Global Cryosphere Watch (GCW)
1st CryoNet South America Workshop

Cryoshere investigations in South America: Brazilian perspectives and contributions for Andes and Amazonia conexions research

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Brazil carries out studies in the Andean Cordillera glaciers, mainly in Bolivia.

Variations in galciers using satellite images and aerial photographs:

- Cordillera Qimsa Cruz (Tres Cruces)
- Cordillera Apolobamba – Nevado Cololo
- Cordillera Real – Nevado Illimani

We have used ice core data from the Nevado Illimani to check connections between the forest and the snow precipitation in this mountain; in this region they are just 300 km apart.


Beni
Cordillera Apolobamba
La Paz
Puno
Nevado Illimani
Cordillera Tres Cruces
Cochabamba
US Dept of State Geographer
© 2014 Mapcity
Image Landsat
Google earth
Data das imagens: 4/9/2013 15°56'43.65"S 67°33'41.41"O elev 1554 m altitude do ponto de visão 488.62 km

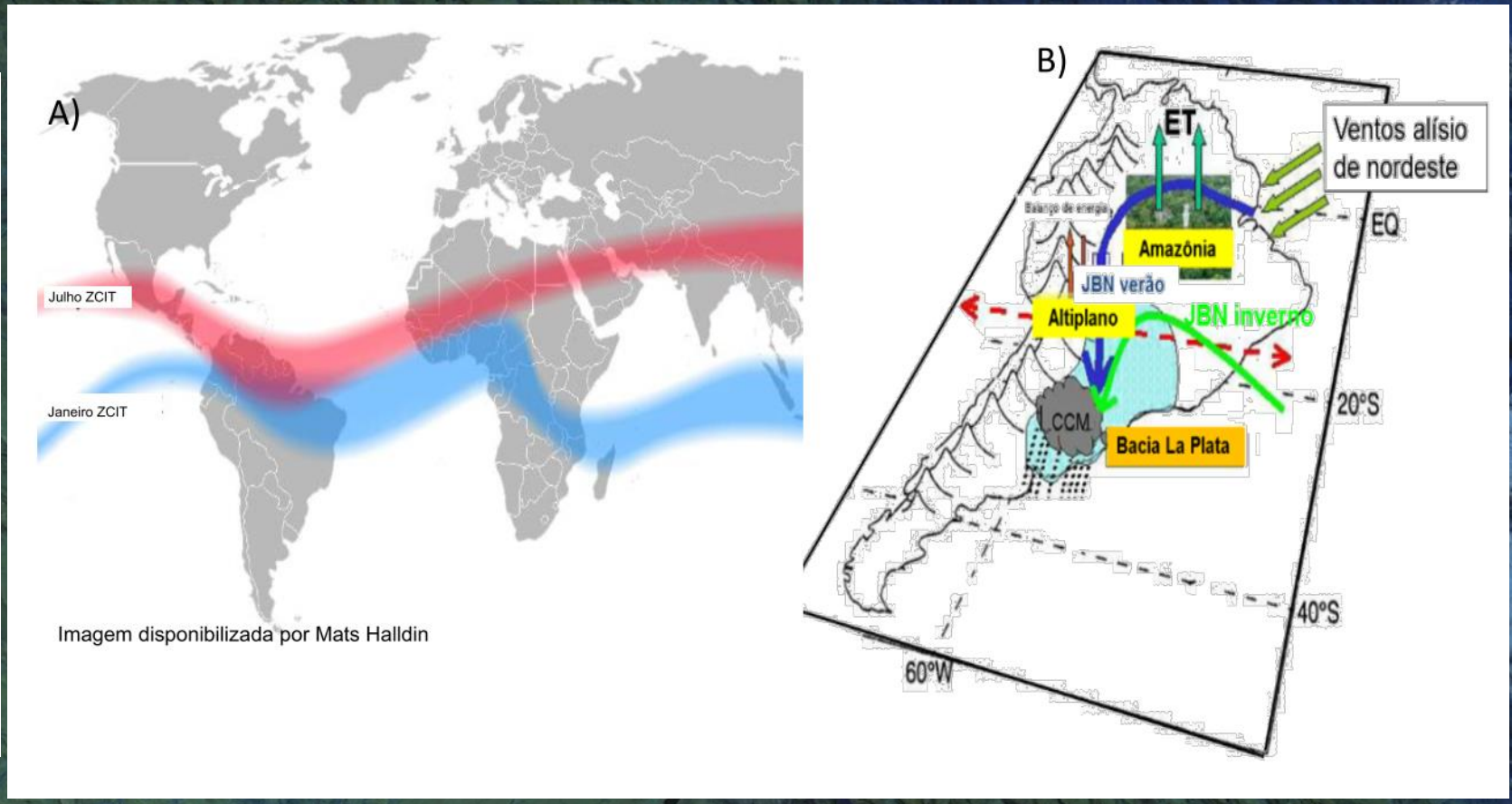

Figura 8: Sazonalidade da Zona de Convergência Intertropical (A) e a atuação dos jatos de baixos níveis (B), no verão (linha azul) e no inverno (linha verde) e suas interações com o processo de Evapotranspiração (ET) na Amazônia, os Complexos Convectivos de Mesoescala (CCM) e os Jatos de Baixos Níveis (JBN). Fonte: Marengo *et al.* (2004).

"A variabilidade do atlântico norte exerce controle na recarga hídrica no leste da região equatorial, consequentemente, influencia no fracionamento isotópico preservado no nevado Illimani."
(Maier et al. 2013)

Ribeiro et al., 2014.

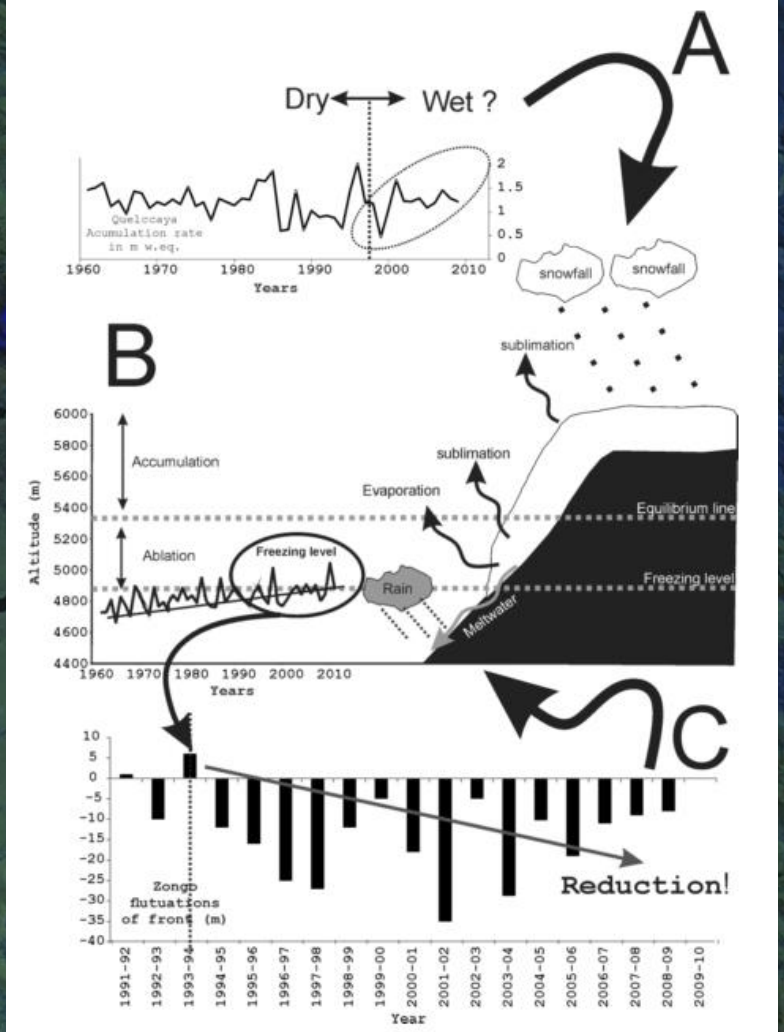

Figure 9 – A theoretical model for the present condition of Bolivian glaciers. (A) Quelccaya ice cap accumulation rates show that in late 1990s started a wet period (increased net accumulation). The figure highlights the trend since the early 2000s. In (B) the graph left corner shows the rising *freezing levels* trend (i.e., 0°C annual isotherm altitude rise) in the Cordillera Real (where is located the Nevado Illimani) since late 1990s. In (C) the retreat of the Zongo Glacier front from early 1990s to the present day.

- At the moment, a precititation-sampling network is being established over the Amazon basin to study stable isotopes fractionation from the source area (the Atlantic ocean), along the Amazonas and Madeira river , to the Bolivian territory and then to the glaciers of eastern Andes.

- THIS STUDY ALSO AIMS TO COLLECT A SHALLOW ICE CORE TO DETERMINE VARIATIONS IN THE STABLE ISOTOPE RATIOS OVER THE PAST 40 YEARS.

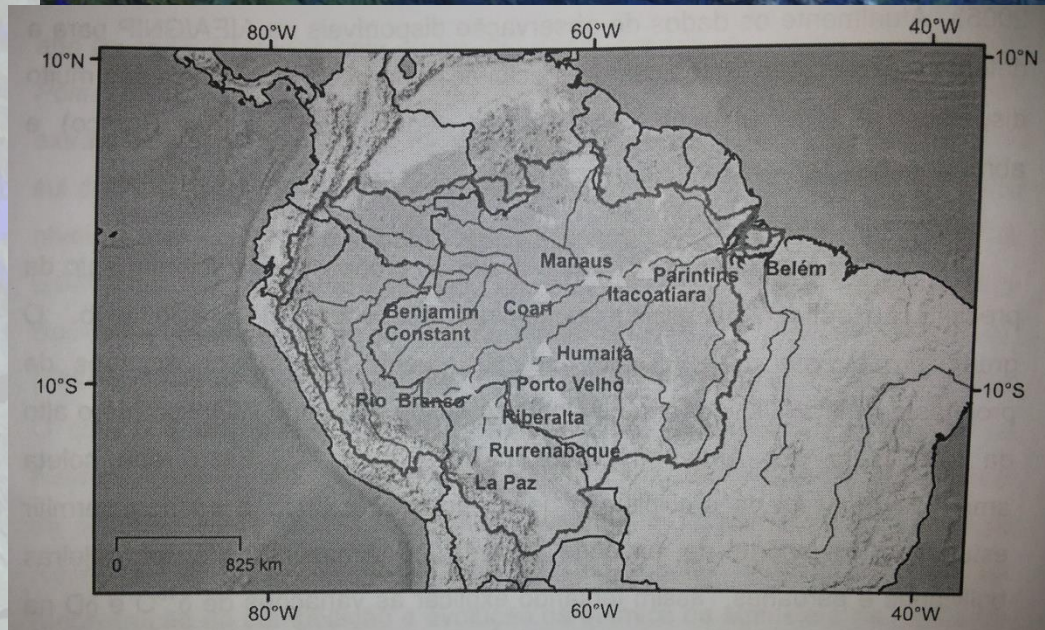

Figura 1 – Localização da rede de amostragem de precipitação para determinação da razão de isótopos estáveis na bacia amazônica (triângulos amarelos) em operação desde julho de 2013.

- These work are coordinated by CPC at UFRGS, led by profesor **Jefferson Cardia Simões** and Dr. **Rafael da Rocha Ribeiro** and the IHH/UMSA, by Dr. **Edson Ramirez**.

- The CPC also maintains collaboration with the **Laboratoire de Glaciologie et Géophysique de l'Environnement du CNRS**, Grenoble /FR, and the **Climate Change Institute**, University of Maine, Orono –/USA, to extend these investigations to the central Andes.

- Glaciological investigations have been carried out for two decades in Antartica, especially in the Antartic Peninsula and more recently on the West Antartica ice sheet, were we have a lobaratory for atmosferic chemistry monitoring (**Criosfera 1**, 84°S, 79.5°W).

Muchas Gracias!

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