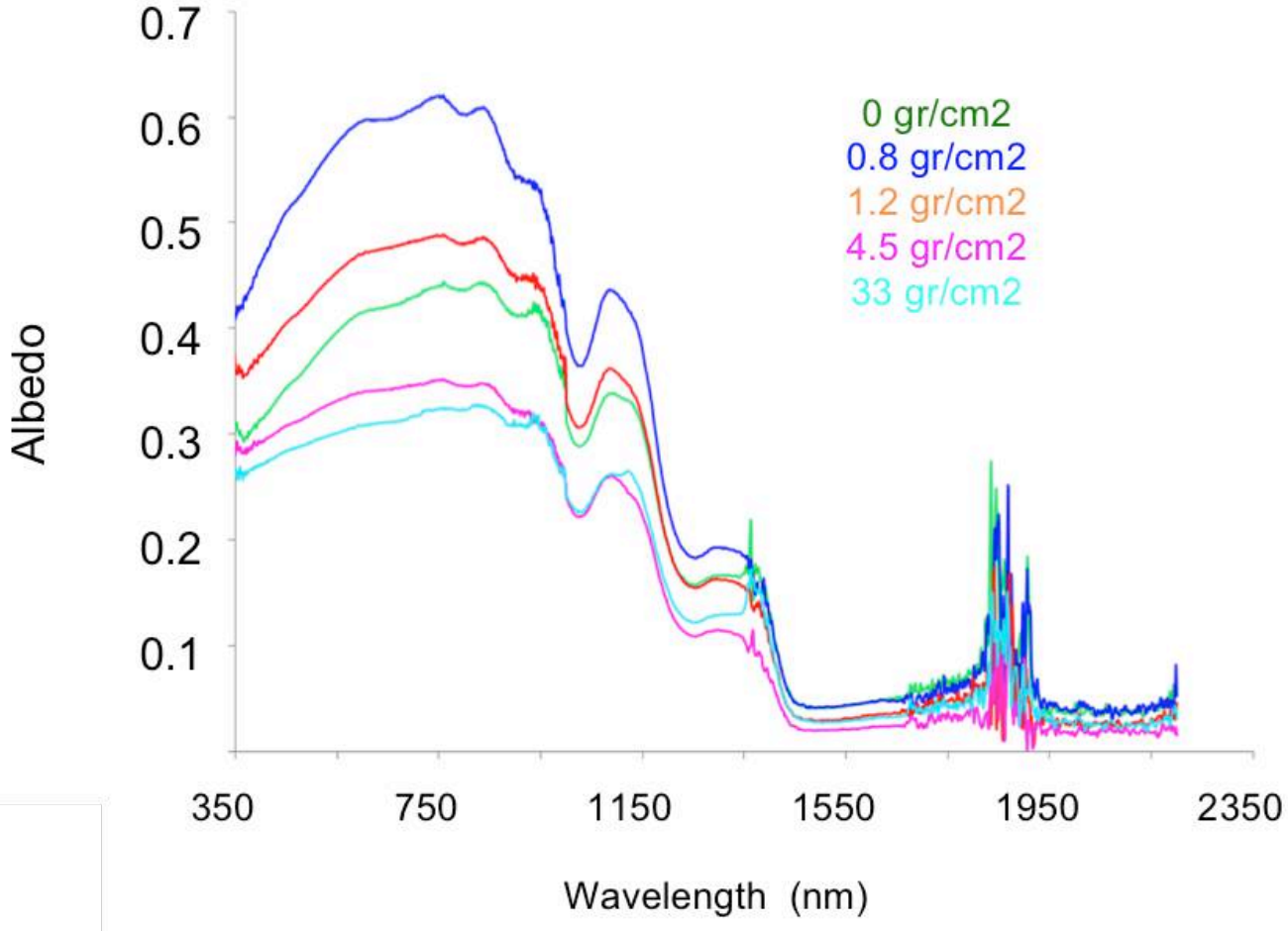
Cordero et al, in preparation.

Changes in the Snow Cover



Cordero et al, in preparation.

Black Carbon affects the Albedo



Albedo: Bihemispherical reflectance factor (BHRF)

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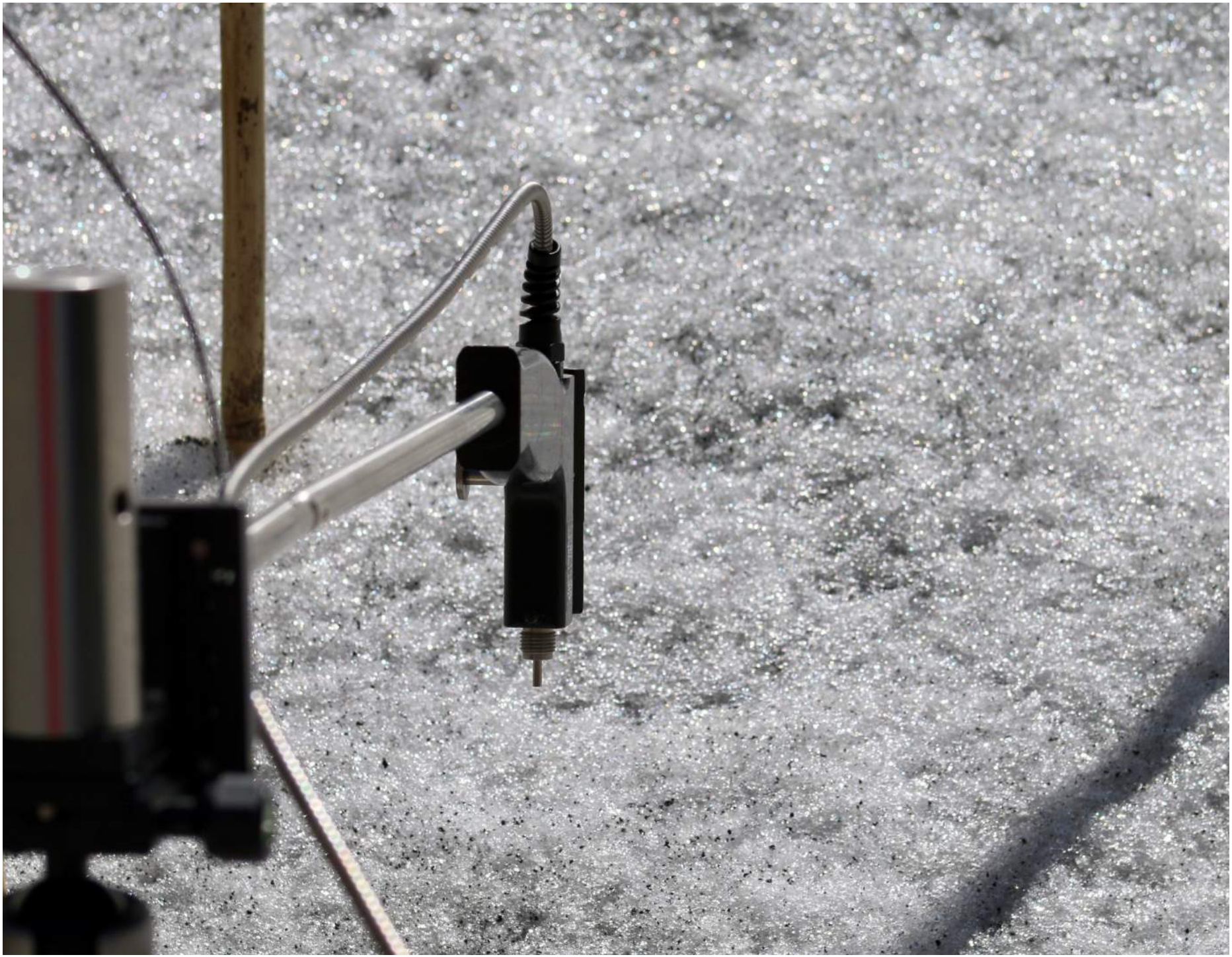

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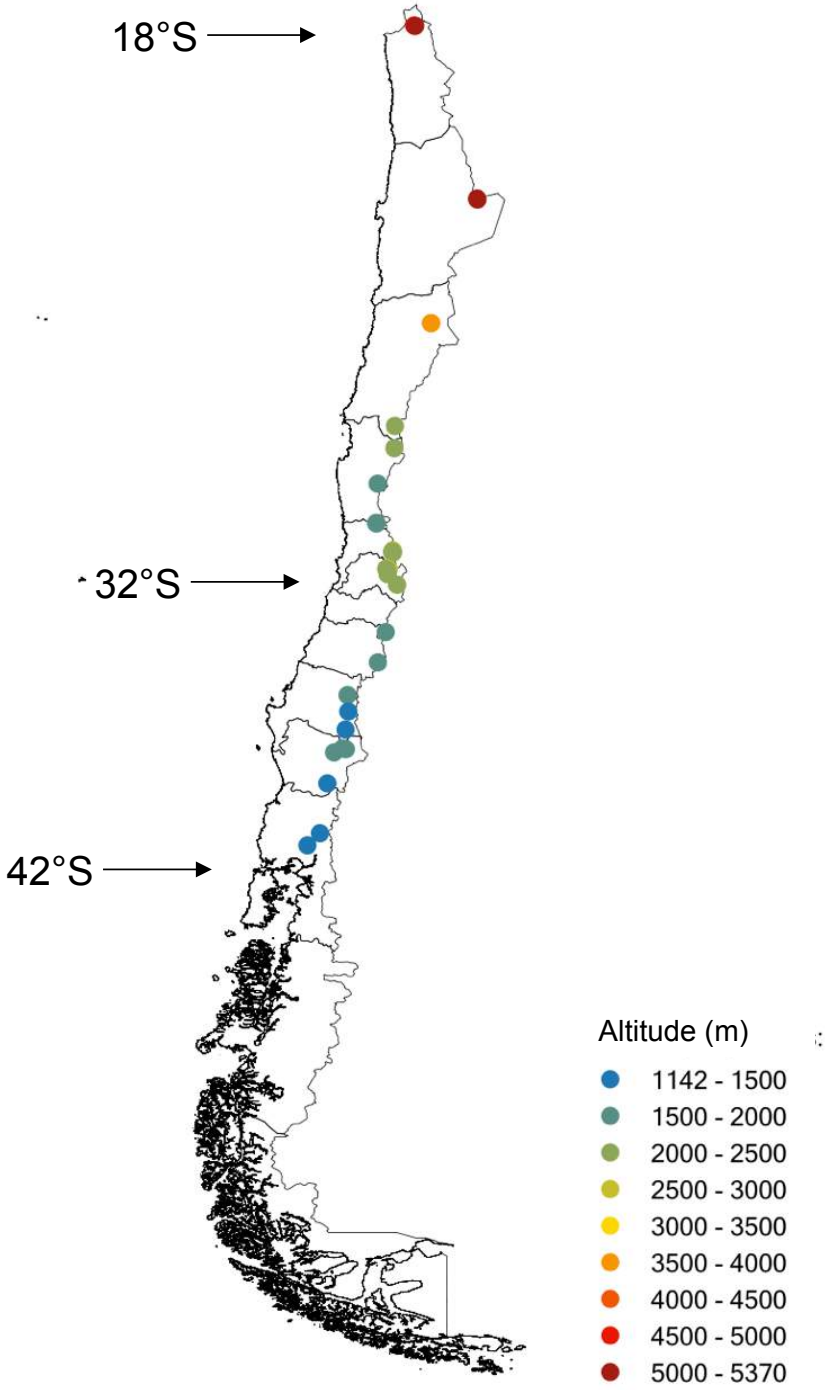


Farellones, 2700 m altitude

Farellones, 2700 m altitude

Meltwater Filtration (MF) Technique

BC Content

Angstrom Coefficient

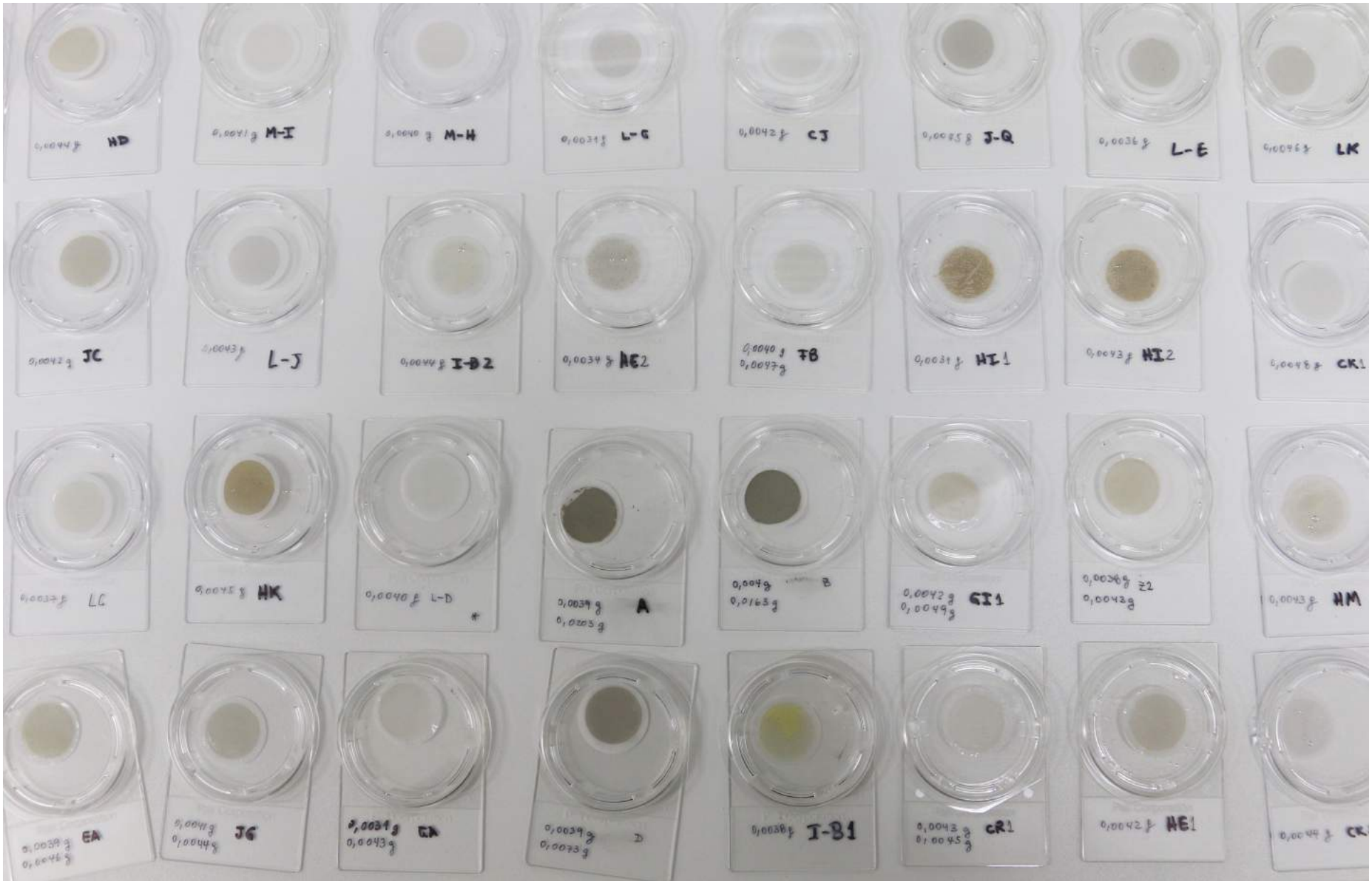
Clarke, A. D., and K. J. Noone (1985), Soot in the Arctic snowpack: A cause for perturbations in radiative transfer, Atmospheric Environ. 1967, 19(12), 2045–2053.

Farellones, 2700 m altitude

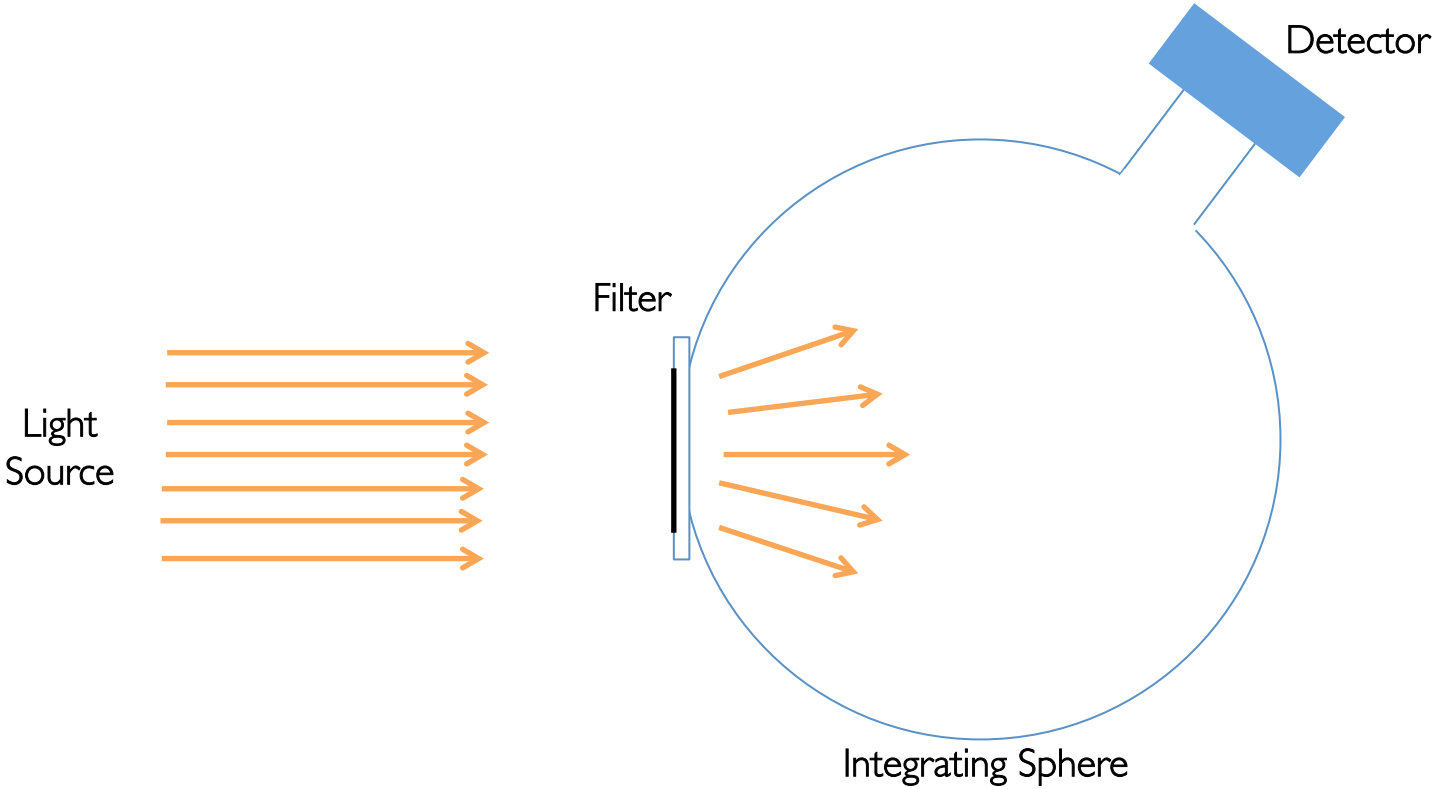

THE NORTH FACE


BAROMETER

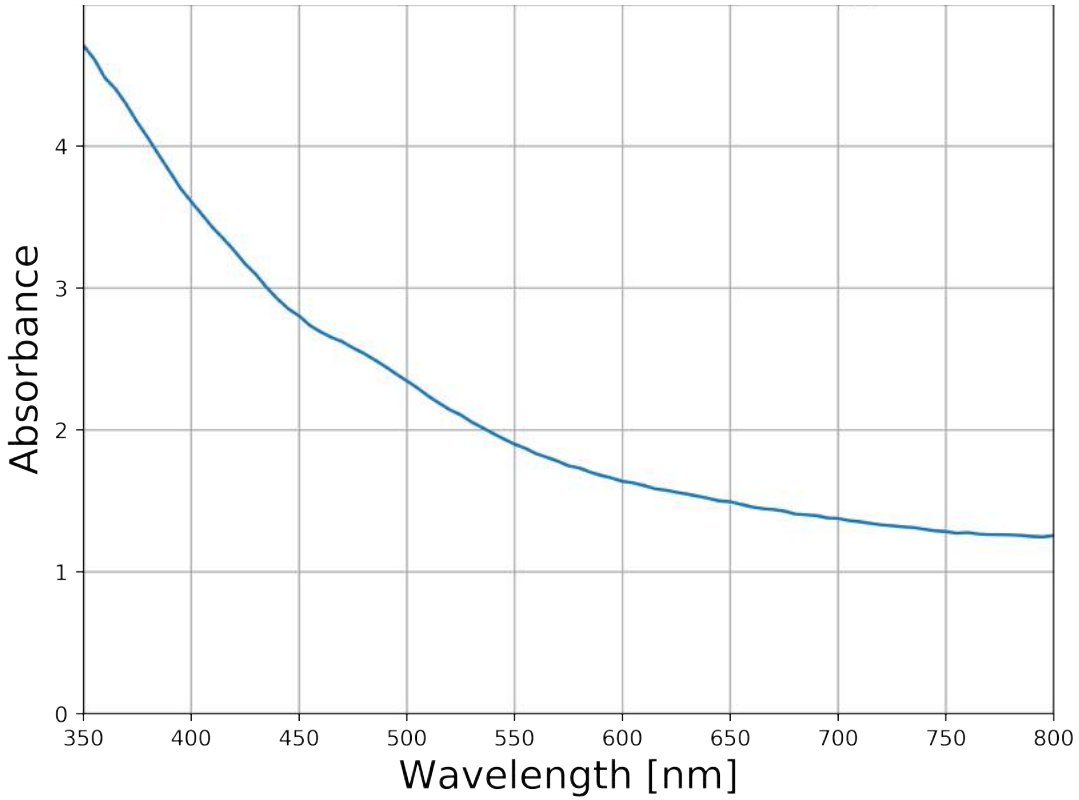

MILLIPORE

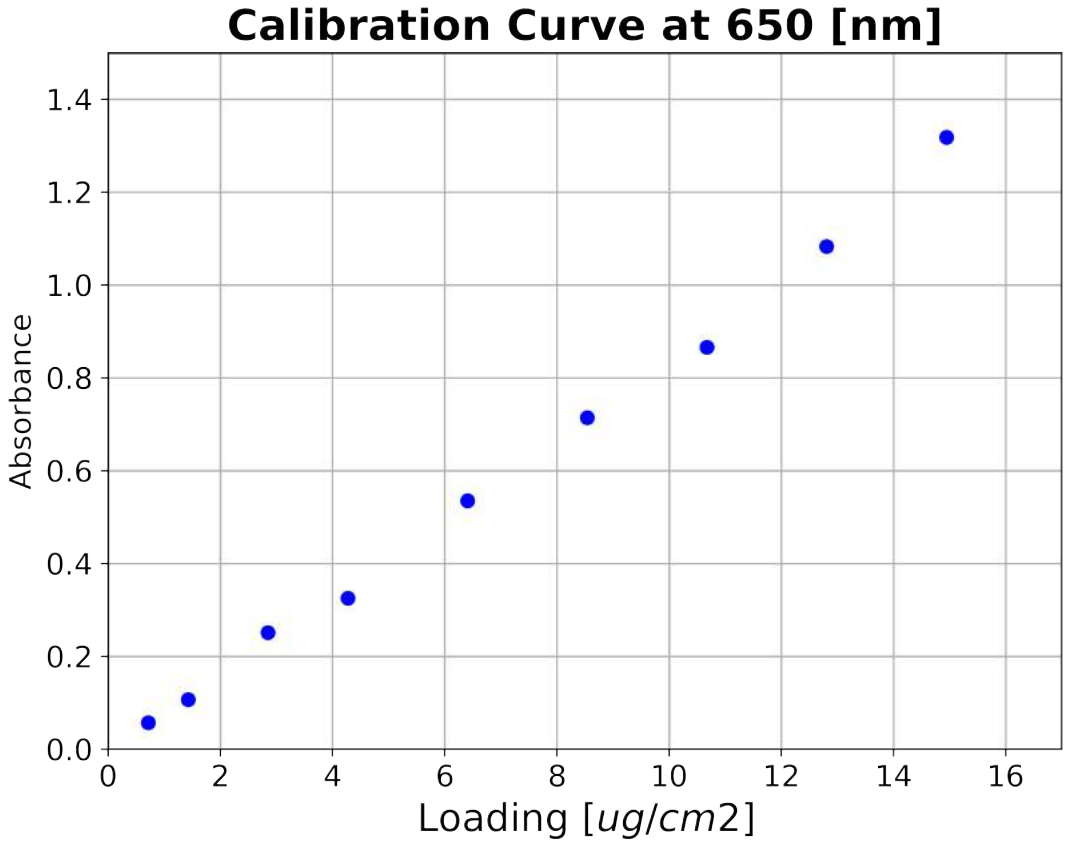

HD
M-I
M-H
L-G
CJ
J-Q
L-E
LK
JC
L-J
I-B2
AE2
FB
HI1
HI2
CK1
LC
HK
L-D
A
B
GI1
Z2
HM
EA
JG
CA
D
I-B1
CR1
HE1

Transmittance



Absorbance


Absorbance
0
1
2
3
4
350
400
450
500
550
600
650
700
750
800
Wavelength [nm]


Calibration Curve at 650 [nm]
Absorbance
Loading [ug/cm2]
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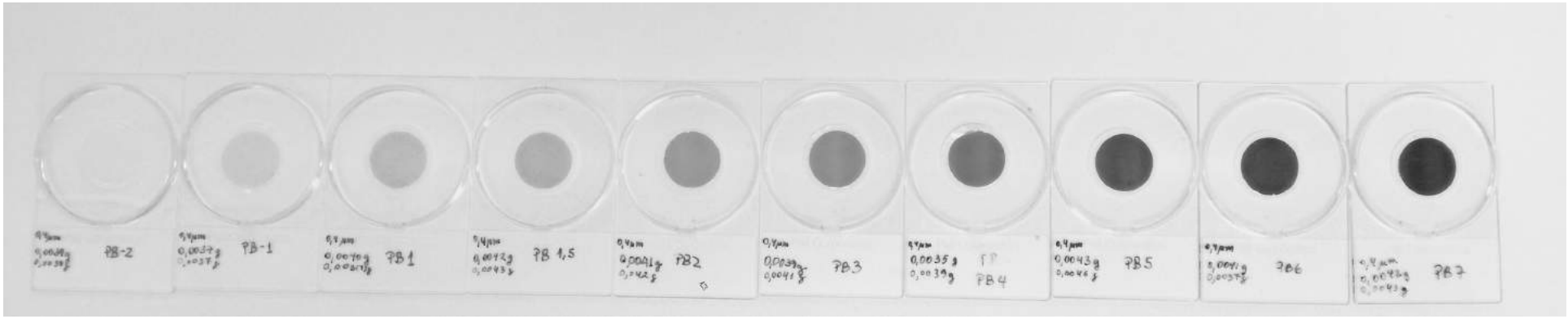
0.2
0.4
0.6
0.8
1.0
1.2
1.4
0
2
4
6
8
10
12
14
16


PB-2
PB-1
PB 1
PB 1,5
PB2
PB3
PB4
PB5
PB6
PB7

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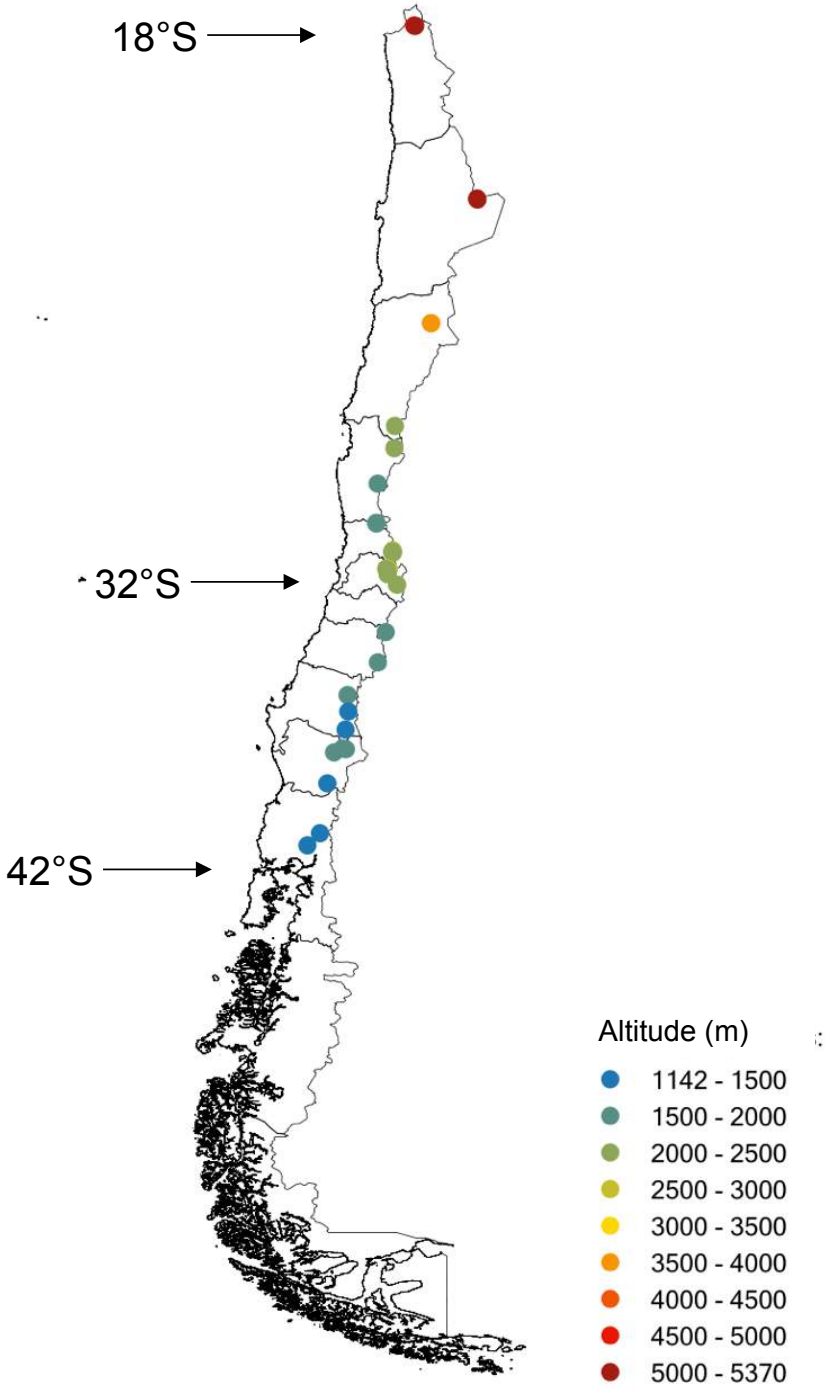
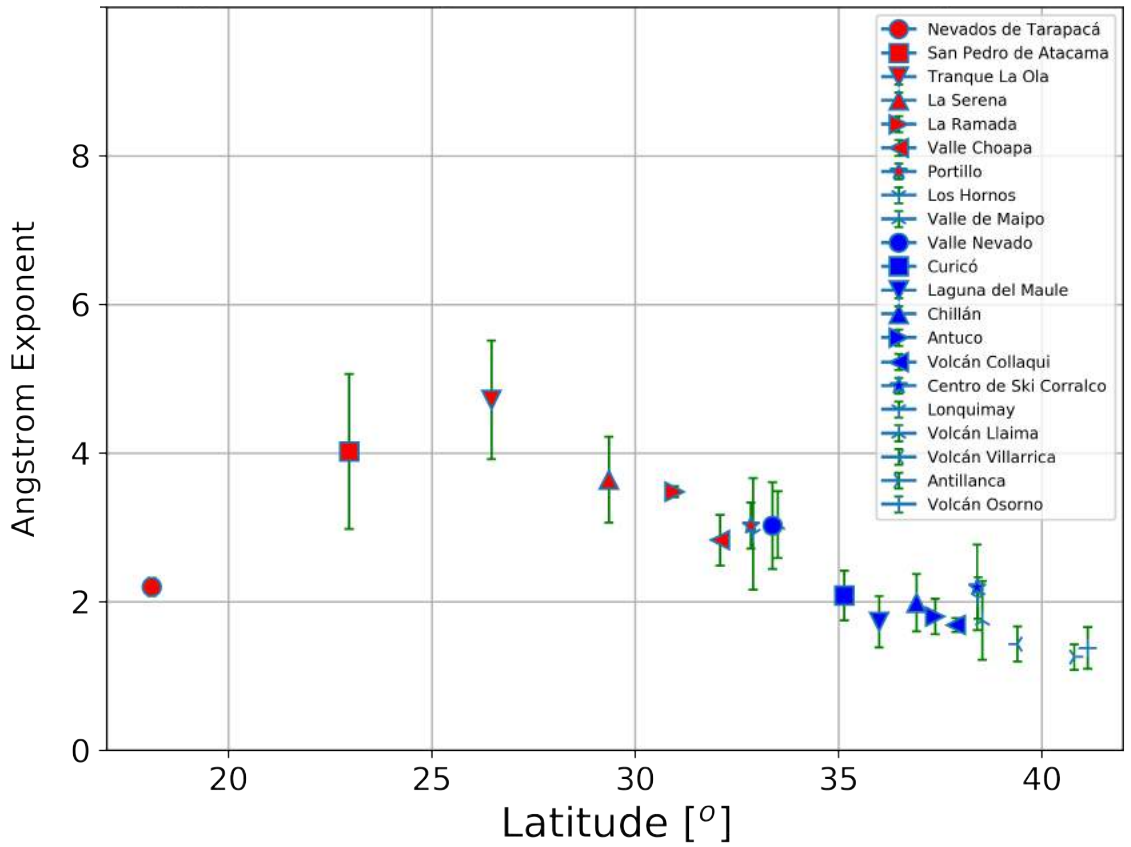
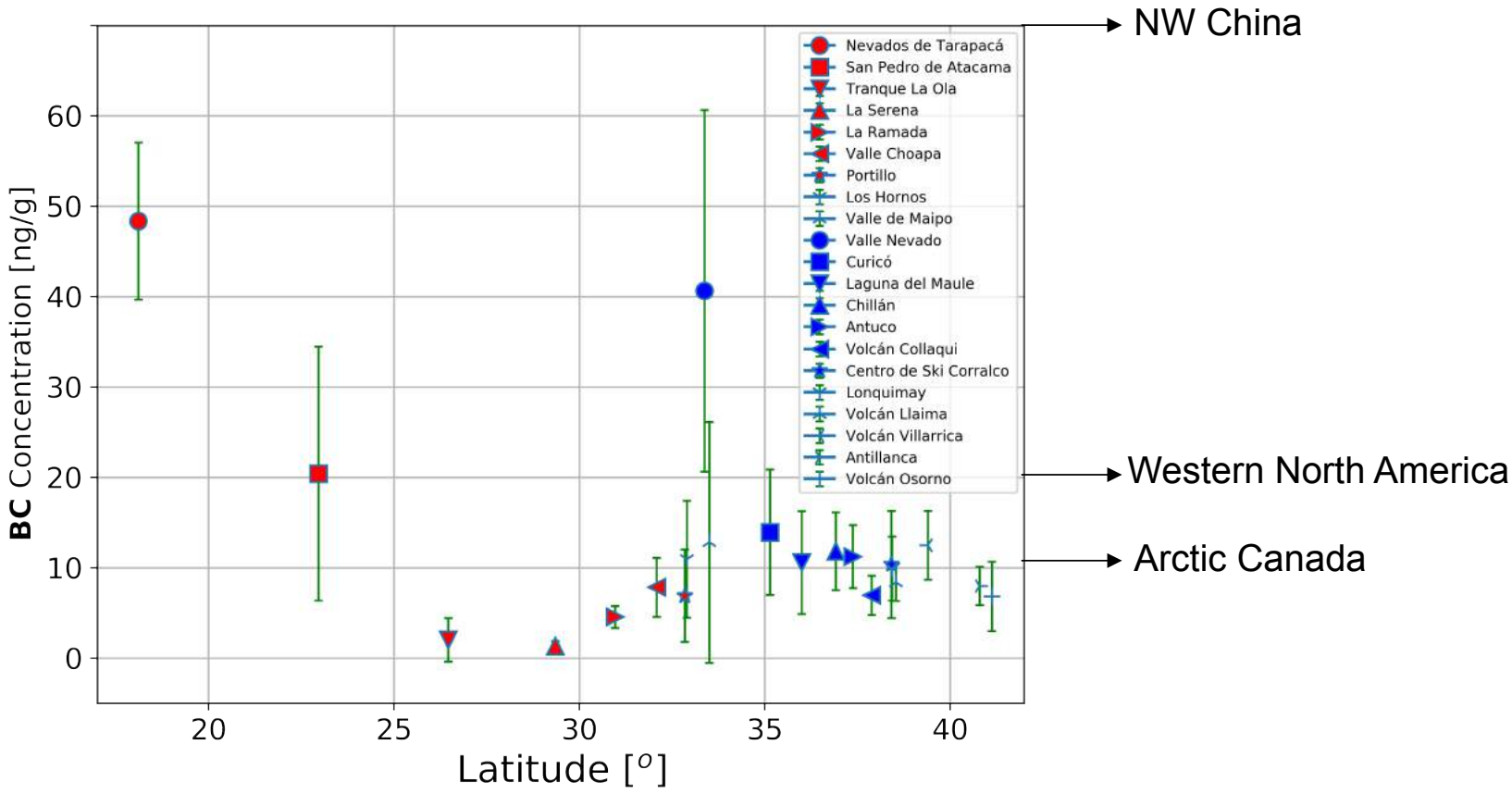


Angstrom Coefficient



Rowe, P.M., Cordero, R.R., et al.., 2019. Black carbon and other light-absorbing impurities in snow in the Chilean Andes. Scientific reports, 9(1), p.4008.

BC Content



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Black Carbon Concentration

Greenland	1-4 ng/g
Arctic Ocean	4-10 ng/g
Arctic Canada	8-14 ng/g
Arctic Russia	10-60 ng/g
NE China	30-2000 ng/g
NW China (XinJiang)	20-600 ng/g (median 70)
Western North America	5-70 ng/g (median 20)
Antarctic Plateau	0.2-0.6 ng/g (Dome C, South Pole, Vostok)
Antarctic Sea Ice	0.2-0.4 ng/g

From Data provided by Stephen Warren (University of Washington).

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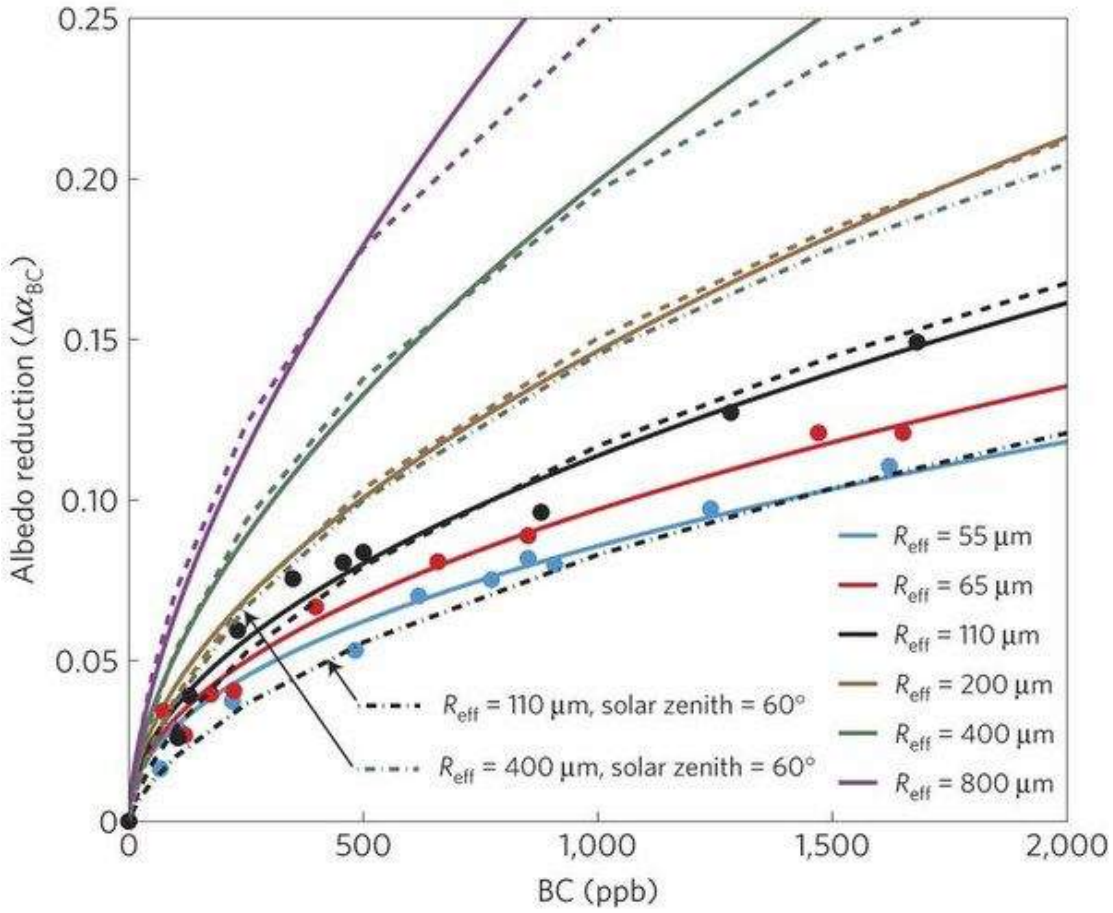
Changes in the Albedo: Black Carbon BC



Quoted from: Hadley, OL; Kirchstetter, TW. Black-carbon reduction of snow albedo Nature Climate Change; (2012): 437-440