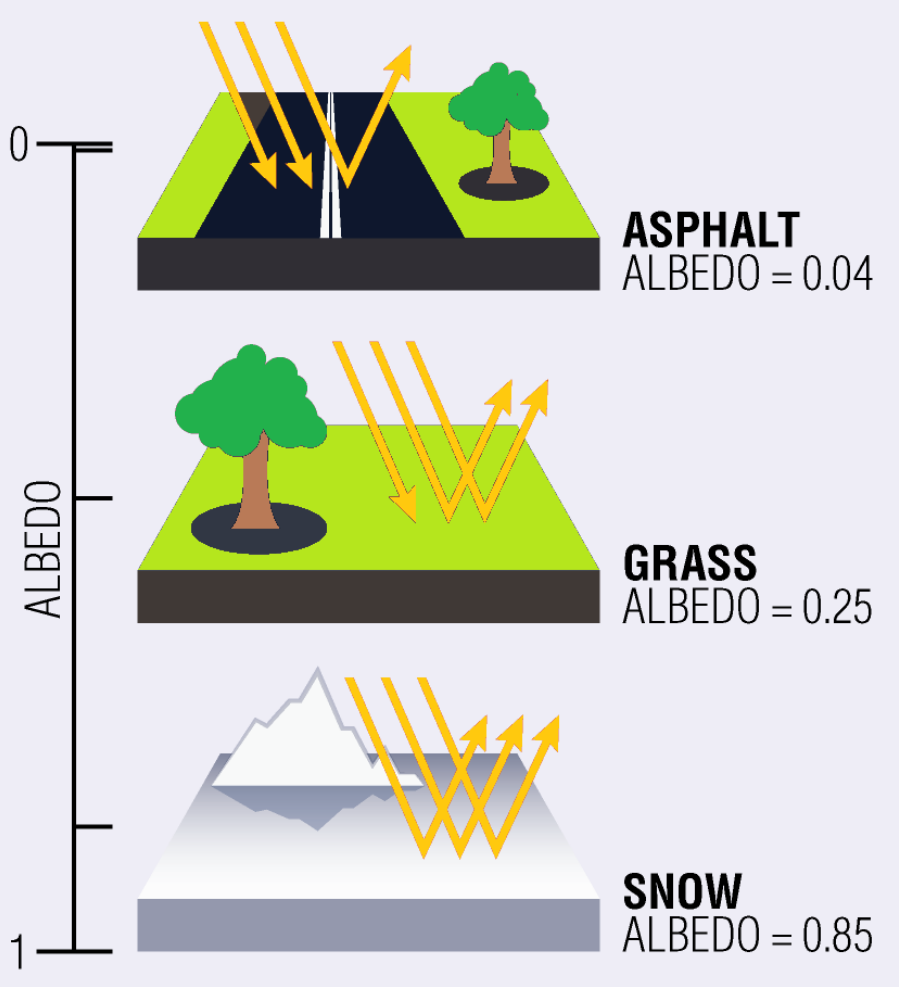
Snow surface albedo changes in the last two decades across the South America (11°N-76°S): Some highlights revealed by satellite observations

Tomás R. Bolaño-Ortiz, *Maria Ruggeri, Lucas L. Berna-Peña, S. Enrique Puliafito and Francisco Cereceda-Balic*

AGU FALL MEETING
Online Everywhere | 1–17 December 2020

C008 - Remote Sensing of the Cryosphere: Seasonal Snow II

Snow surface albedo - SSA



-> Snow is among the most reflective of natural surfaces on Earth.

-> A small SSA decrease can increase its absorption of solar energy.

-> Climate models indicate that the reduction of SSA contributes to global warming and near-worldwide melting of cryosphere.

South America and the Andes Mountains

-> The snowpack in South America is found mainly in the Andes Mountains.

-> This snowpack provides drinking water to more than 80 million people in 9 countries (*Molina et at.,* 2015).

-> Andean glaciers are among the fastest shrinking and largest contributors to sea level rise on Earth (*Dussaillant et at.,* 2019).

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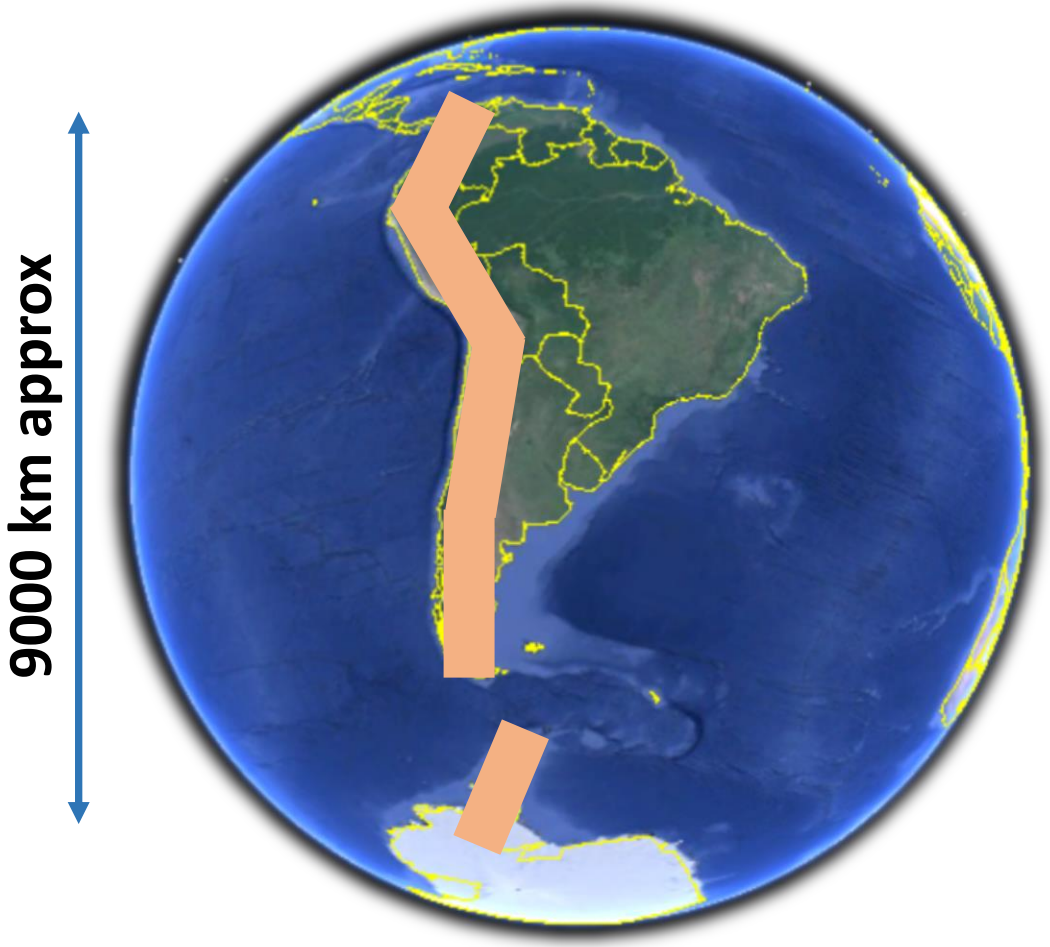

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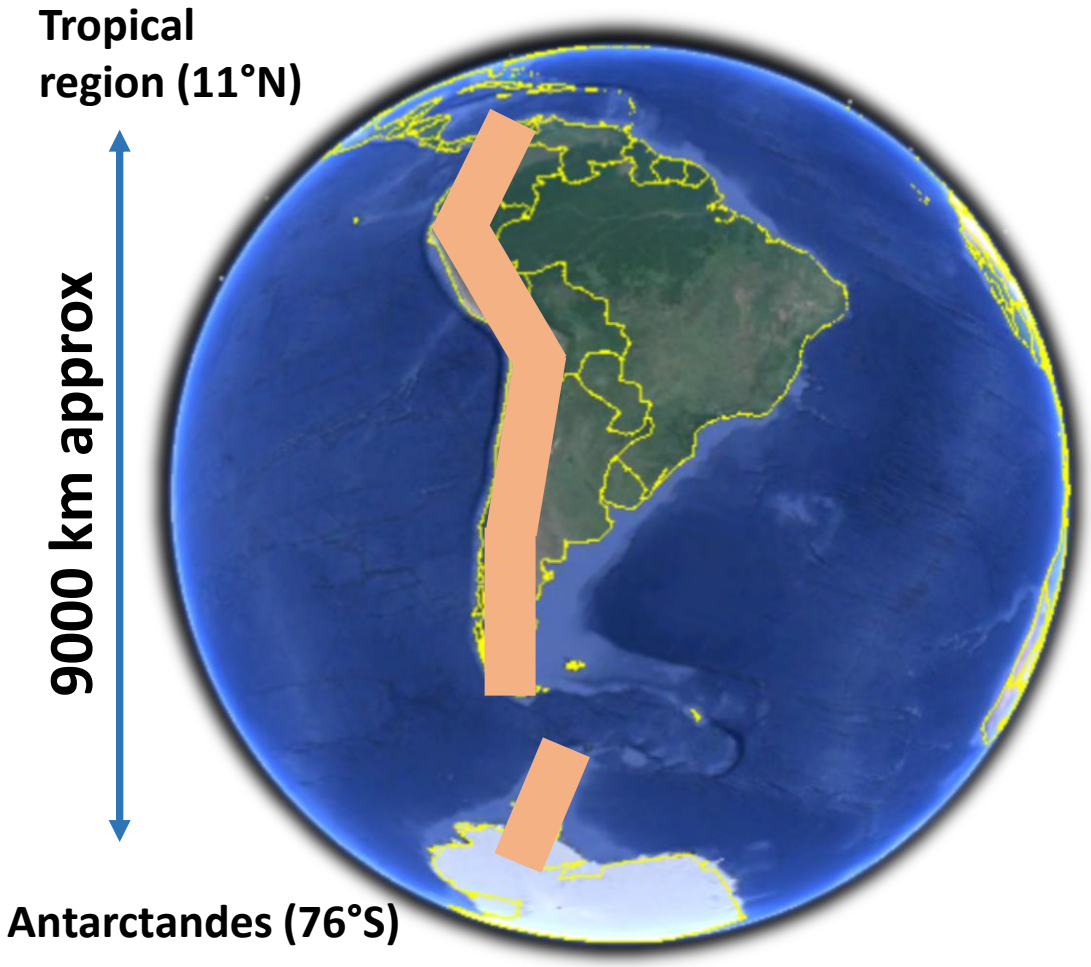

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Methodology

a. The study area was divided into 8 zones:

1) Inner Tropics (11°N - 5°S)
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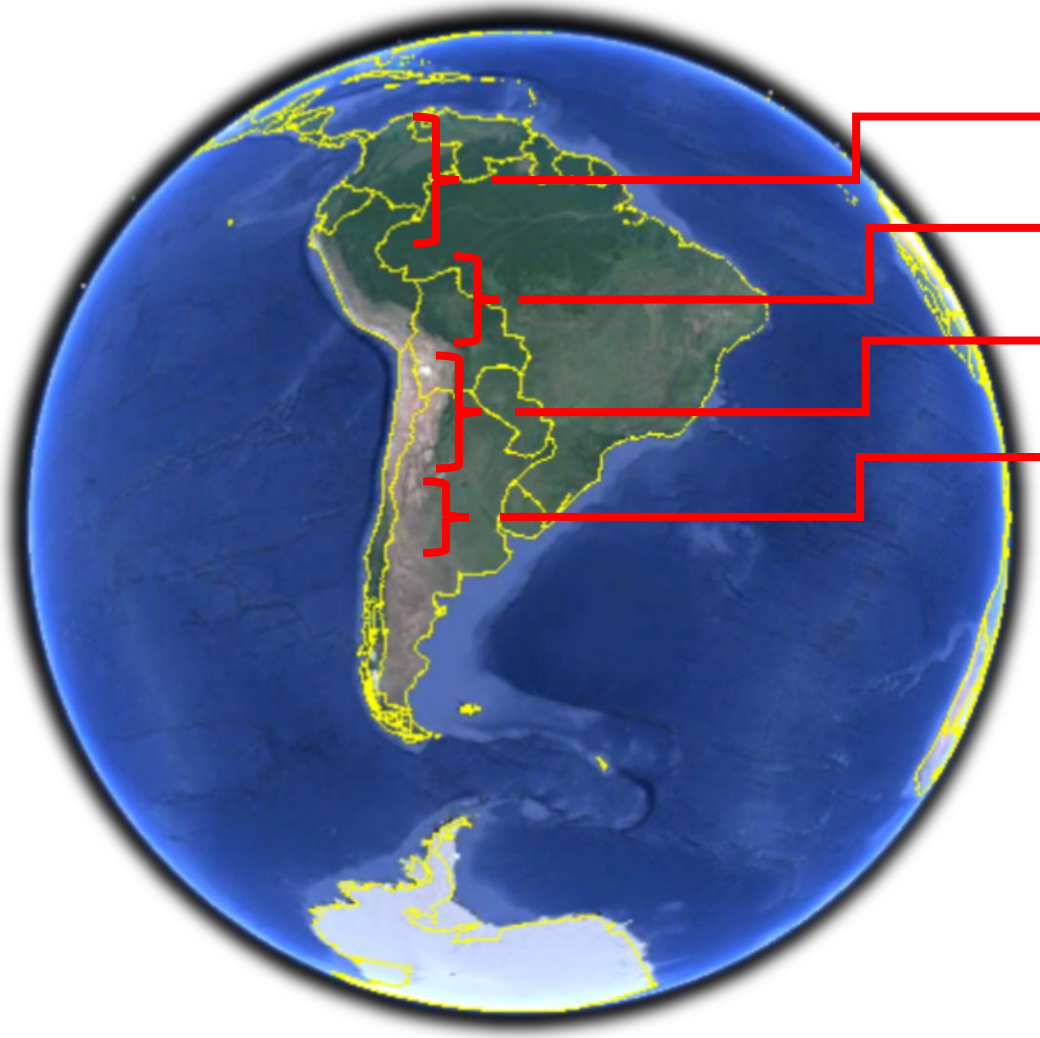

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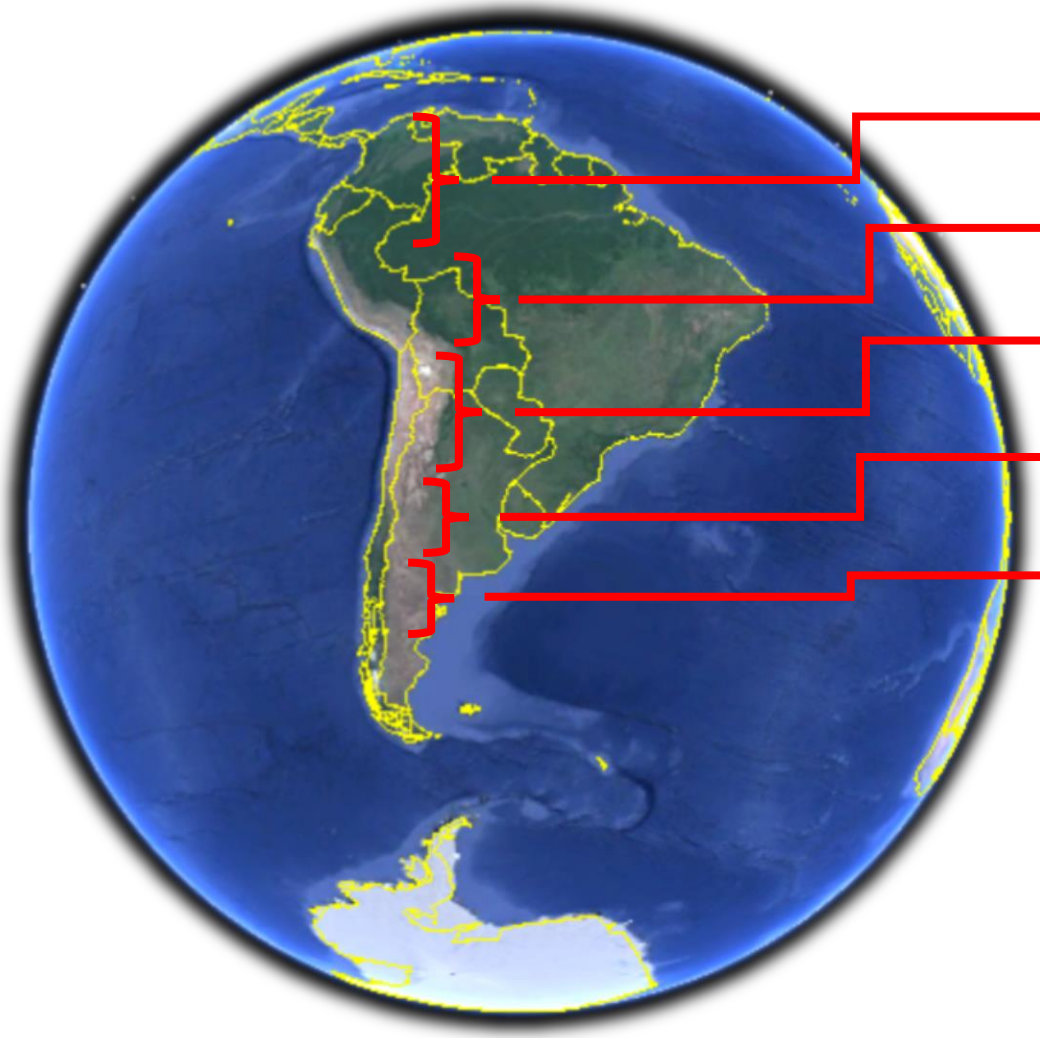

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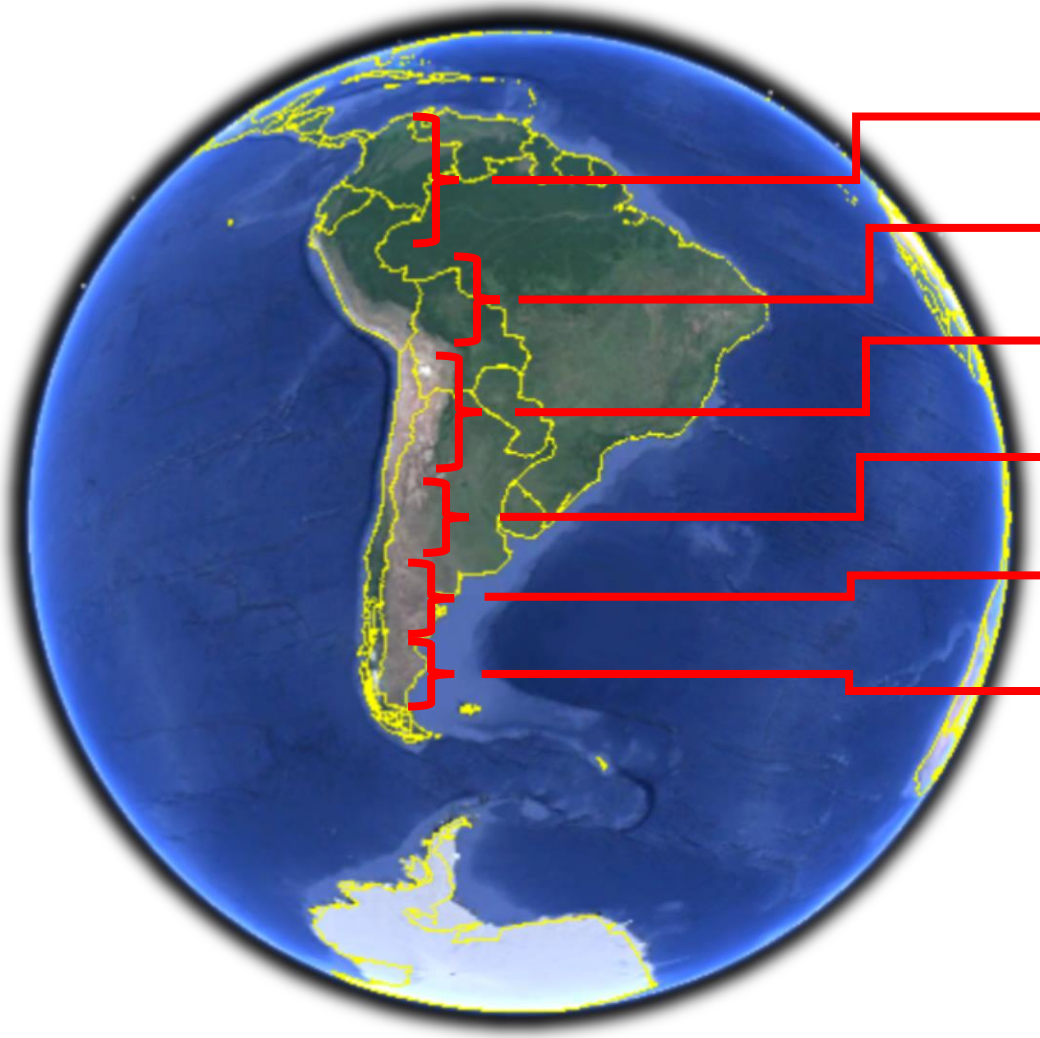

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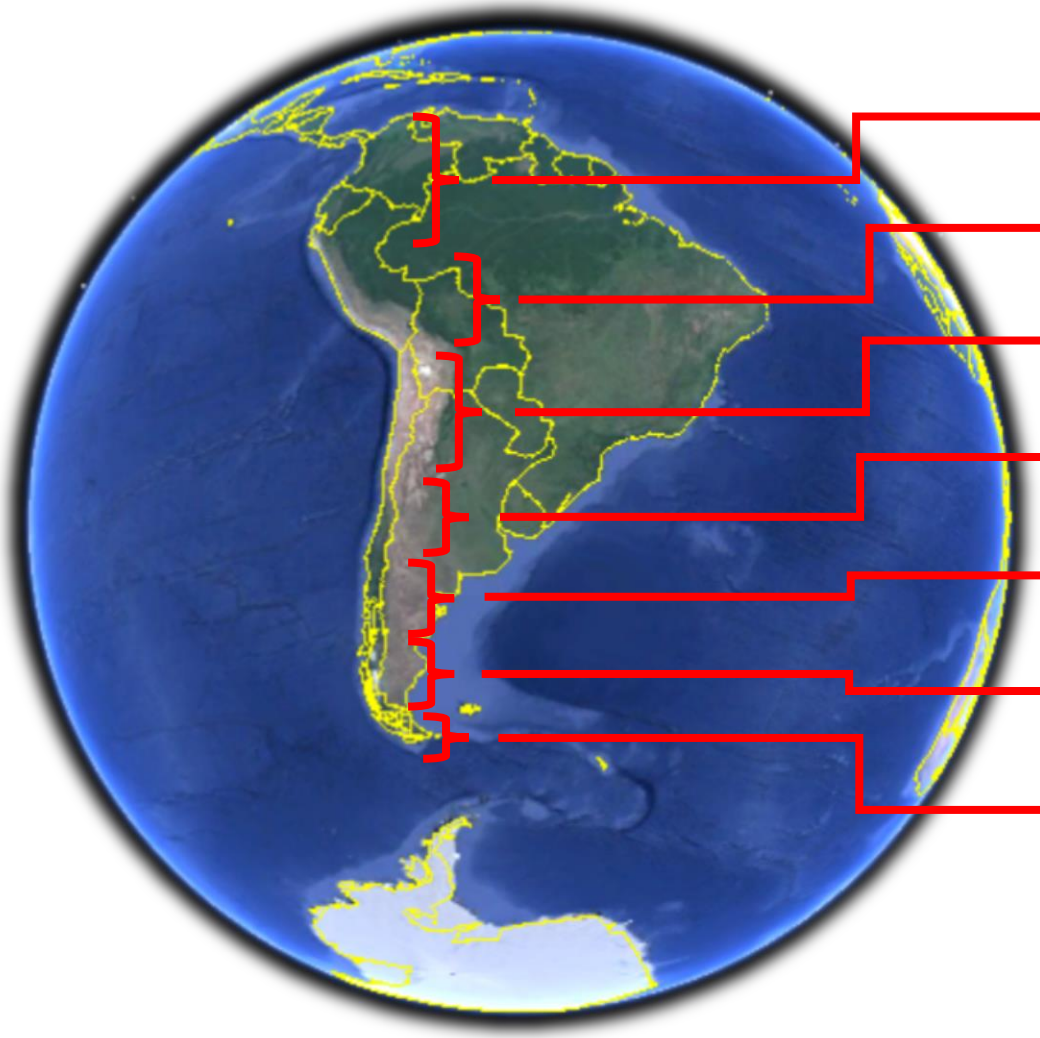

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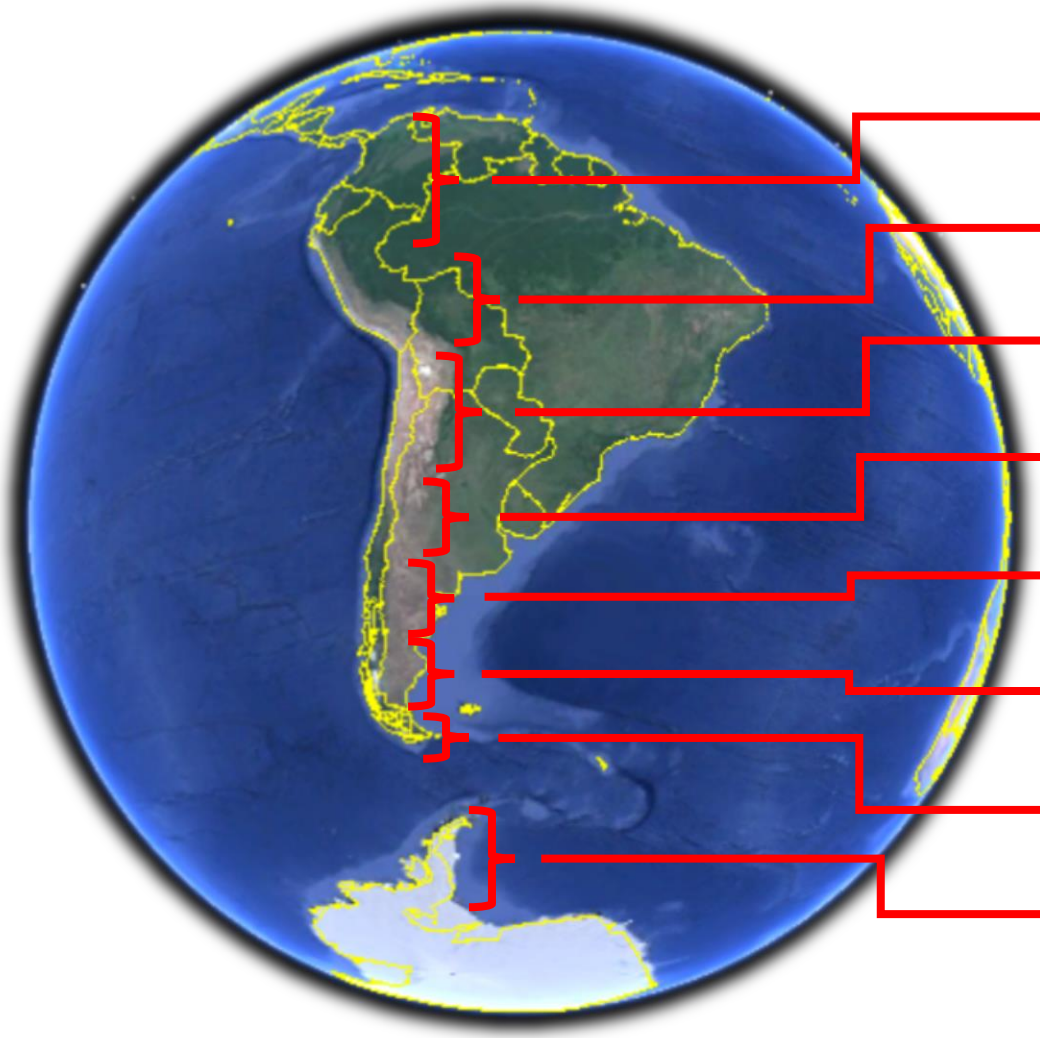

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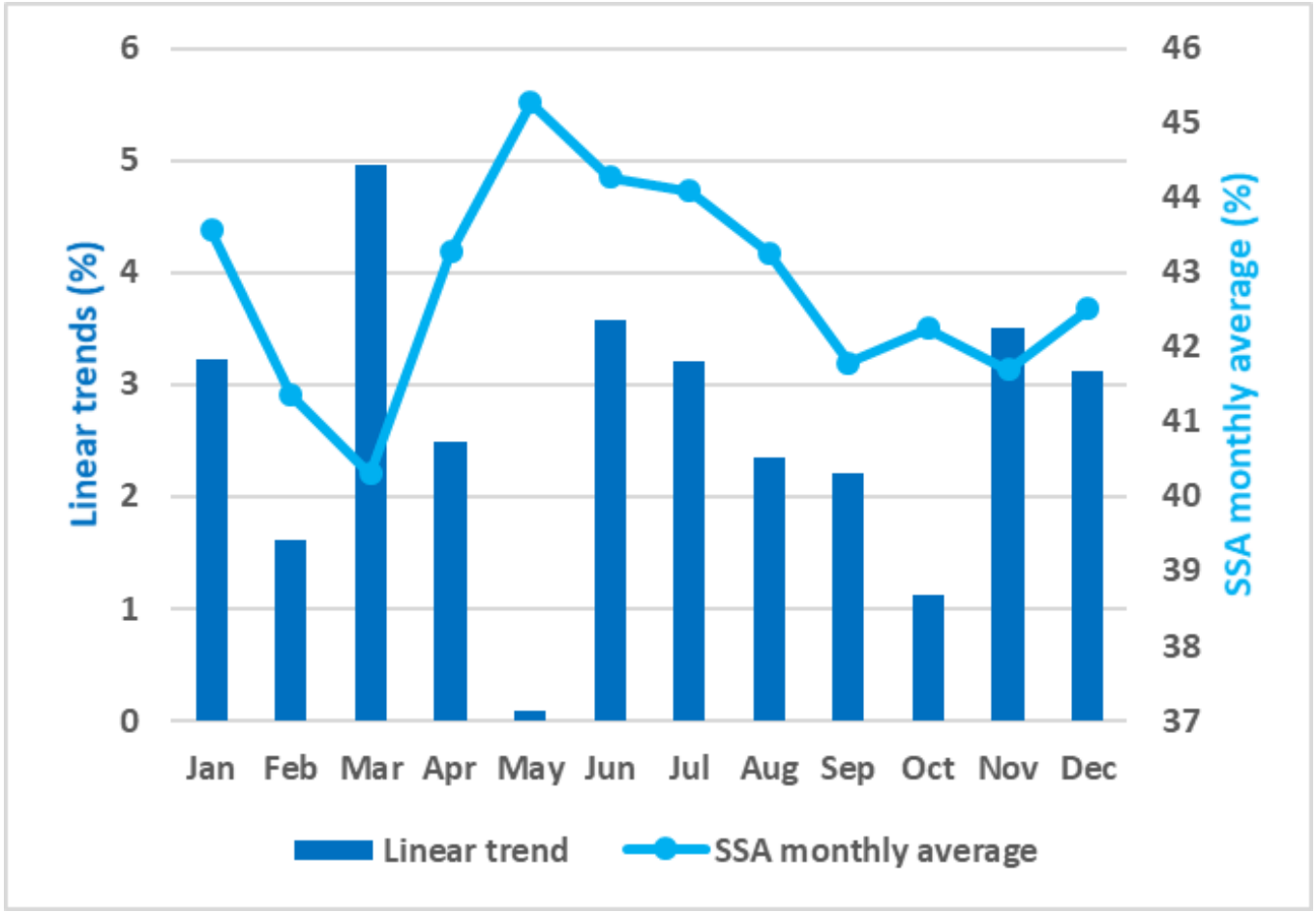
b. A median trend procedure was applied using the Theil-Sen slope estimator (median trend) which has proven to be robust against outliers (Eastman, 2009), considering snow albedo data from March 2000 to March 2020, that is, 20 years.

c. The SSA monthly trend was estimated for each zone. Also, its SSA average.

Results

Inner Tropics (11°N - 5°S)



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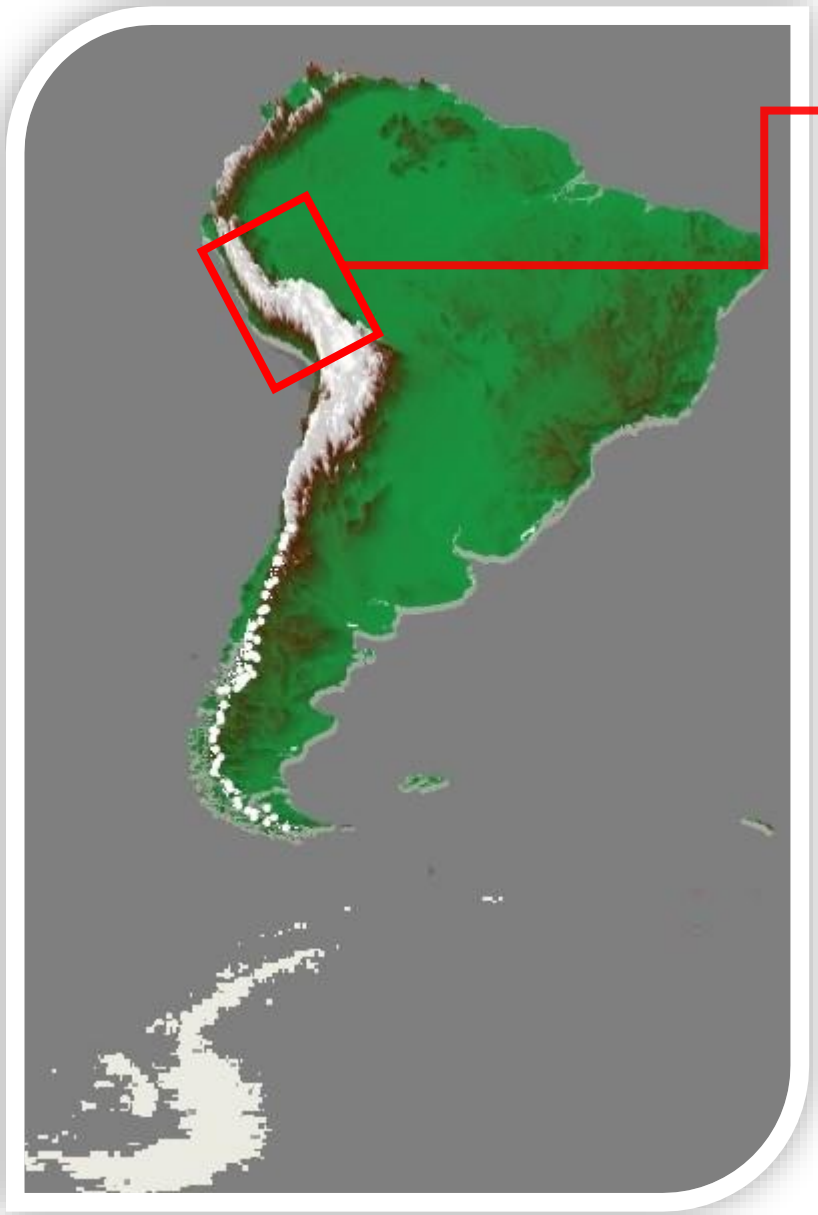
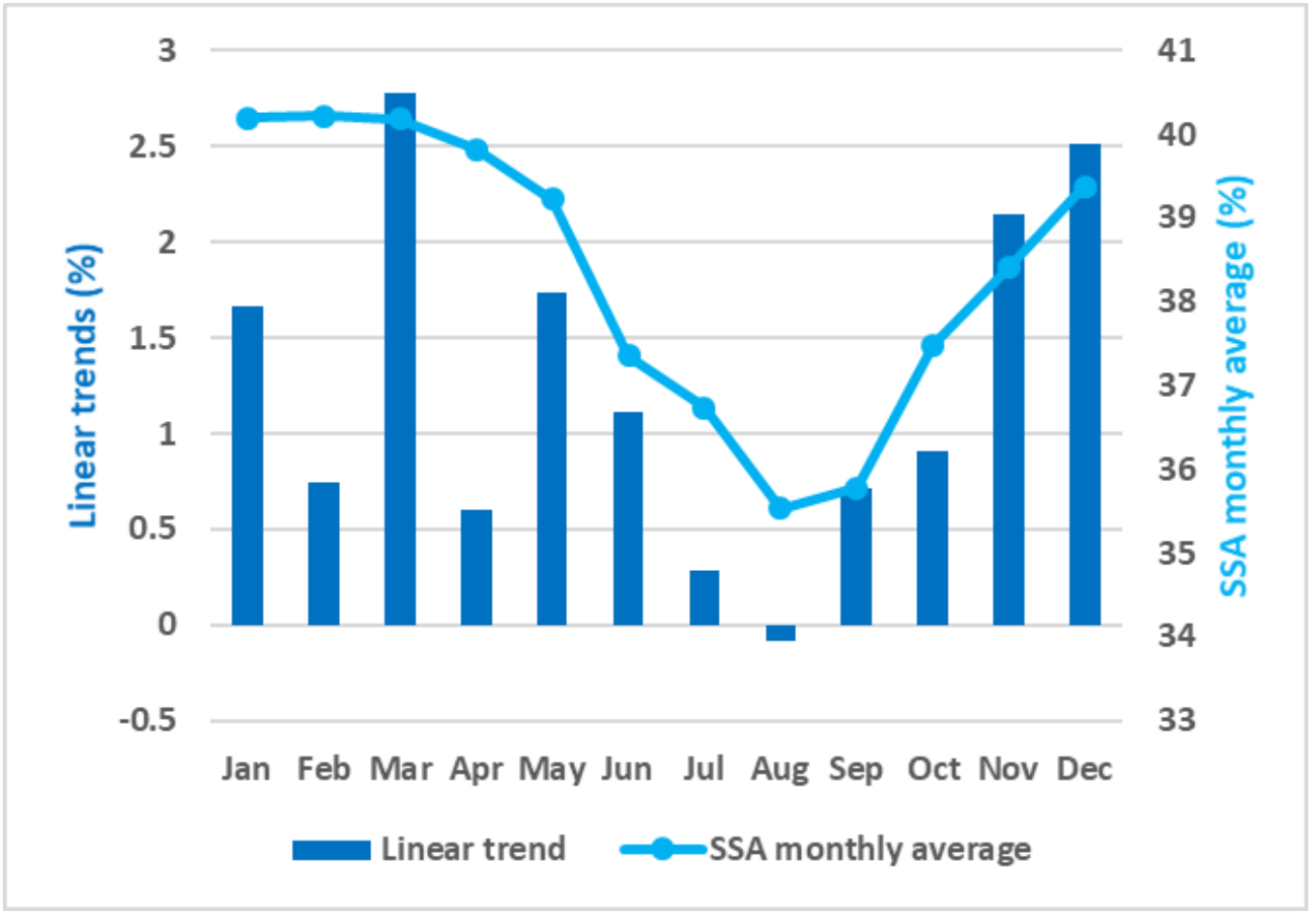


Outer Tropics (5°S - 18°S)



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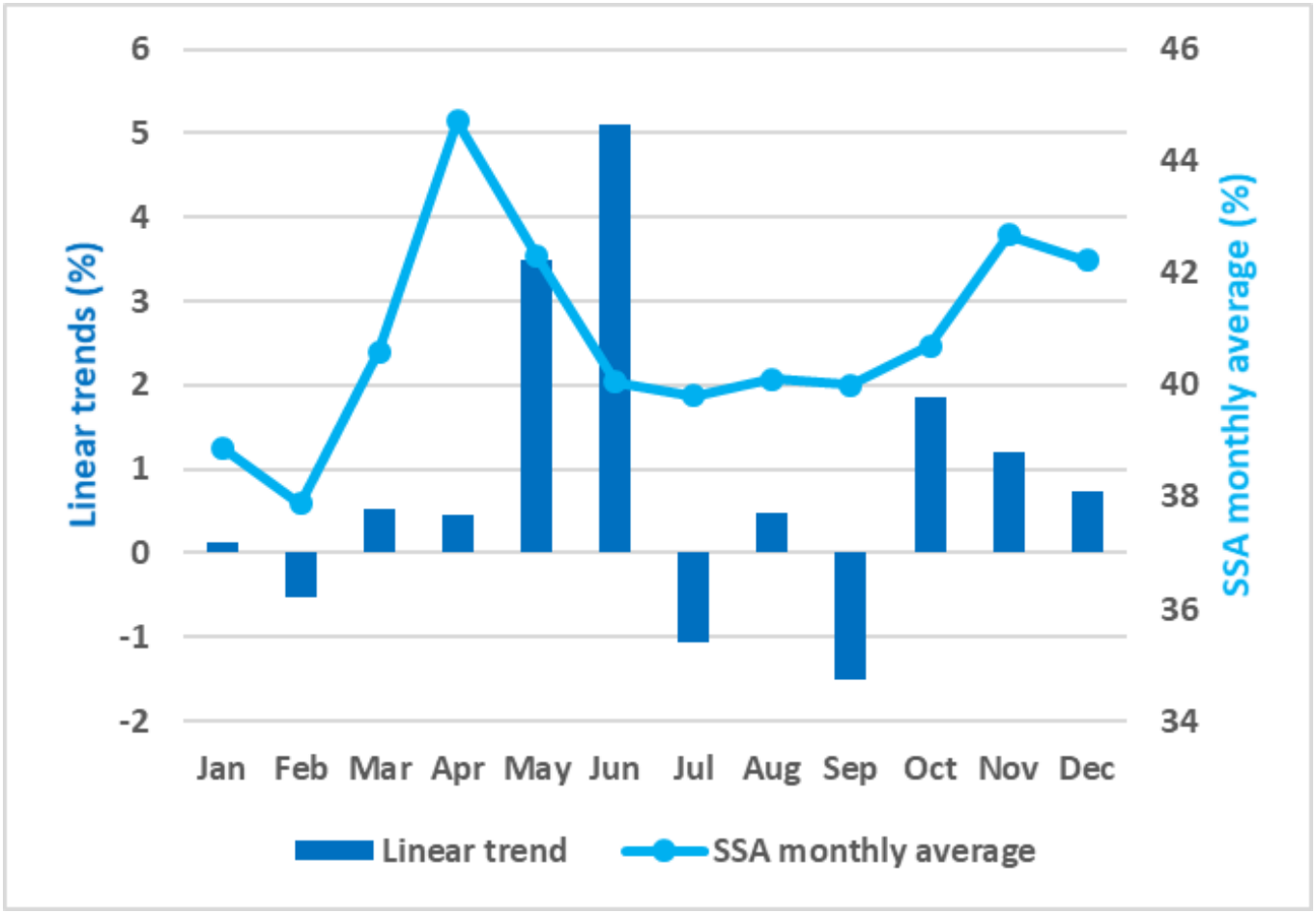
Desert Andes (18°S - 31°S)



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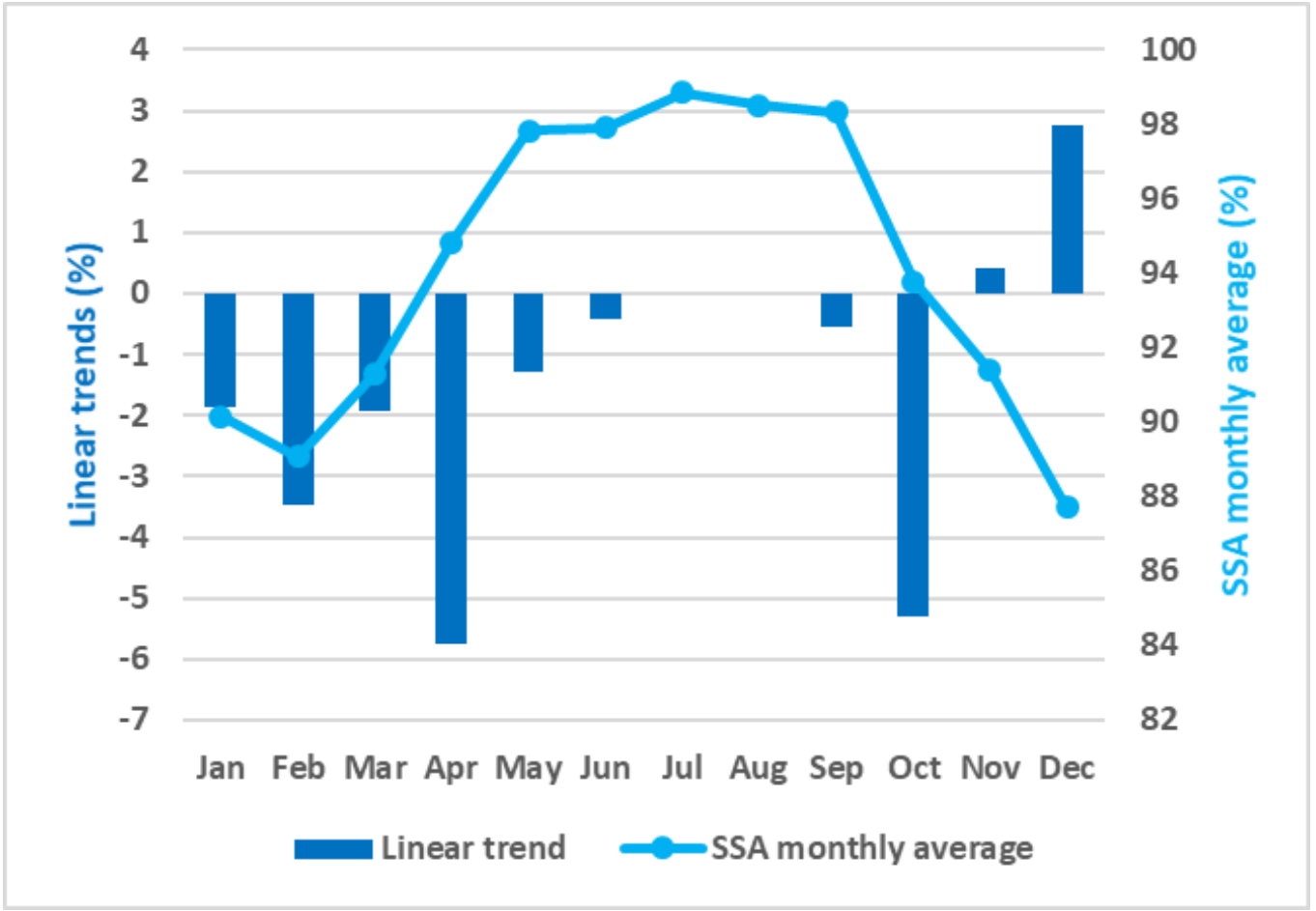
Central Andes (31°S - 37°S)



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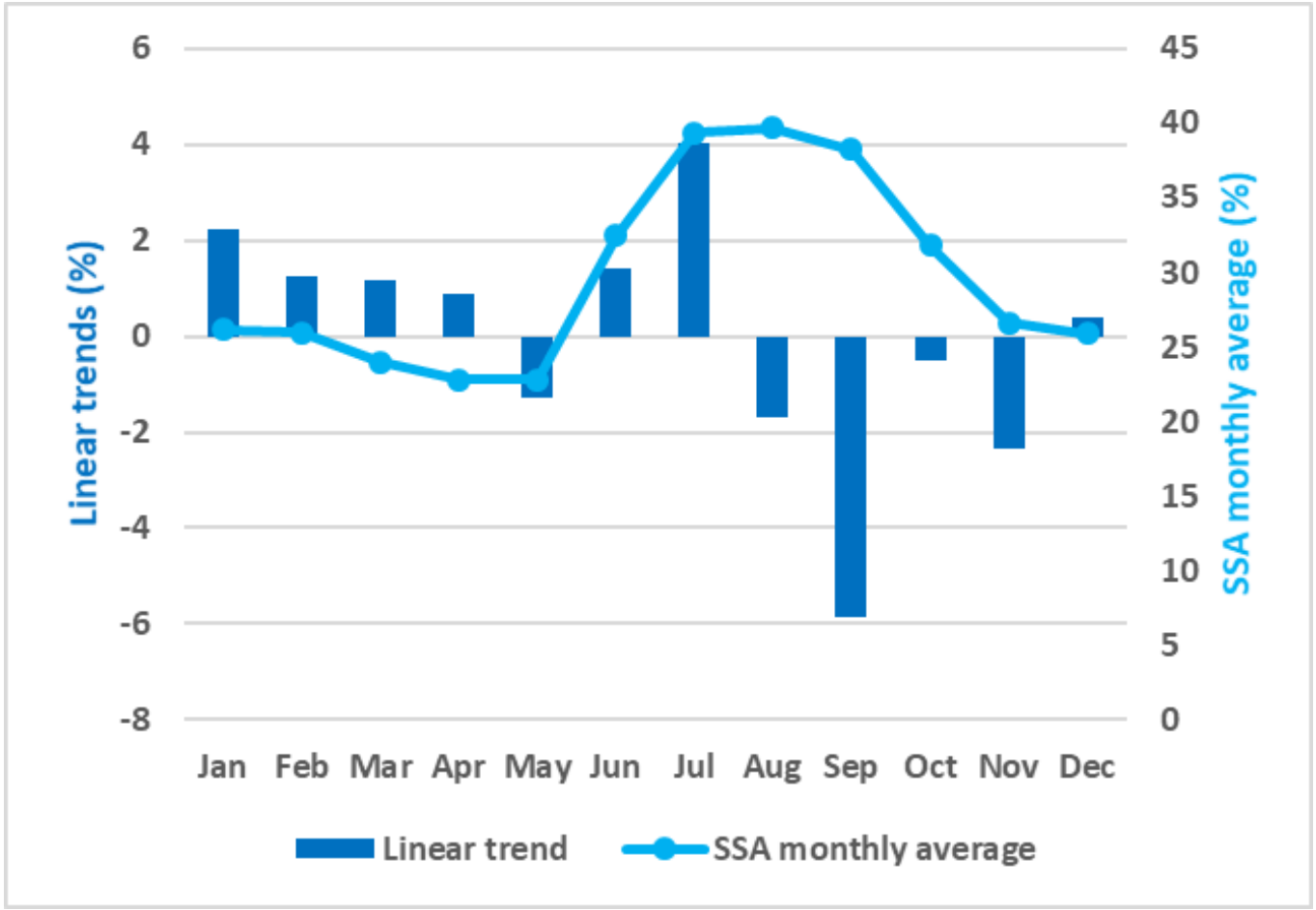
North Patagonia (37°S - 46°S)



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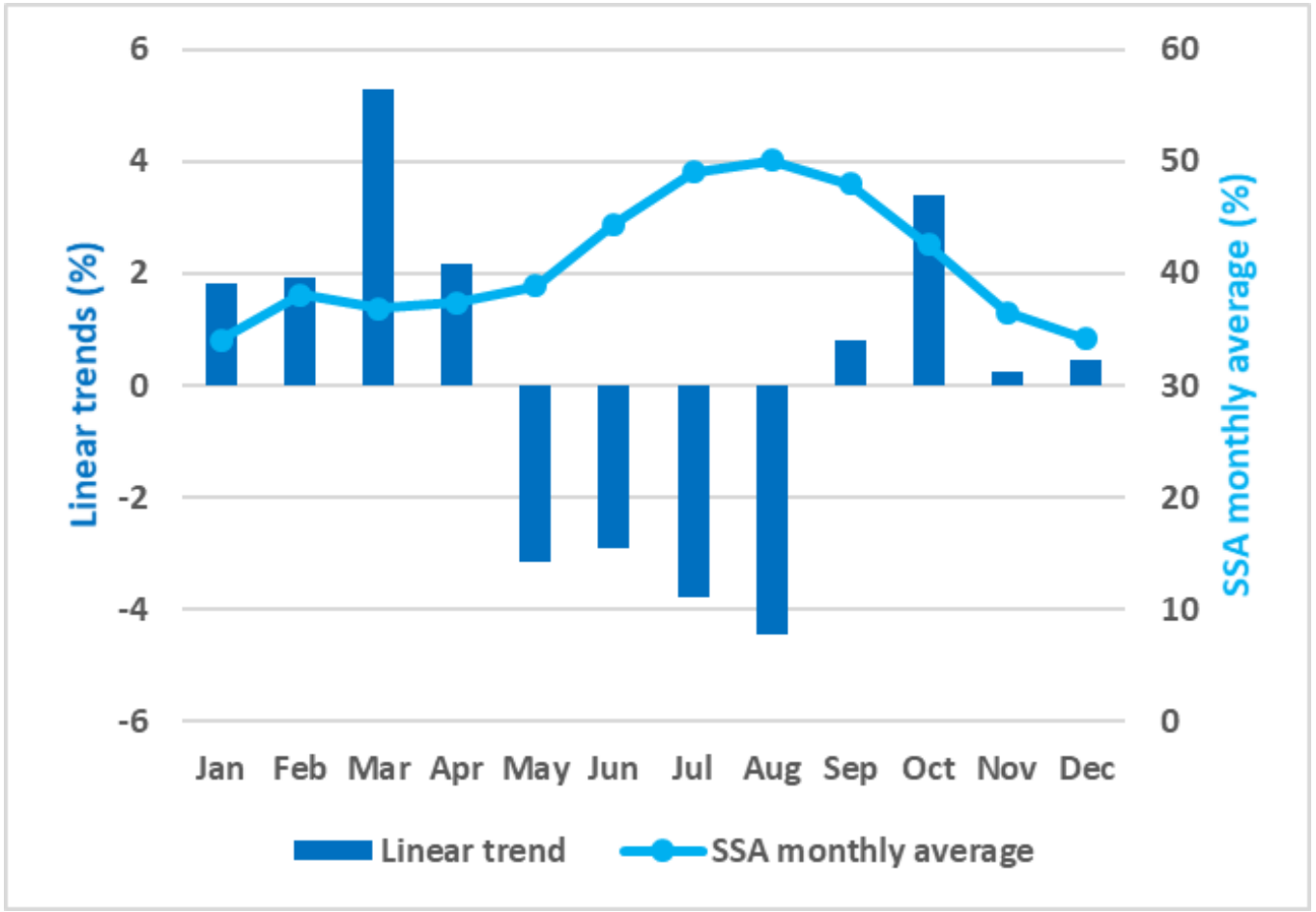
South Patagonia (46°S - 54°S)



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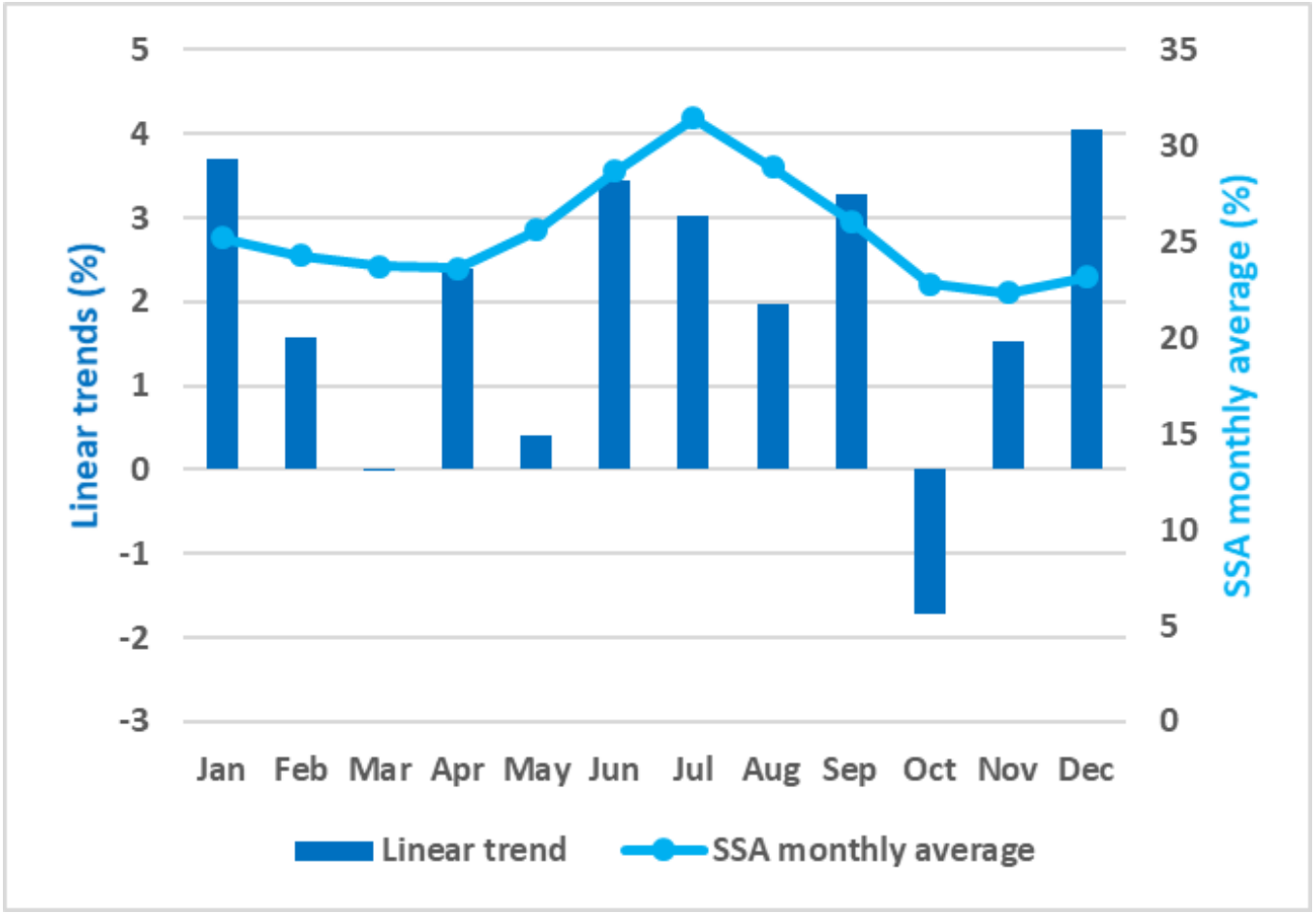

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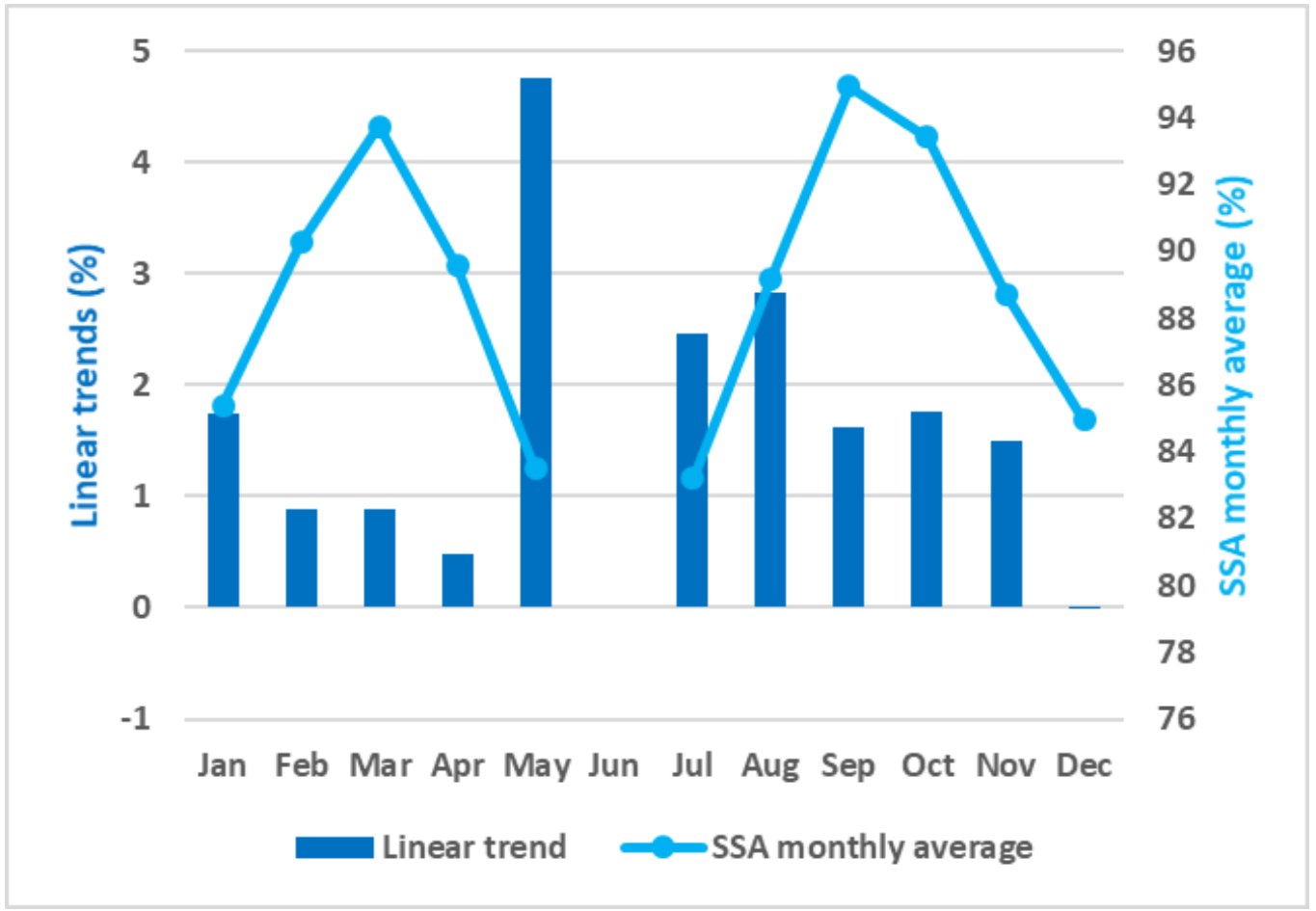

Summary and outlooks

- **The greatest negative trends observed**
- The greatest positive trends observed
- Better understanding of the radiative forcing changes generated in the cryosphere of South America and Antarctandes

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The greatest negative trends were observed in:

Central Andes (April, -5.76%; $p < 0.001$)

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Acknowledgment

- The National Agency of Scientific and Technological Promotion (ANPCyT) under project PICT 2016 1115. Argentina

- ANID FONDEF: ID19I10359 project from Ministerio de Ciencia, Tecnología, Conocimiento e Innovación. Chile

Thank you very much for watching this presentation

Any question or suggestion:

tomas.bolano@frm.utn.edu.ar

Furthermore, we see you again in live virtual presentation:

Session date and time: Monday, 7 December 2020; 20:30 - 21:30 PST

Session number and title: C008: Remote Sensing of the Cryosphere: Seasonal Snow II

Las Cuevas, Mendoza, Argentina
August 2019