Glacier change modelling in the tropics

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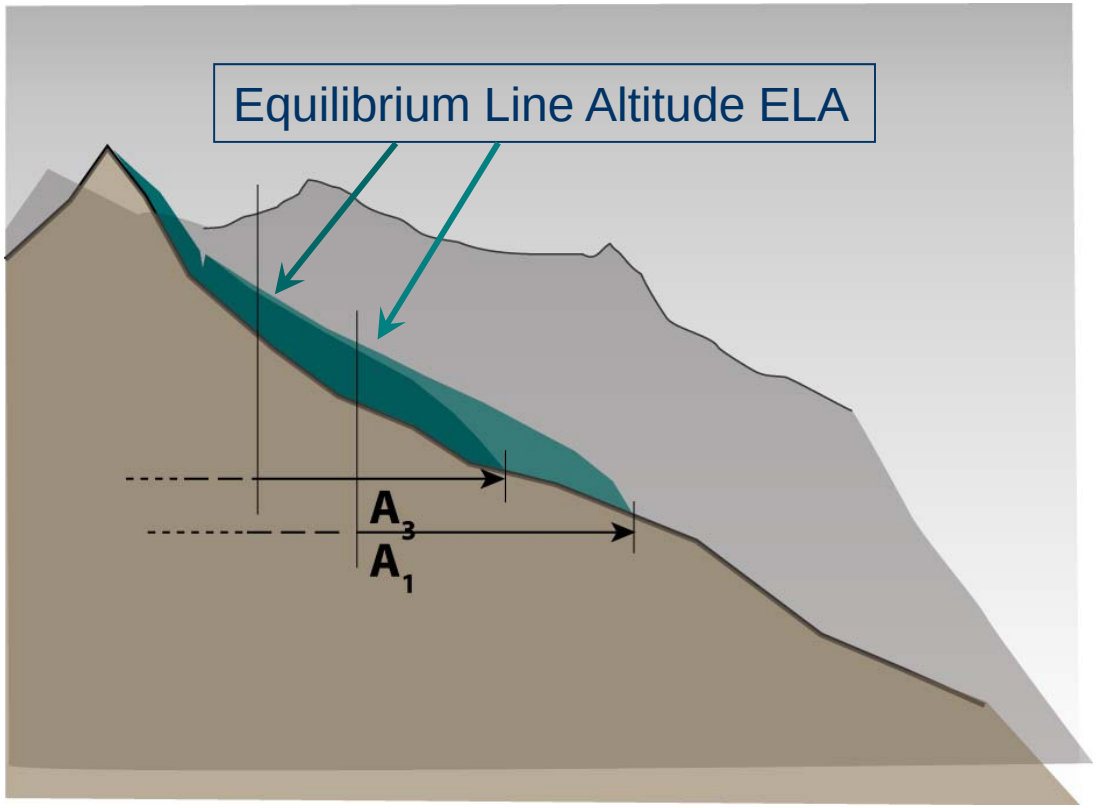
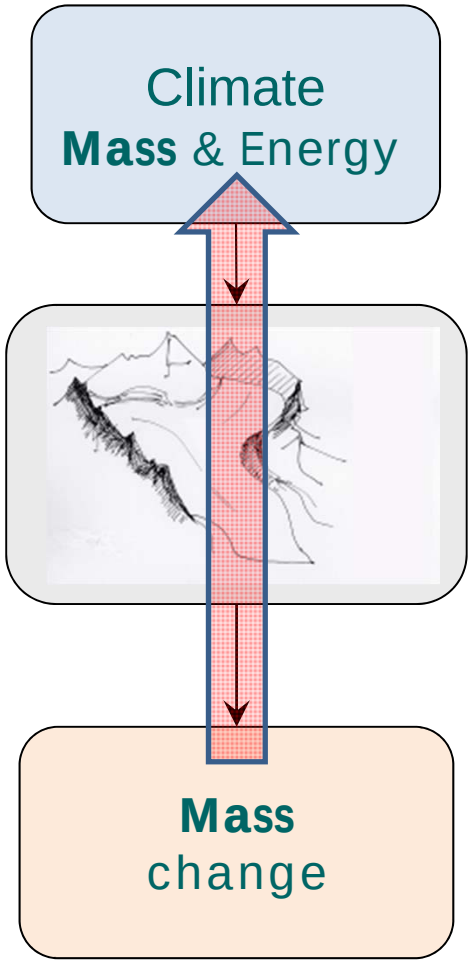
http://www.imaggeo.net/view/142

Climate → glacier





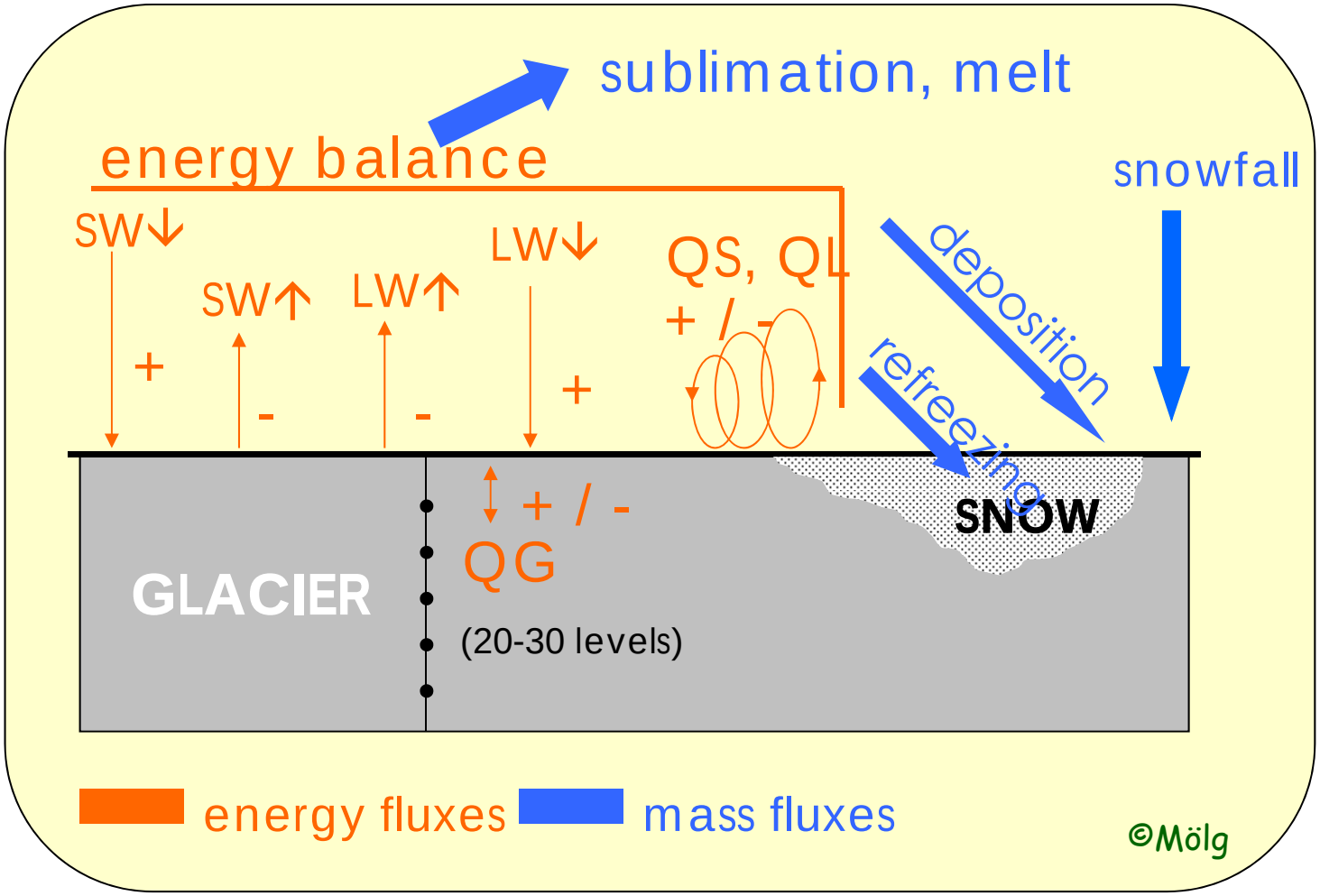
Glaciers are …

… machines that turn weather into climate signals

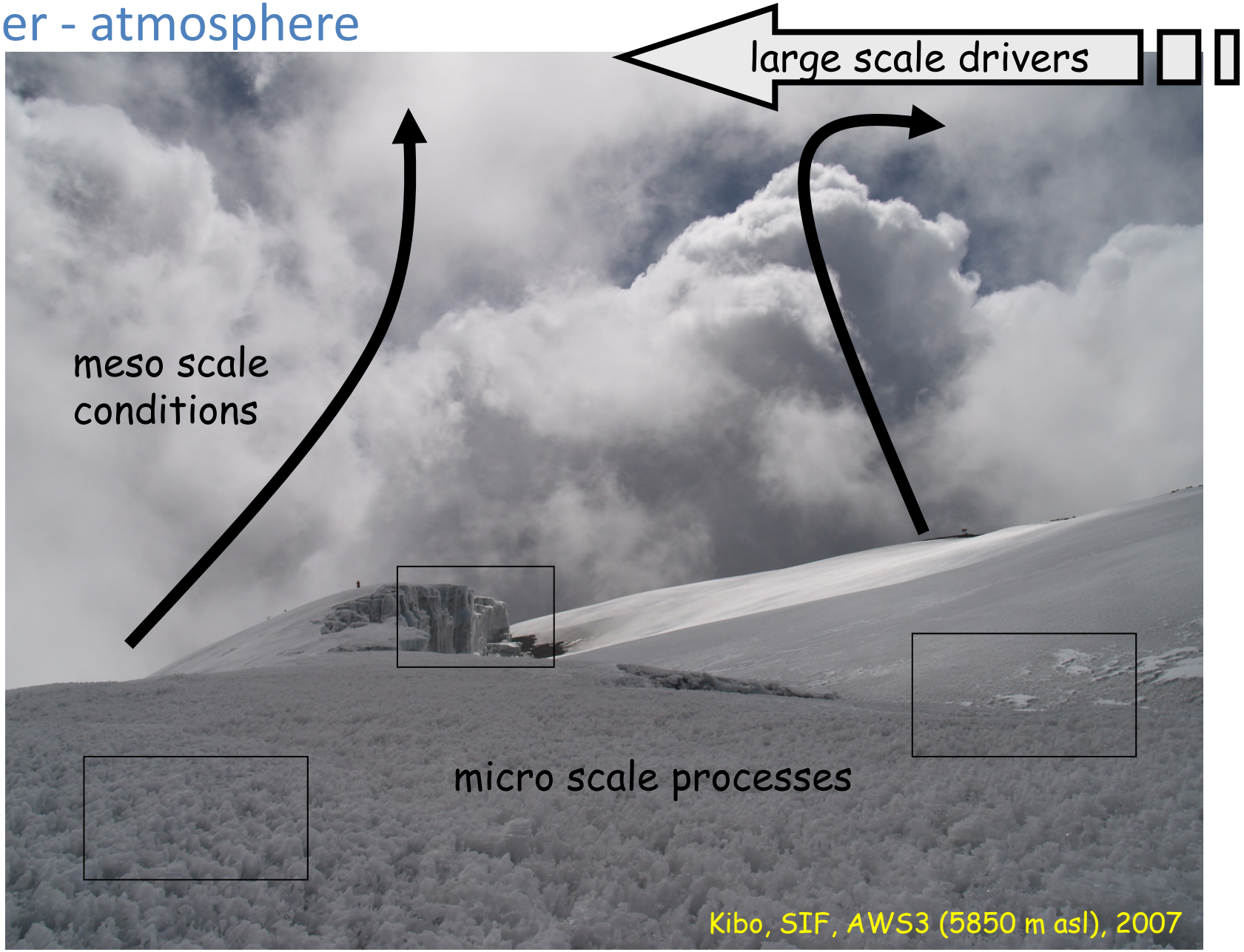
… low pass filters, „but these filters come without a manual“

B. Marzeion (Marzeion et al, TC 2012)

Climate | Glacier: processes

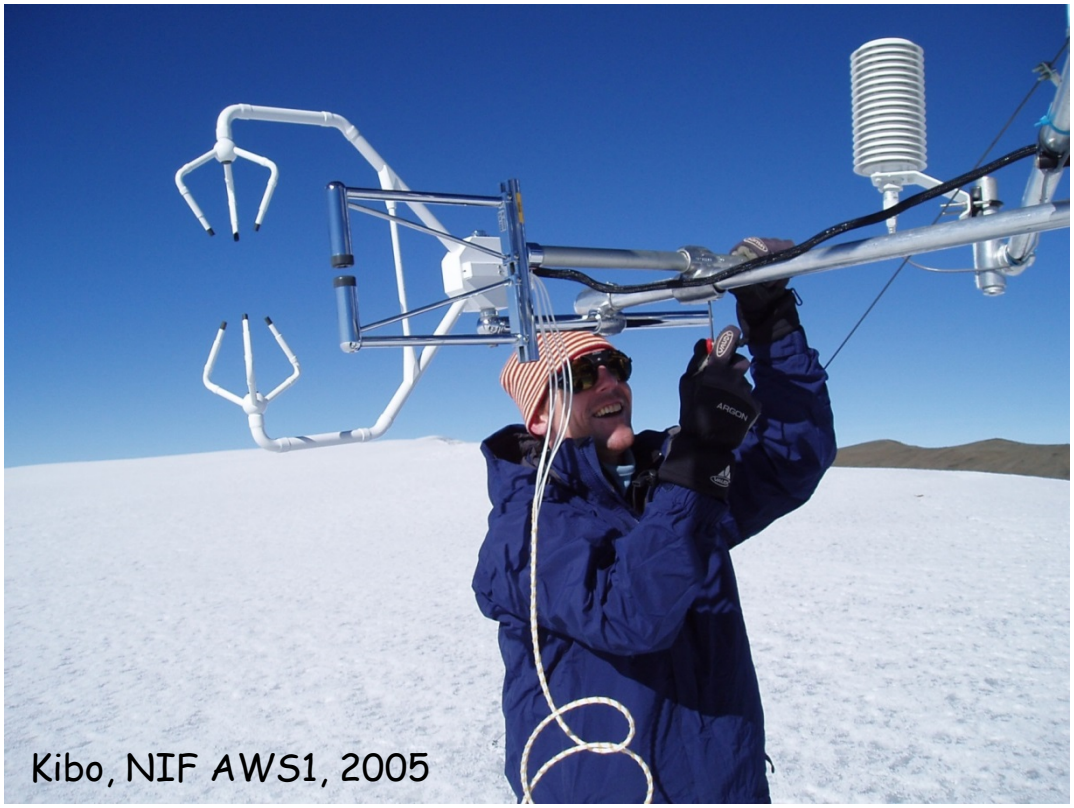


Glacier - atmosphere



Kibo

Glacier - atmosphere



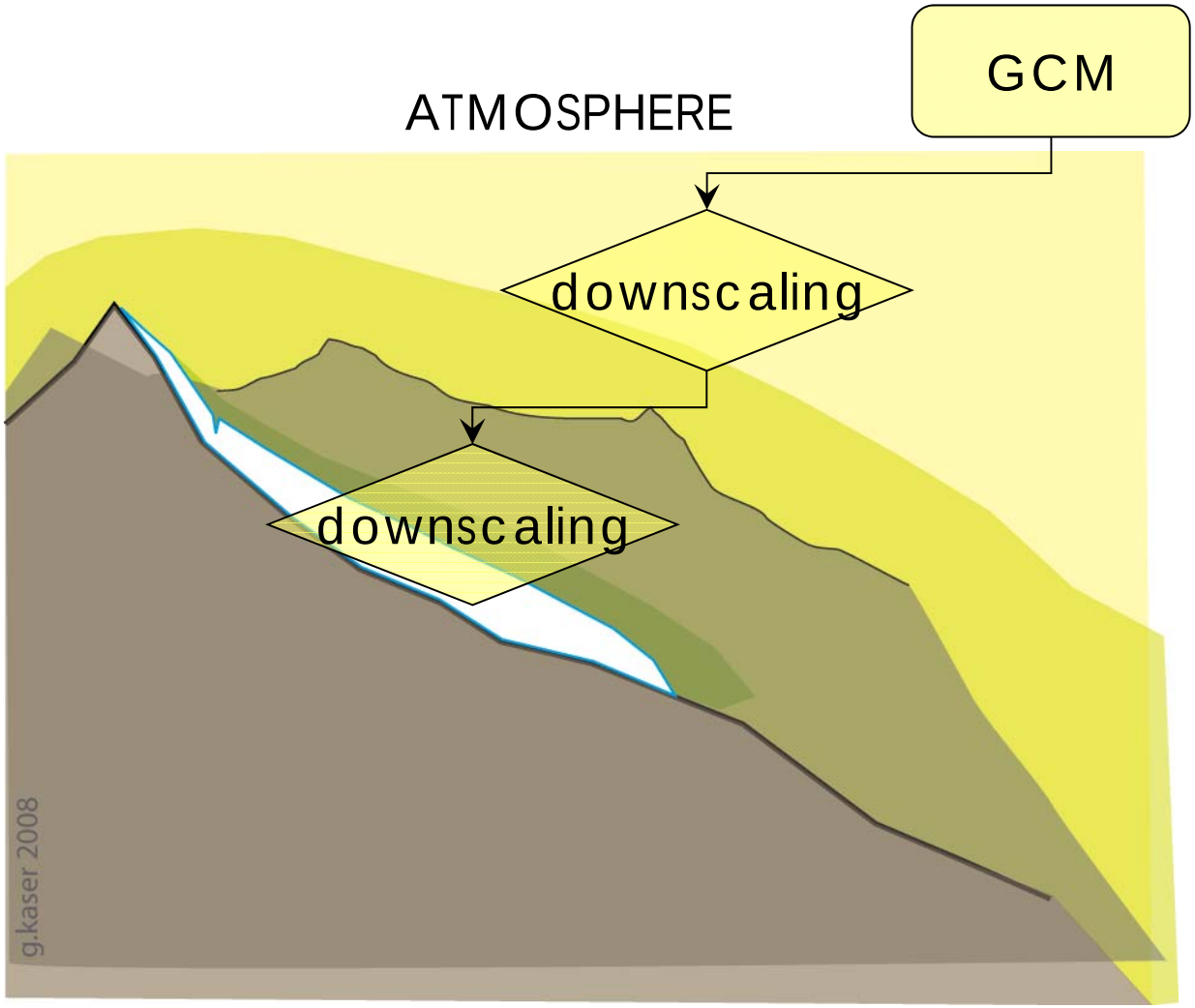
26–29 July 2005

Modelled turbulent fluxes (bulk method) compared well to eddy covariance data.

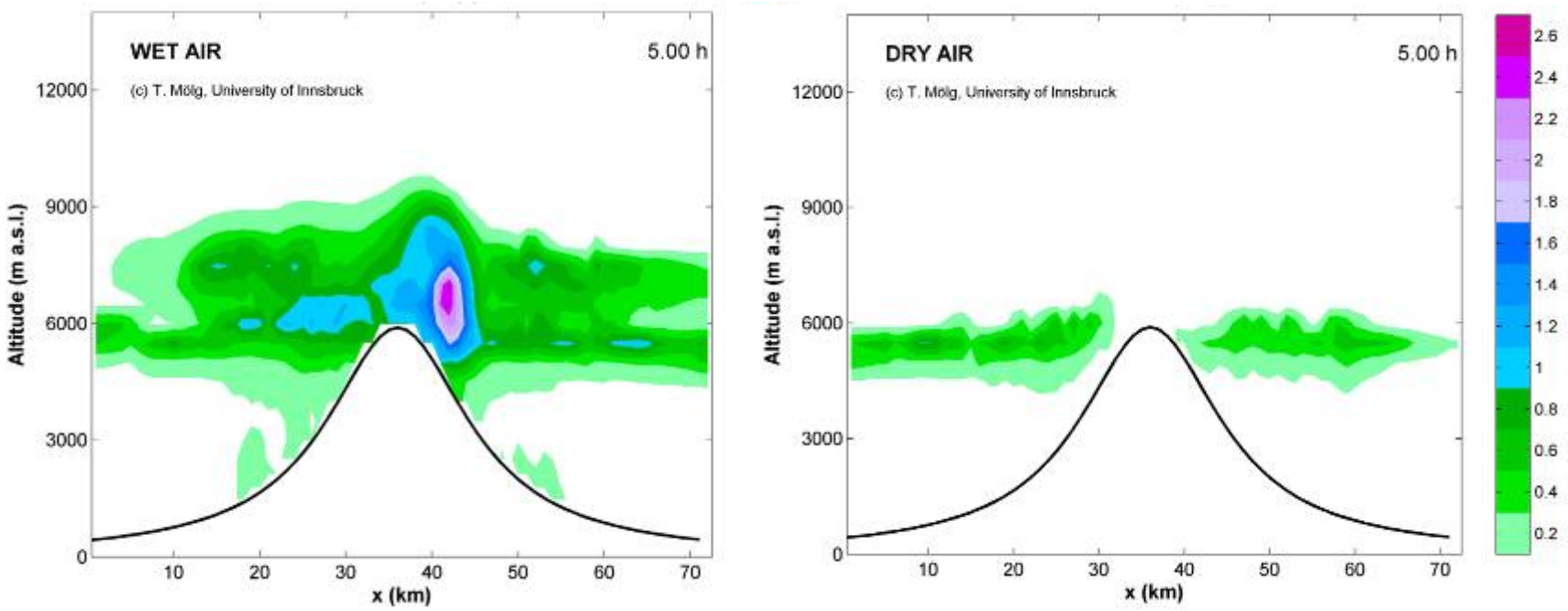
Modelled **sublimation** accounted for about **90%** of observed ablation

Cullen et al, **AnnGlac** (2007)

Glacier - Atmosphere



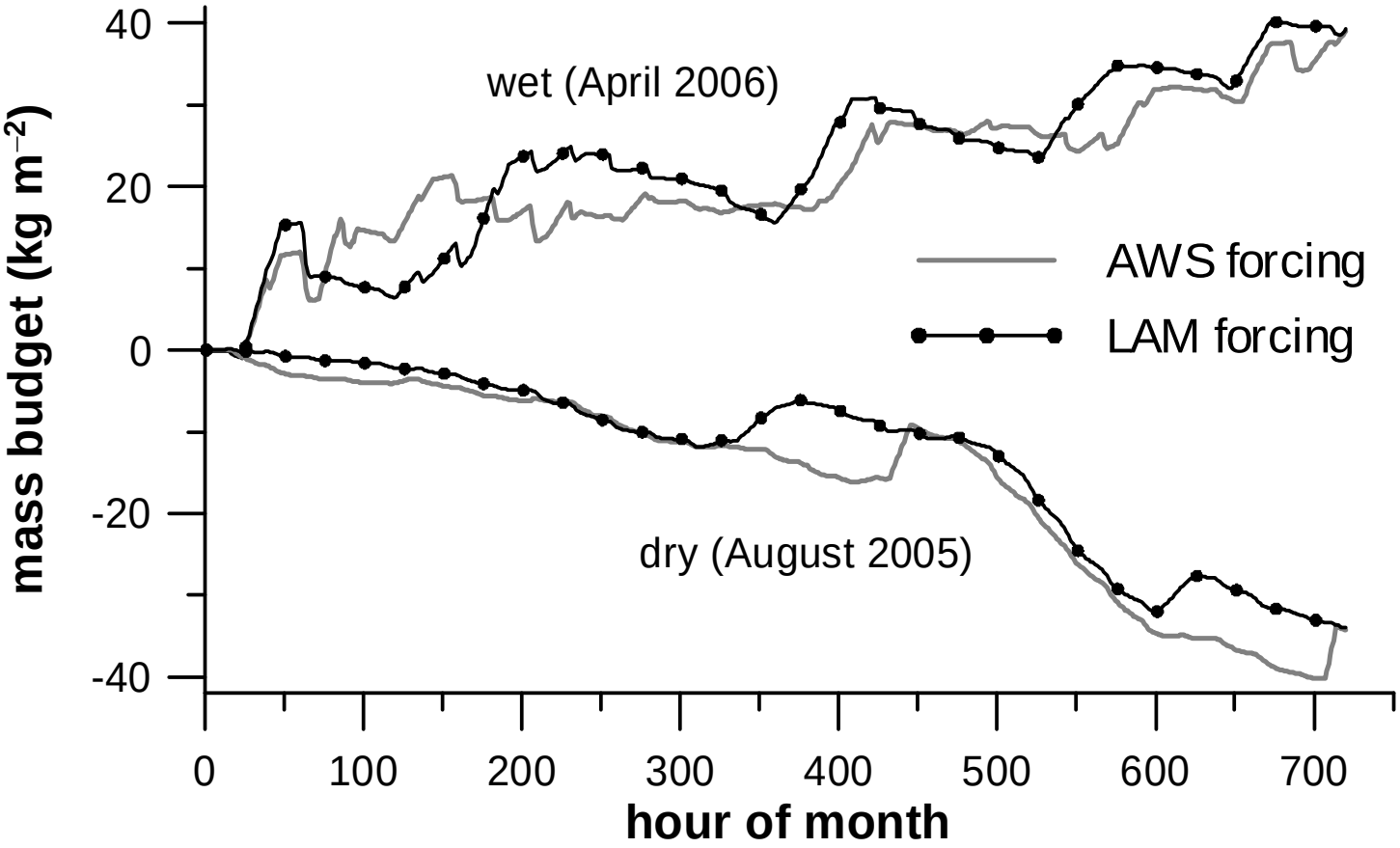
Regional circulation



Mölg et al., **QJRMS** *(2009)*

Cloud mixing ratio with (left) WET and (right) DRY forcing

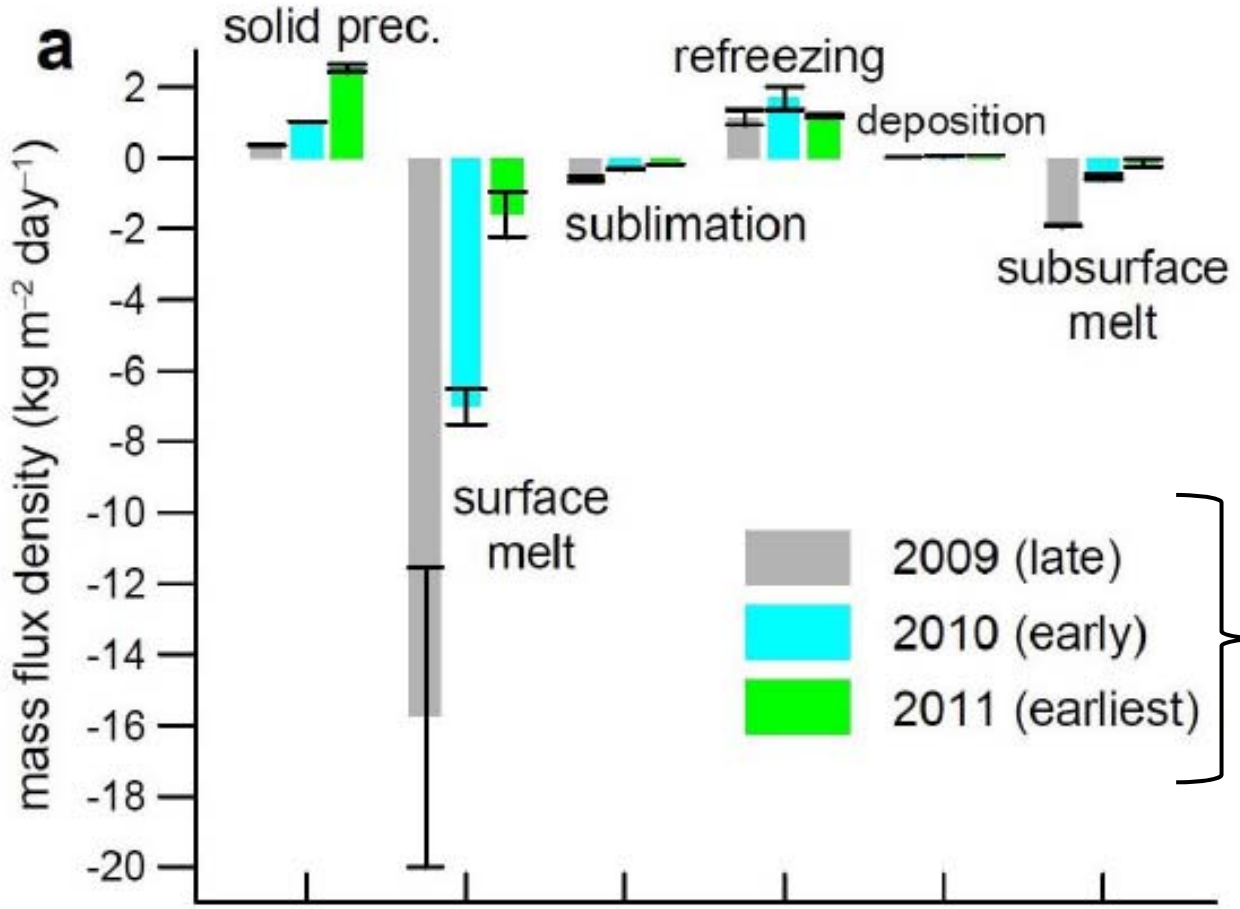
Dynamical „downscaling“



Mölg und Kaser **JGR** *(2011)*

Partitioning the contributors to MB

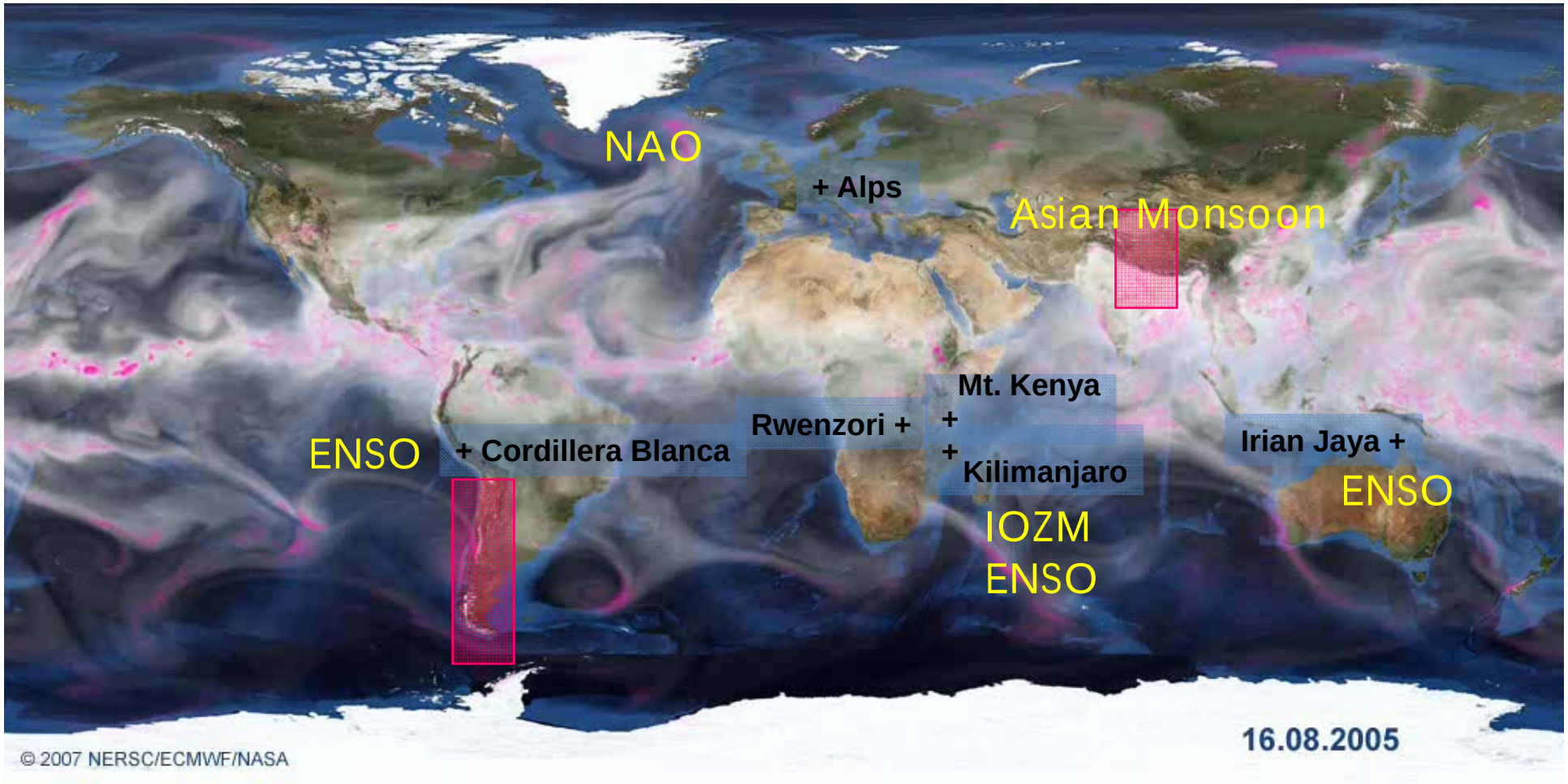
Zhadang Glacier (central Tibet, 30° N)



Mölg et al., **TC** (2012)

Monsoon onset

Glaciers as climate-meters



hygric seasonality – circulation patterns (modes)

Observes sea level rise 1993-2010:
3.2 mm/year

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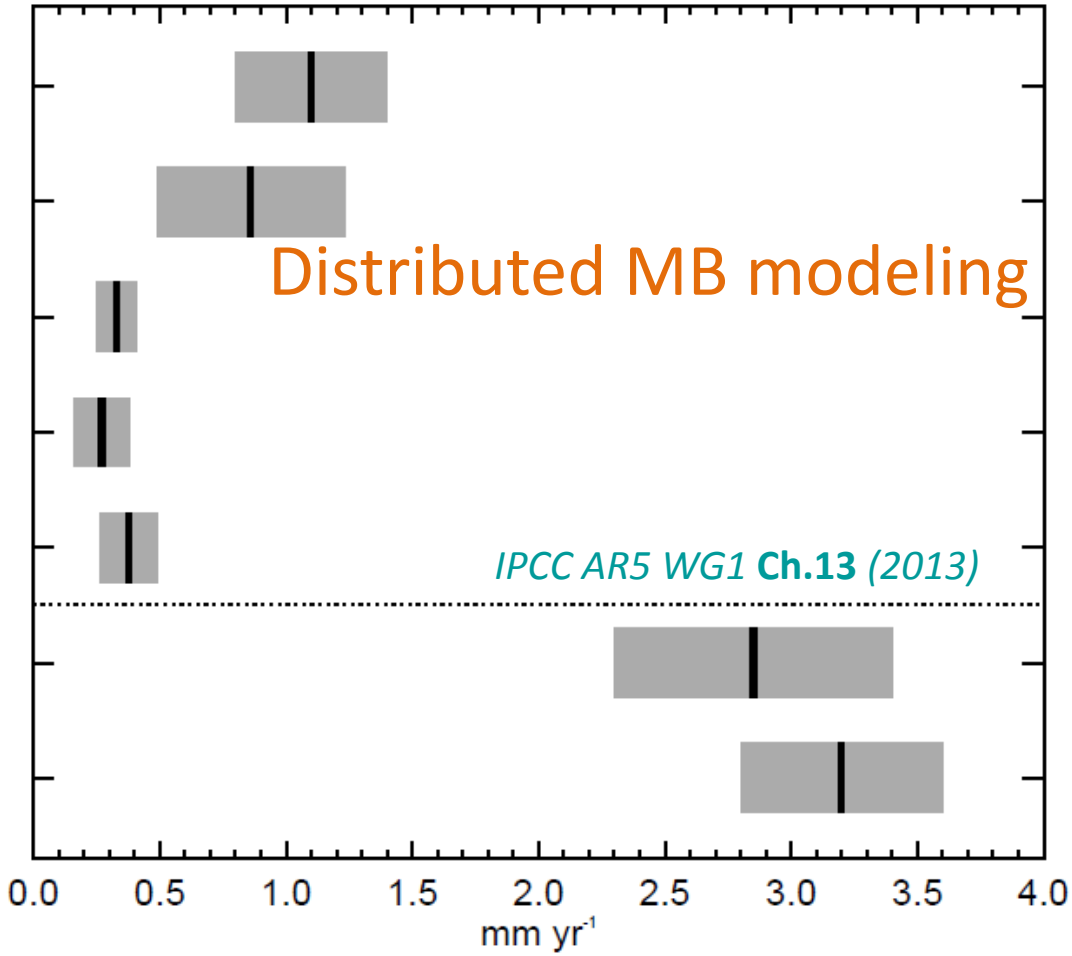
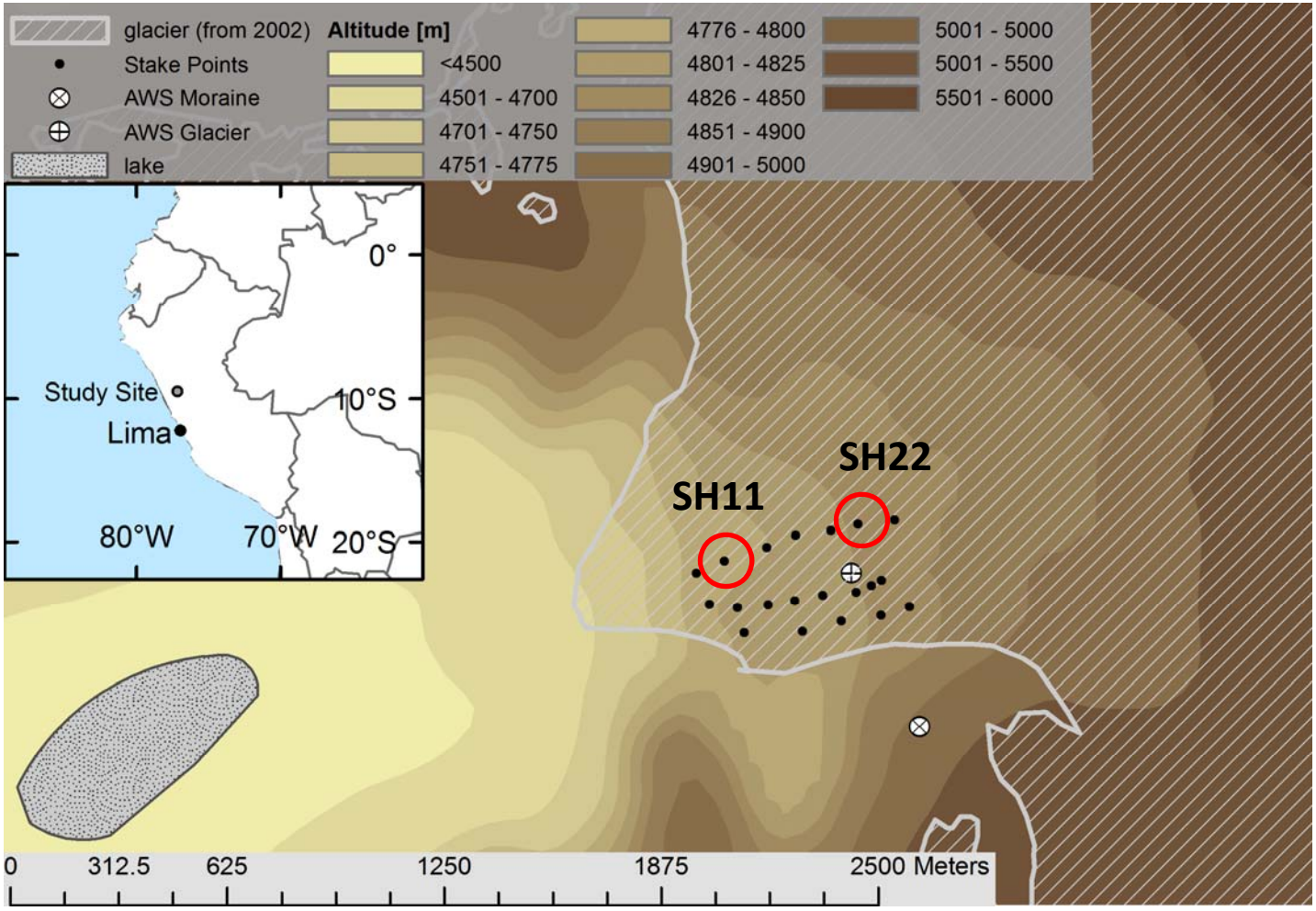
Thermal expansion:		38%
Glaciers:		**28%**
Greenl. Ice Sheet:		10%
Antarct. Ice Sheet:		10%
Land water stor.:		14%
Total :	100%	
Obs. GMSLR:		110%



Glaciar Shallap, Cordillera Blanca

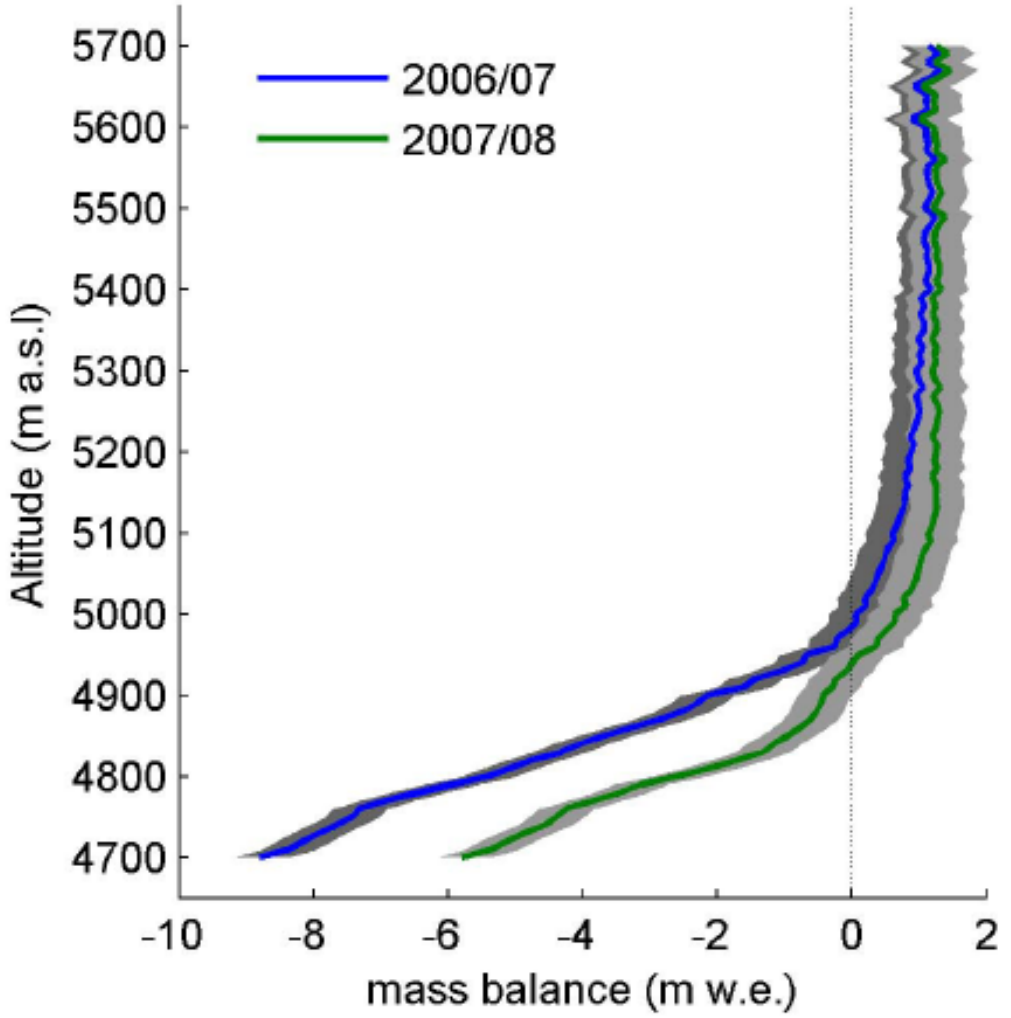


*Gurgiser et al. **TC** (2013)*

Glaciar Shallap

Distributed MB modeling

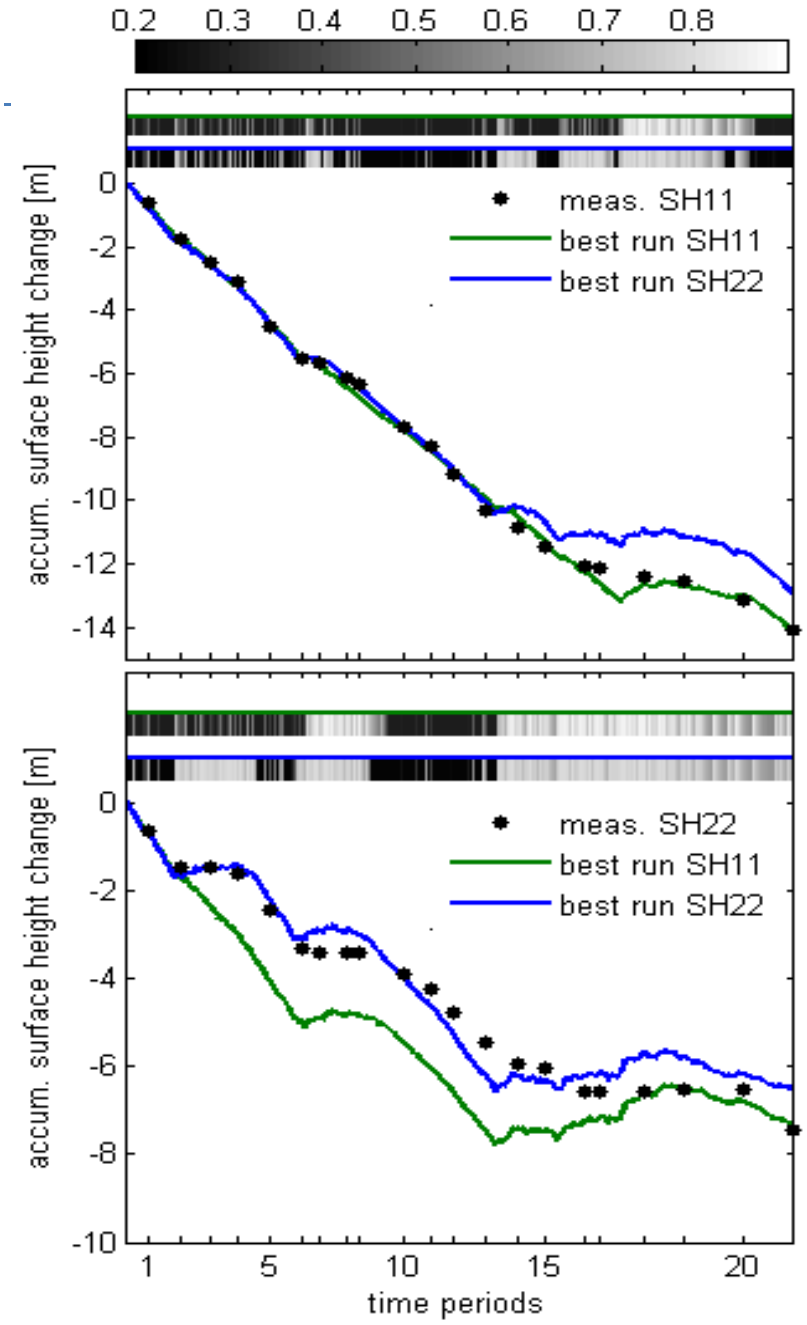
Daily snow fall and disaperance



Gurgiser et al. **TC** 2013

Glaciar Shallap

Point comparison



Gurgiser et al. **JoG** *(2013)*

Back to the „Lab “: Hintereisferner

Fig. 13. Bohren am Hintereisferner.

Blümcke, A. and H. Hess (1899)

1880s

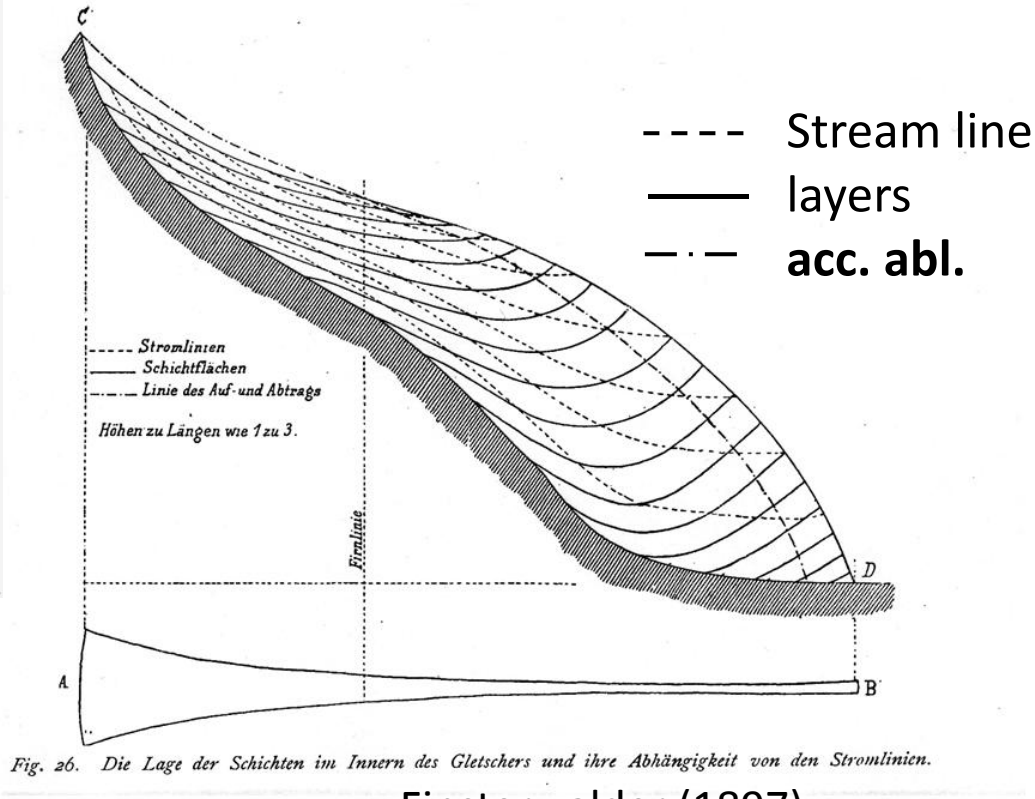


Fig. 26. Die Lage der Schichten im Innern des Gletschers und ihre Abhängigkeit von den Stromlinien.

Stream lines

layers

acc. abl.

Finsterwalder (1897)

Seasonal mass balance and ENSO

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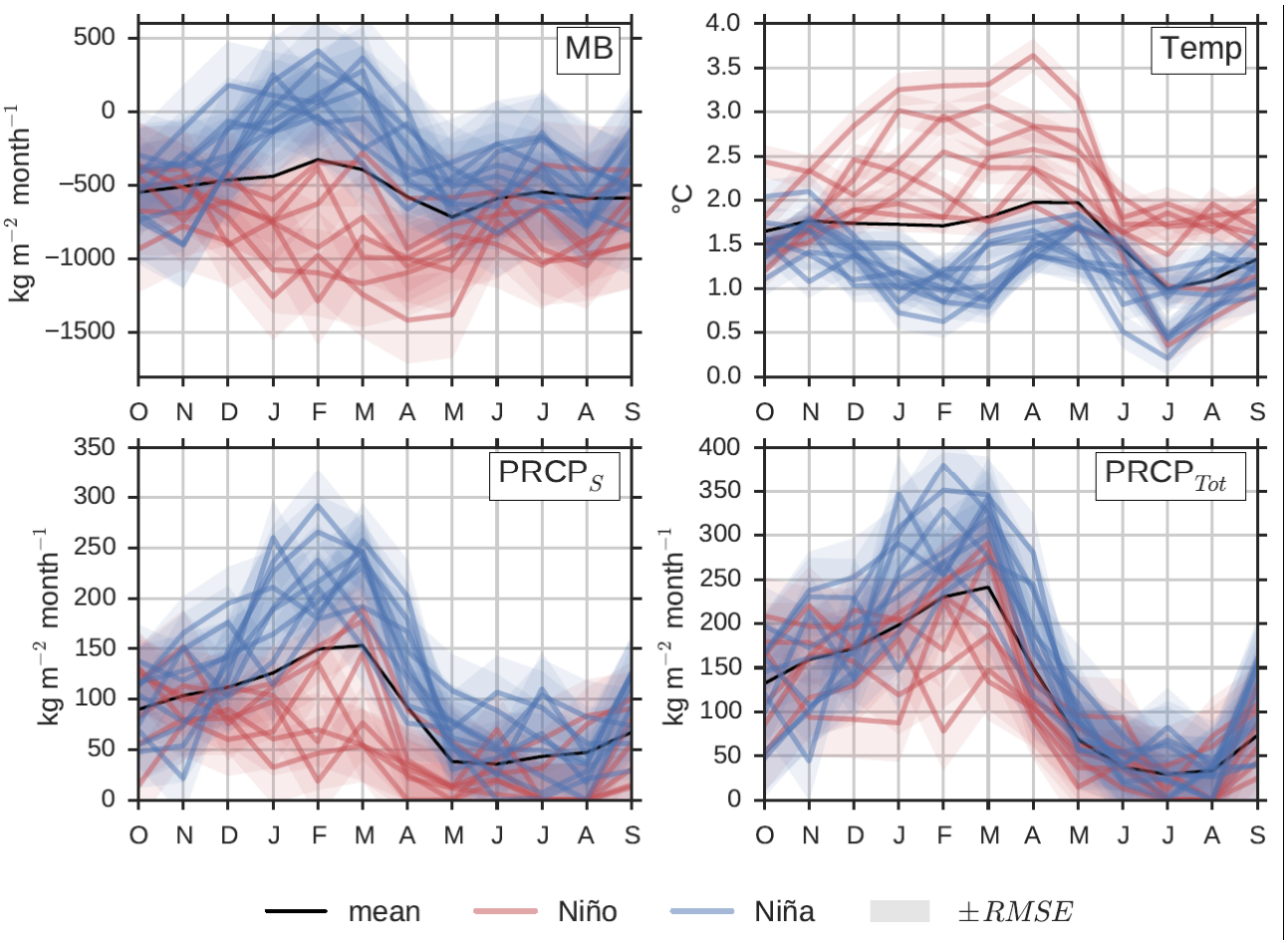
regression-based downscaling model that links the local SEB/SMB fluxes to atmospheric reanalysis variables on a monthly basis



Maussion et al. TCD (2015)