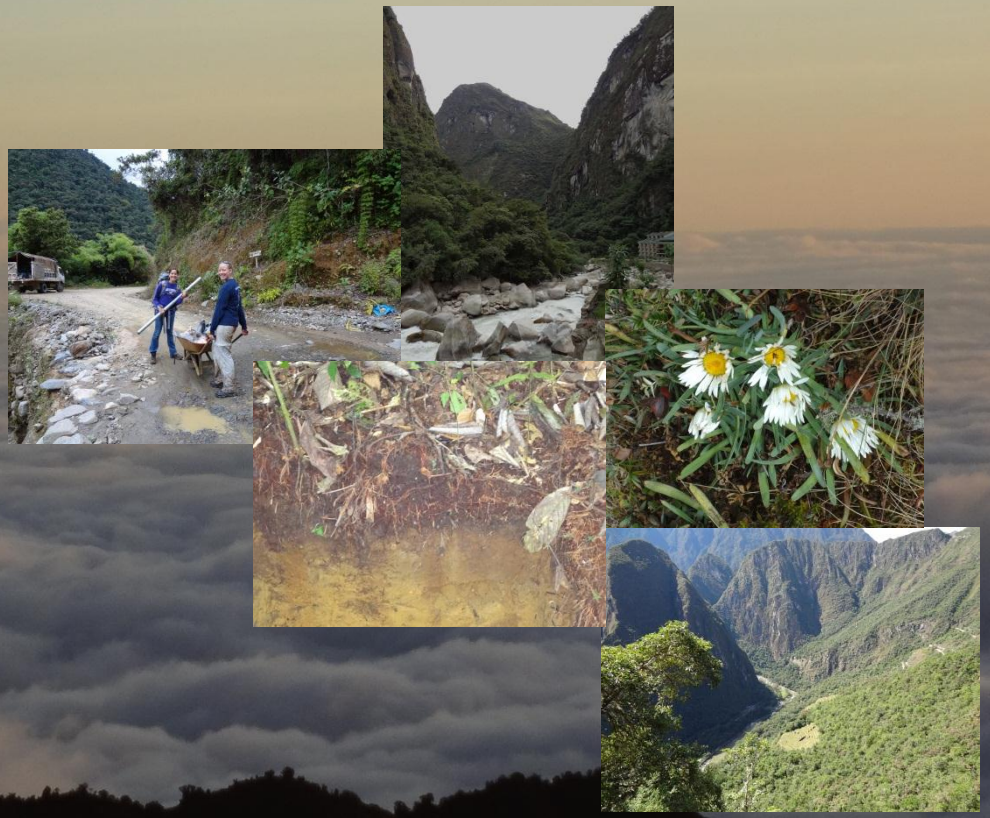
Topic 1

Multiscale Co-Organization of Atmospheric and Terrestrial Moisture Fluxes in Mountain Landscapes

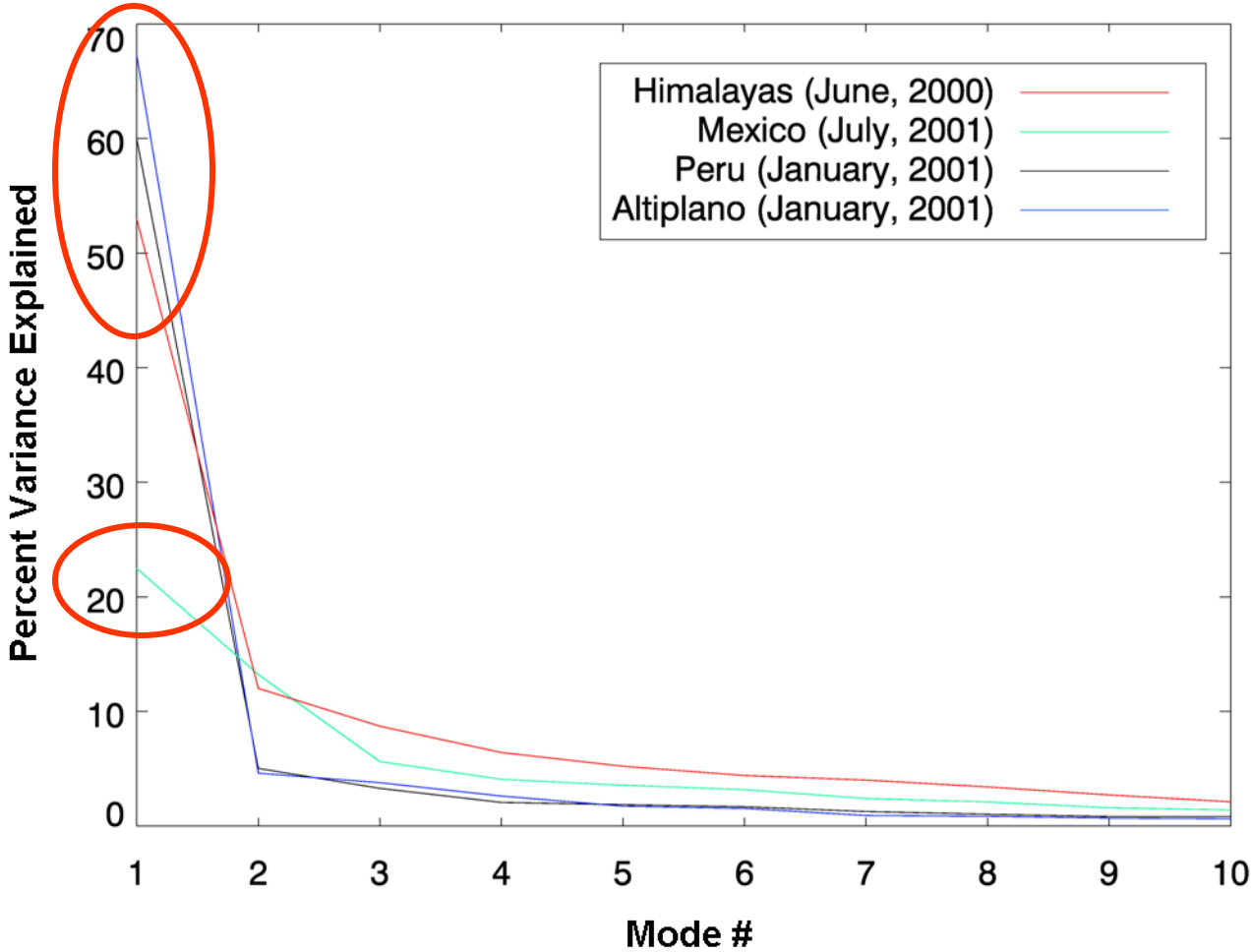


Ana P. Barros

DOE Water Cycle Workshop Sept 24-26 , 2012

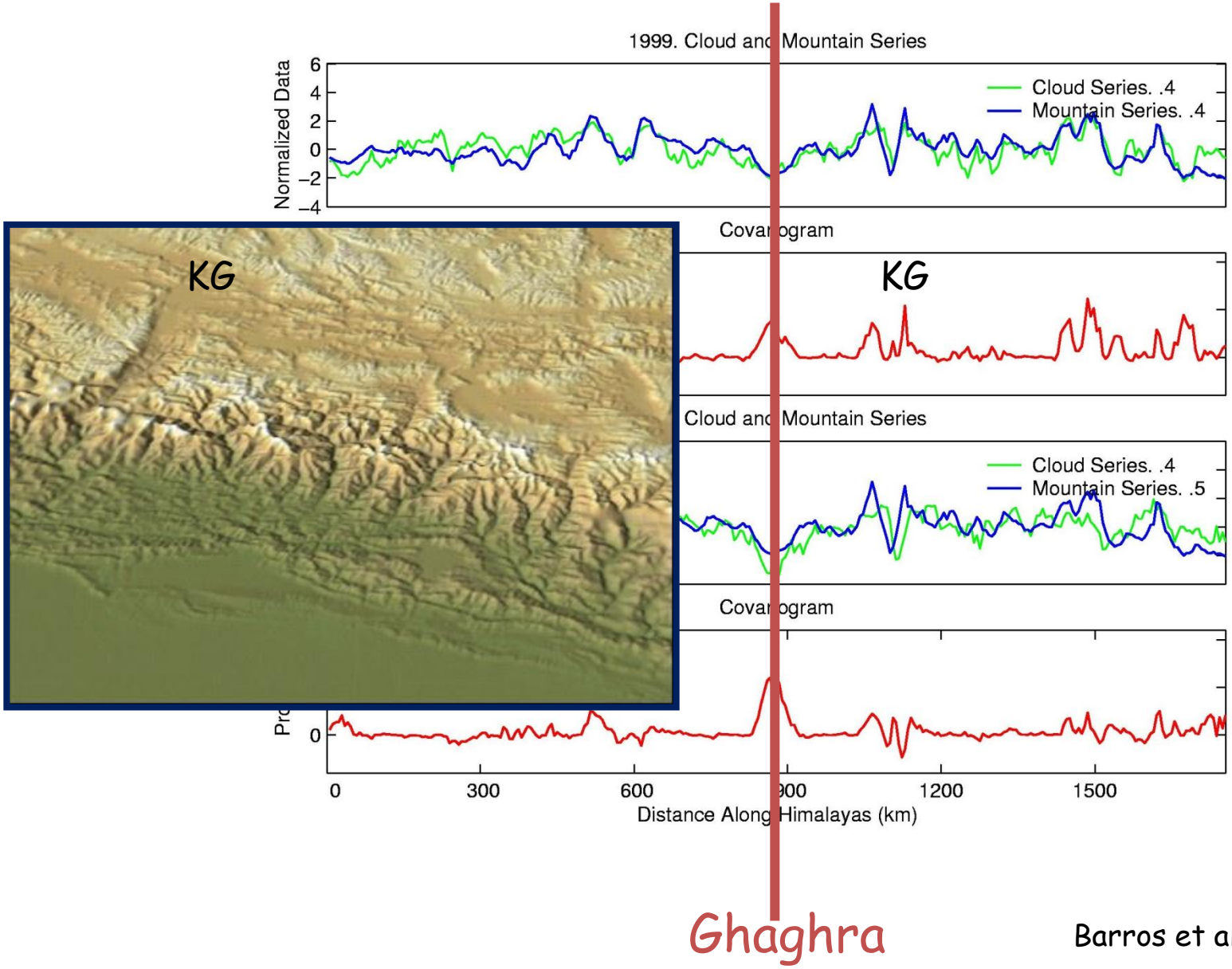
From Clouds to Precipitation to River Networks

1st Principal Component of Cloudiness (IR Brightness)



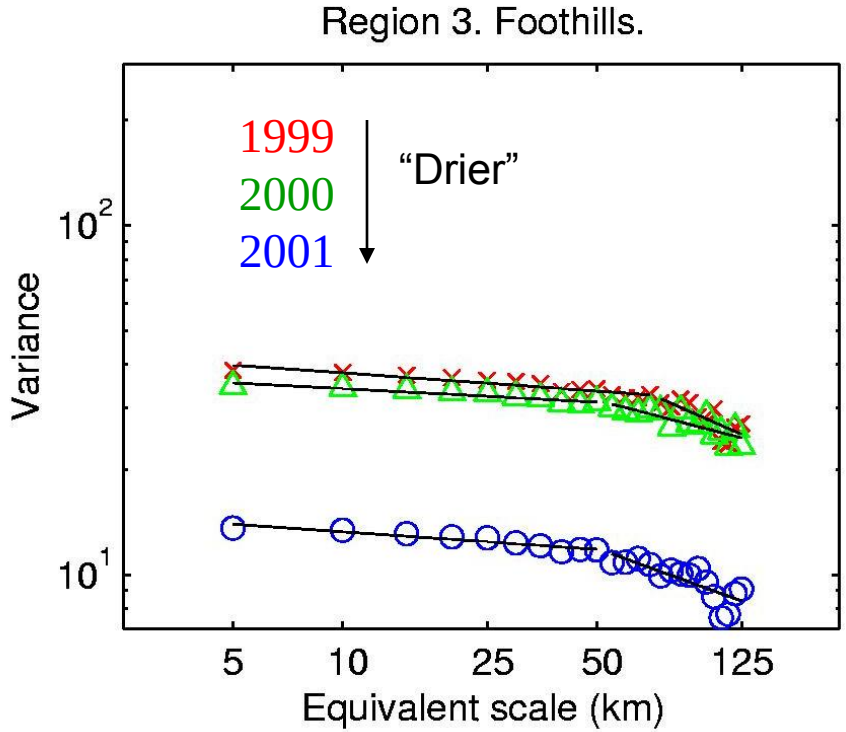
Giovannetone and Barros 2008 and 2009

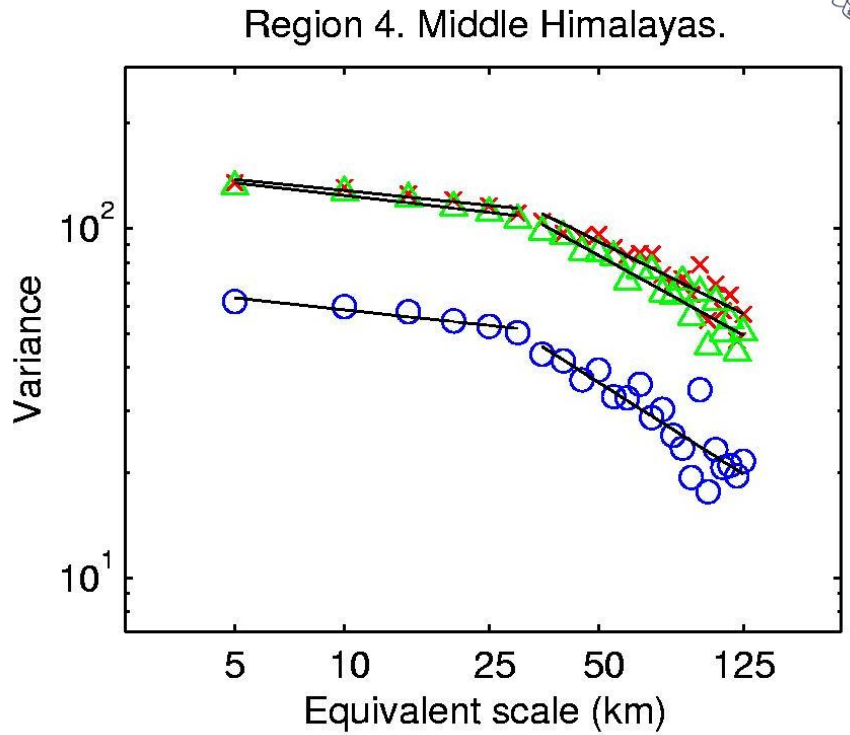
South Asian Monsoon Cloudiness Climatology

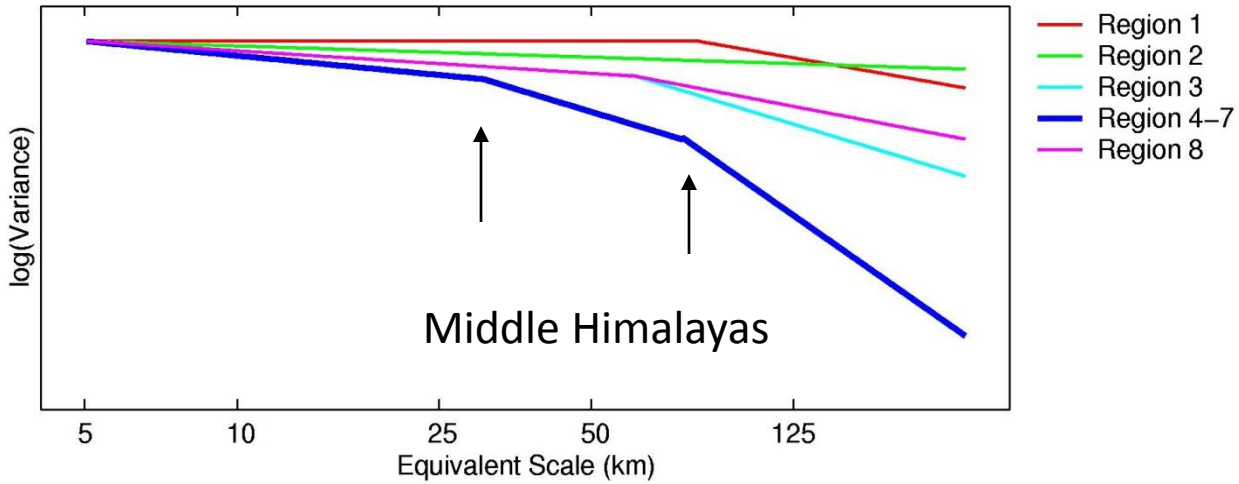


Barros et al. 2004

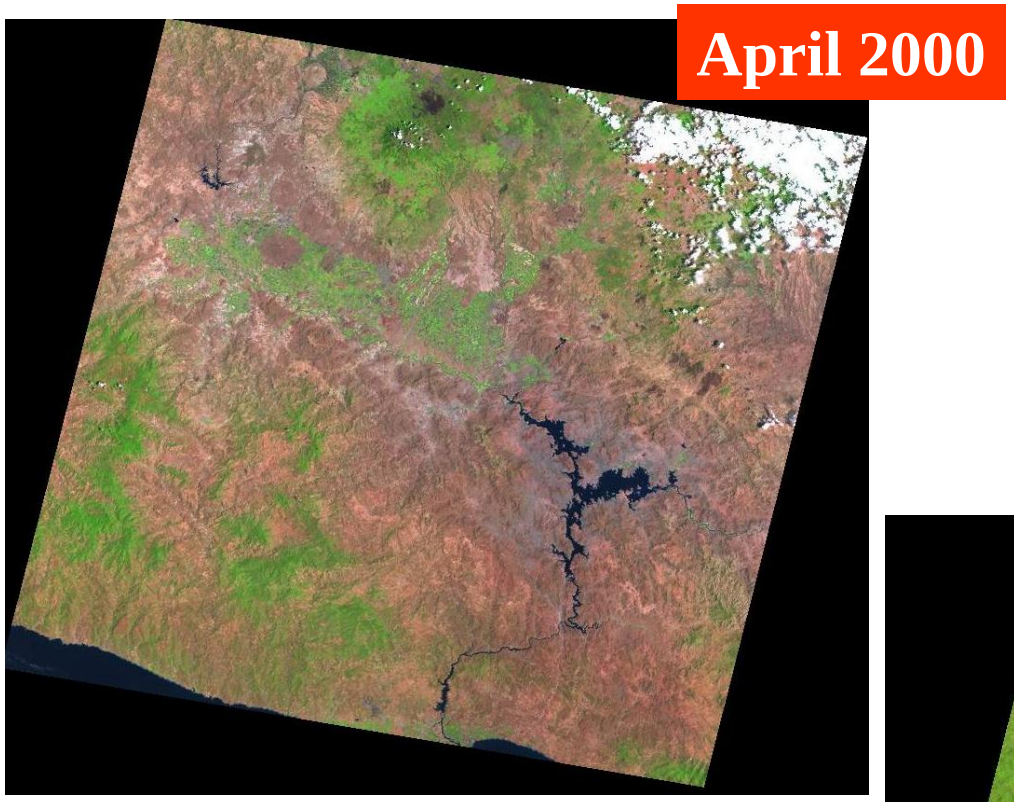
Scaling Behavior of Cloud Fields



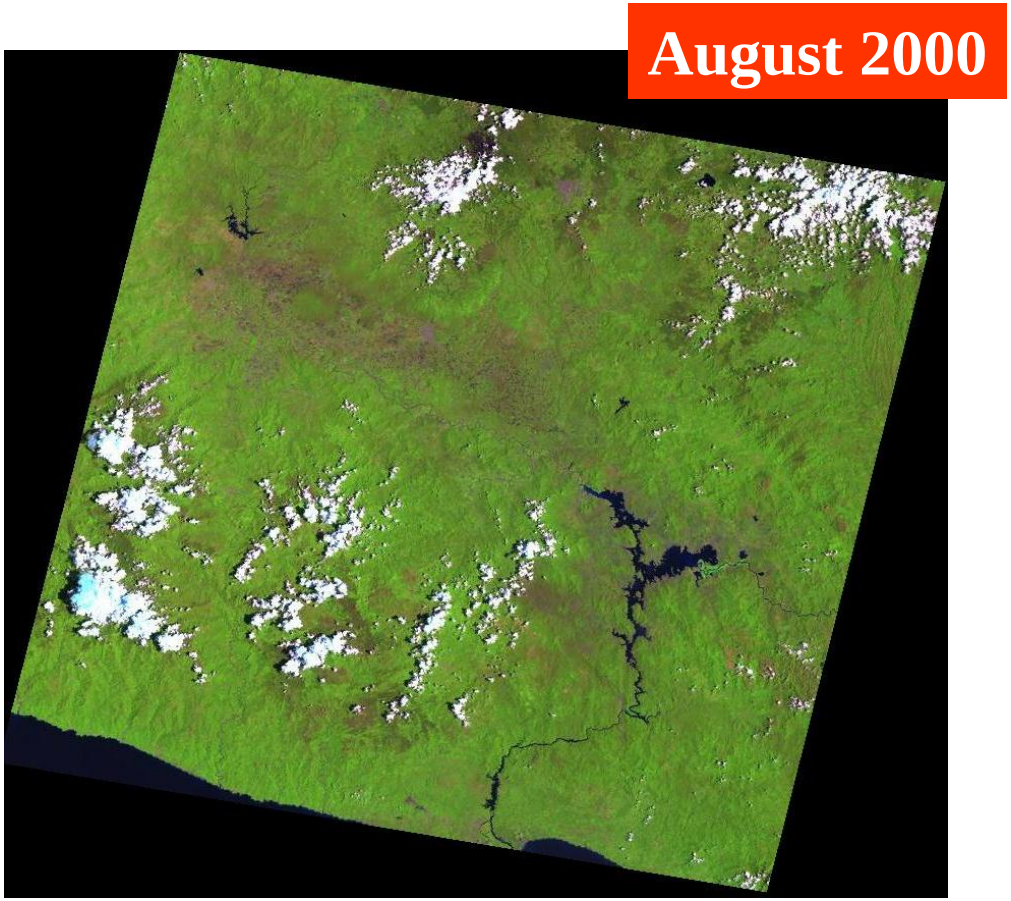




Barros et al. 2004

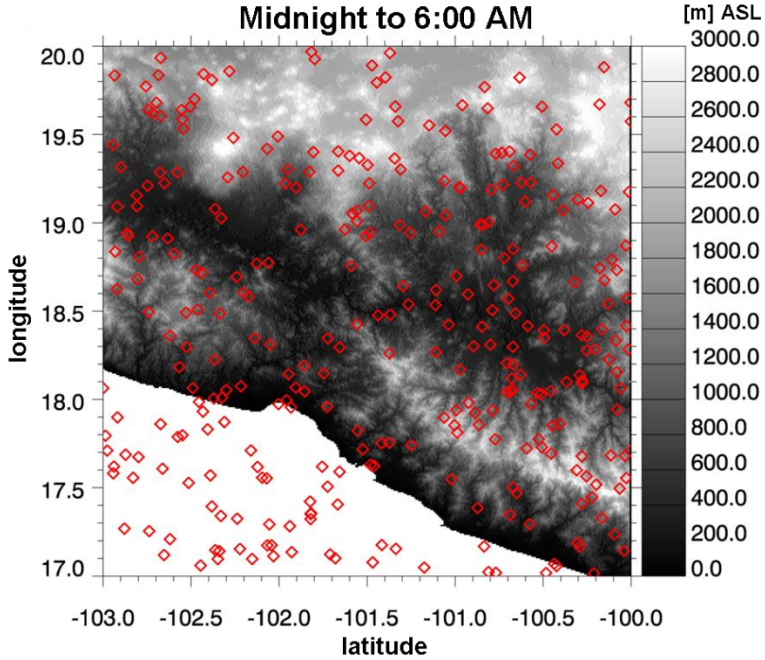


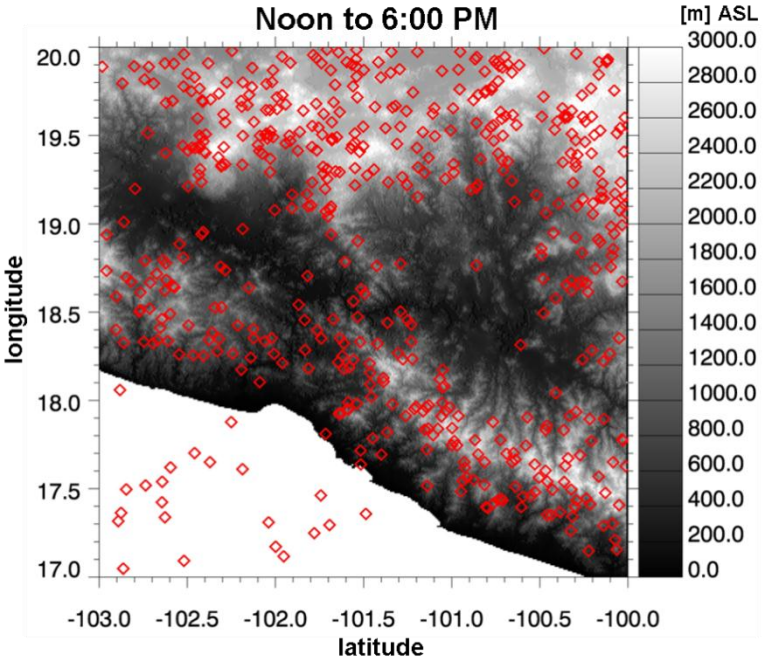
Las Balsas during NAME



MODIS Visible Imagery

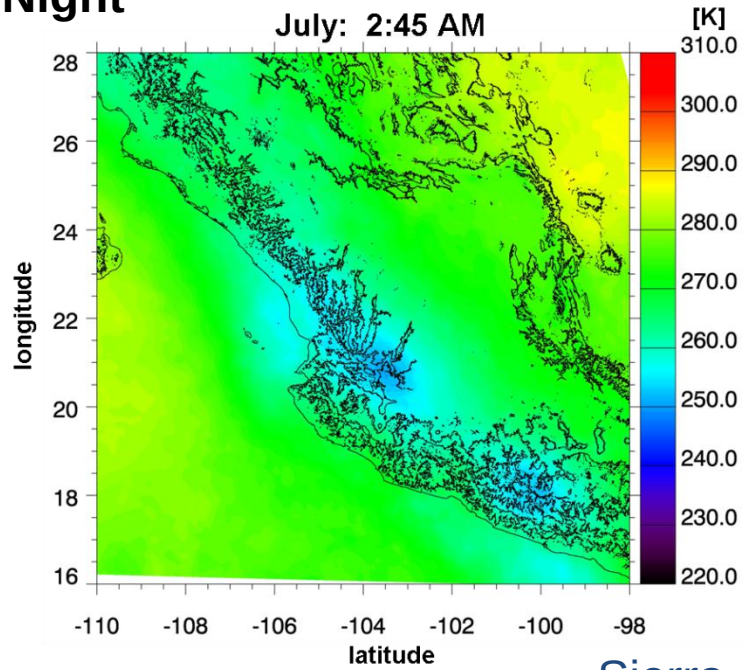
Gebremichael & Barros 2005

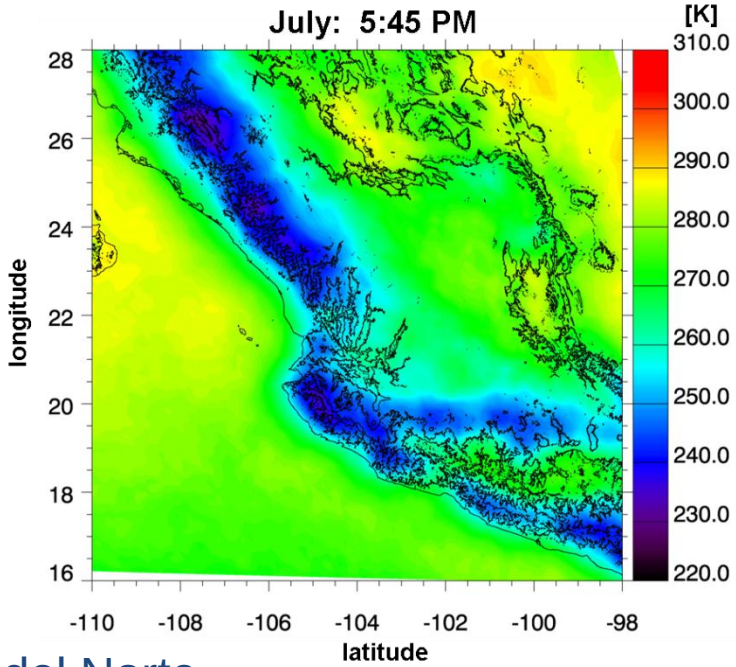




Night

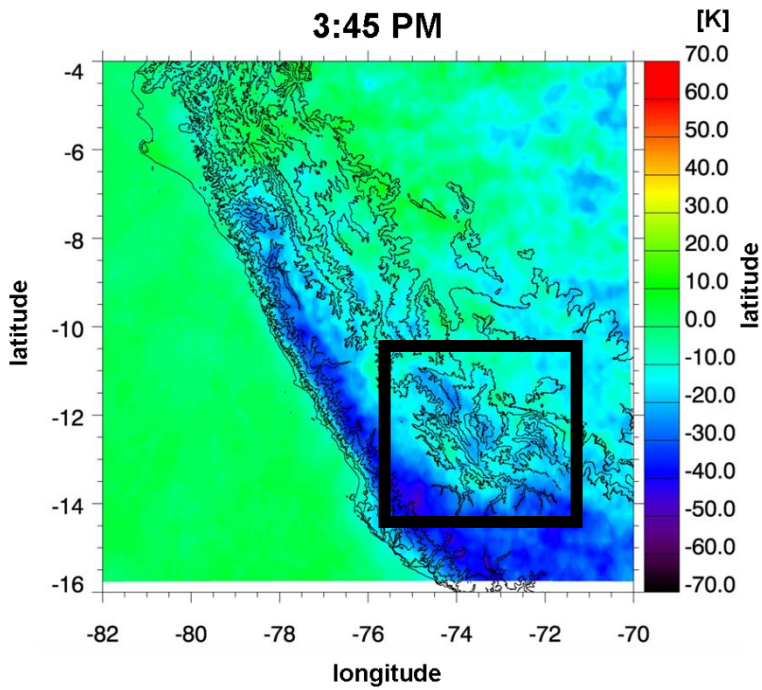
Day

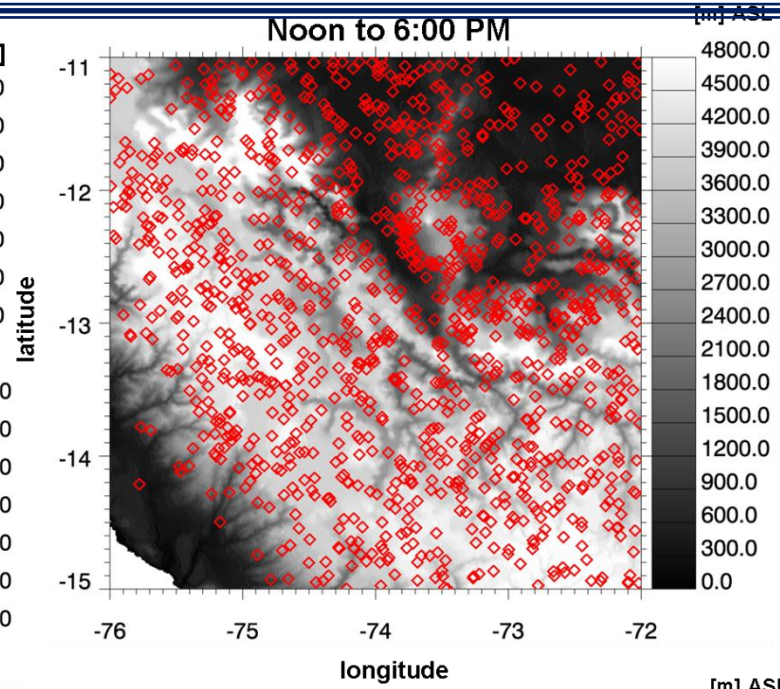




Sierra Madre del Norte

Giovannetonne and Barros, 2008

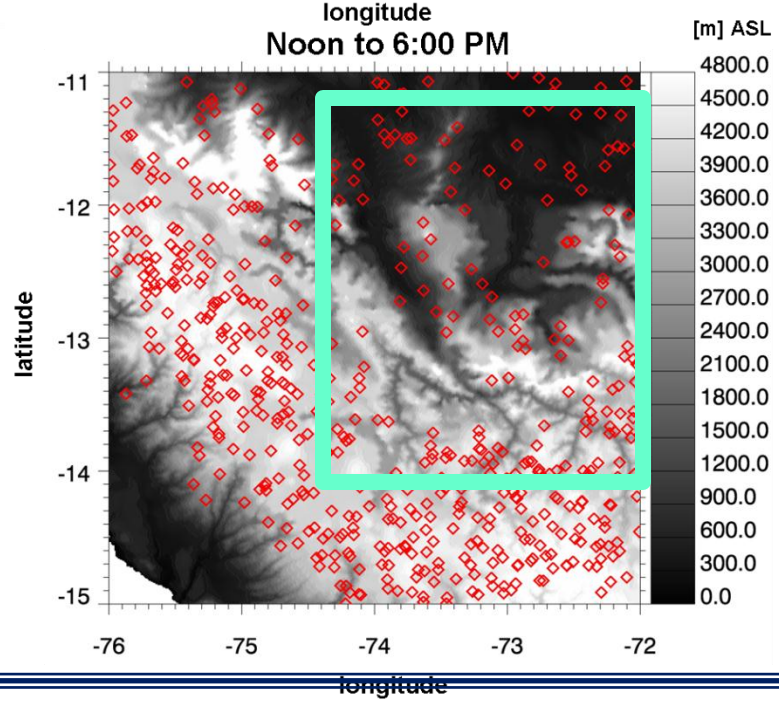




Warm Rain

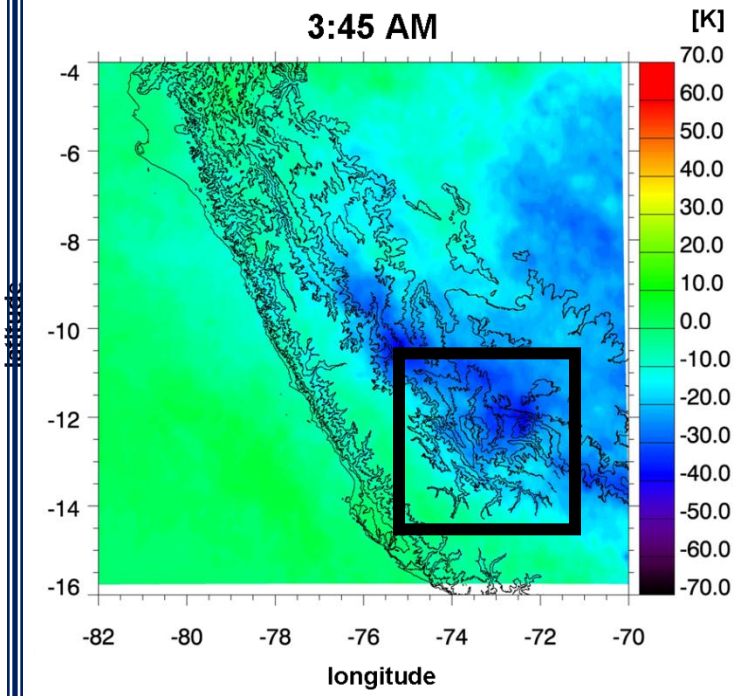
Daytime

TRMM Central Andes

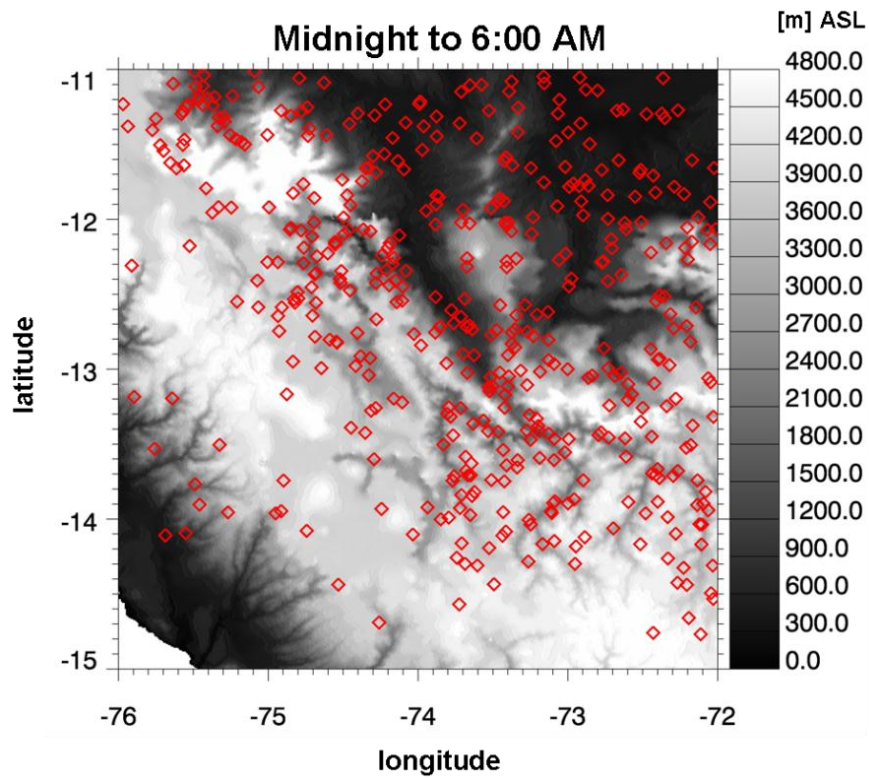


"Deep" Convection

Giovannettone and Barros, 2009



Shallow Embedded Convection

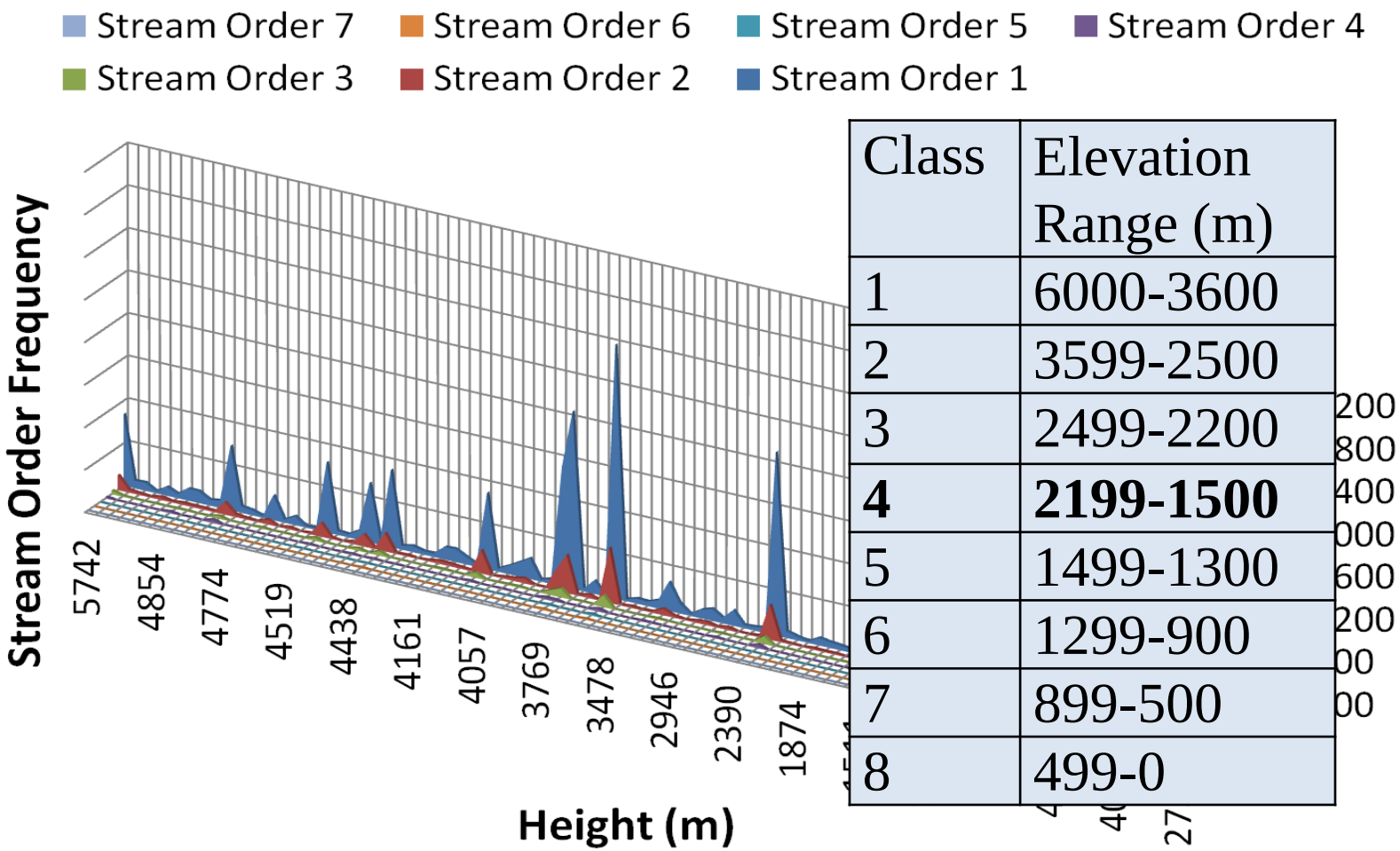


Nighttime

TRMM Central Andes

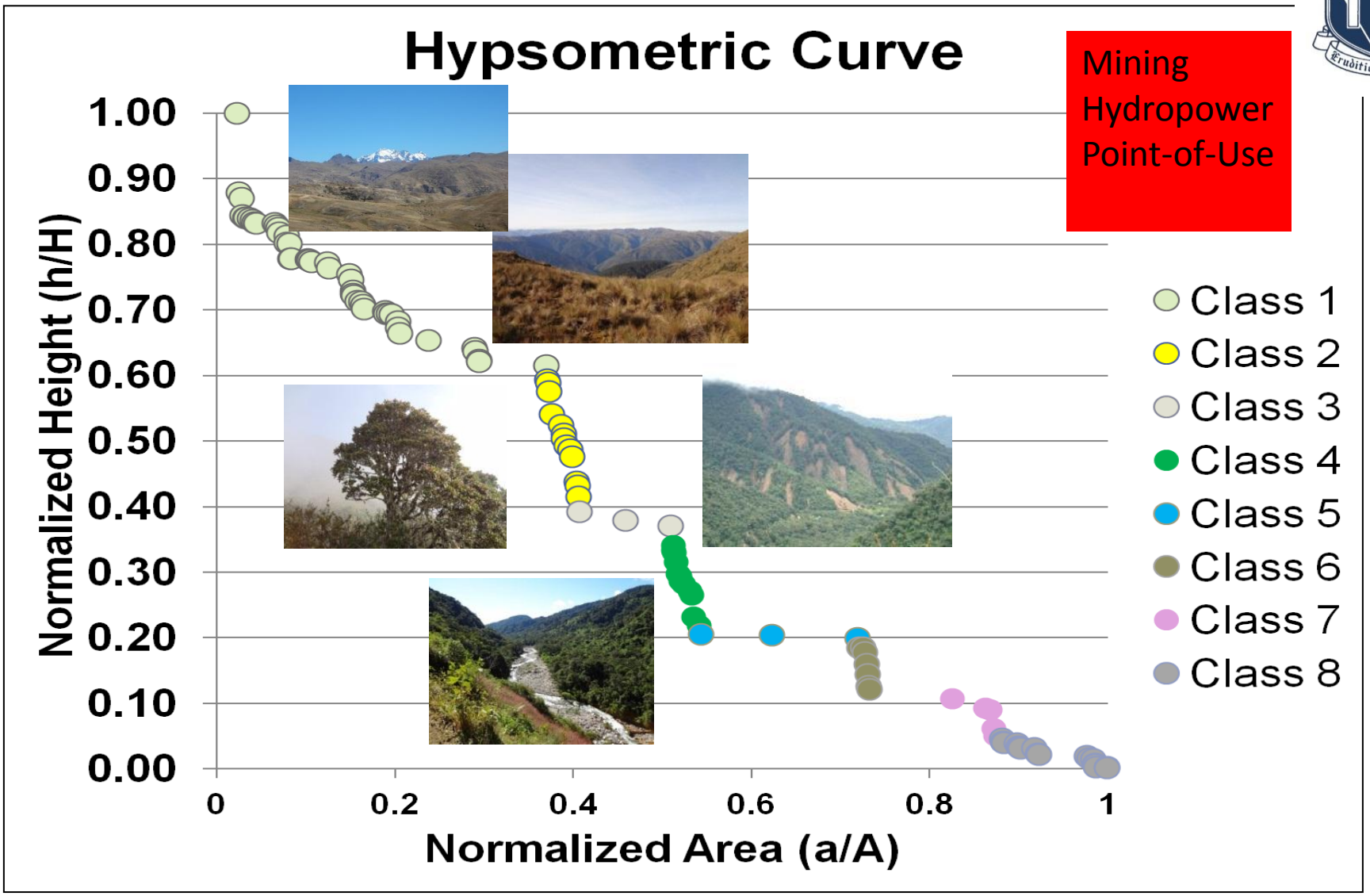
Giovannettone and Barros, 2009

Stream Order Frequency vs. Elevation



Class	Elevation Range (m)
1	6000-3600
2	3599-2500
3	2499-2200
4	**2199-1500**
5	1499-1300
6	1299-900
7	899-500
8	499-0

AGU Poster EP32B-0737 Deitz et al. 2011

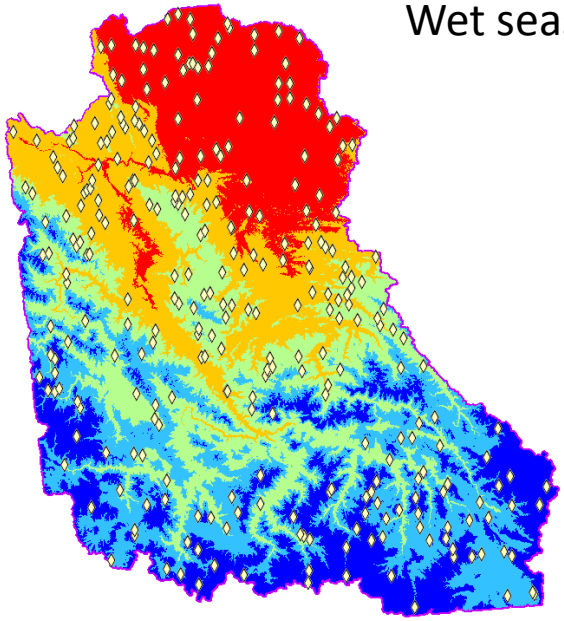


AGU Poster EP32B-0737 Deitz et al. 2011

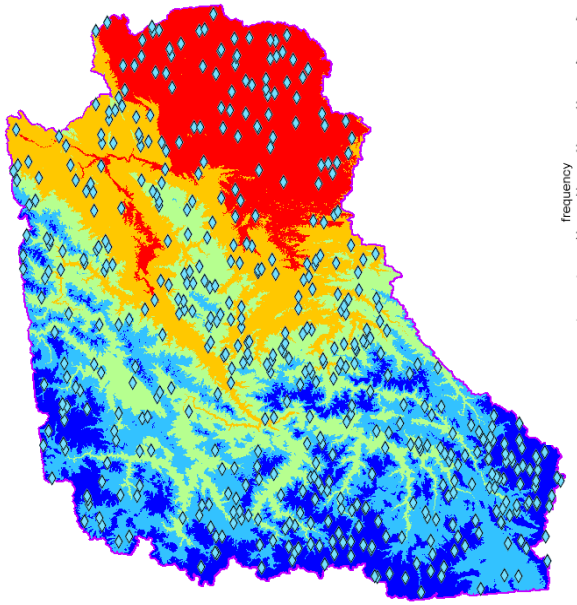
TRMM PFs December 1998-2010

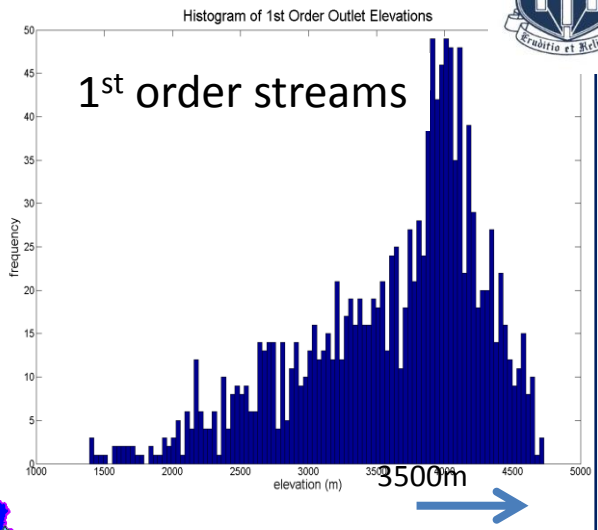
15-18 UTC

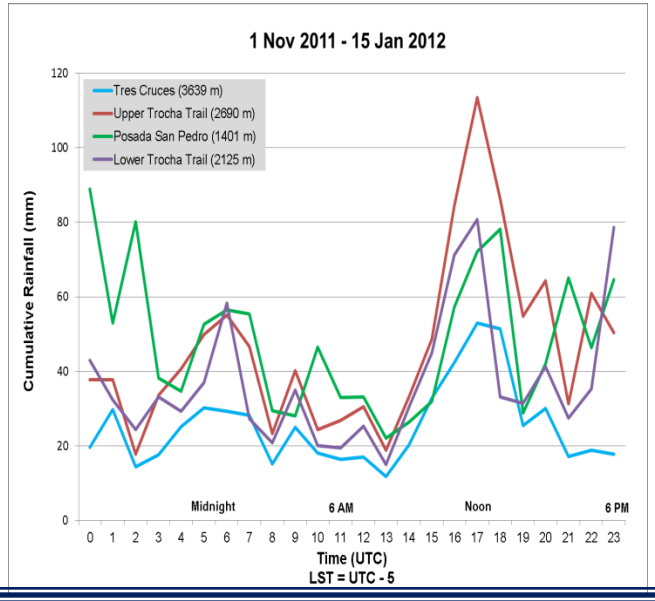
Wet season



18-21 UTC







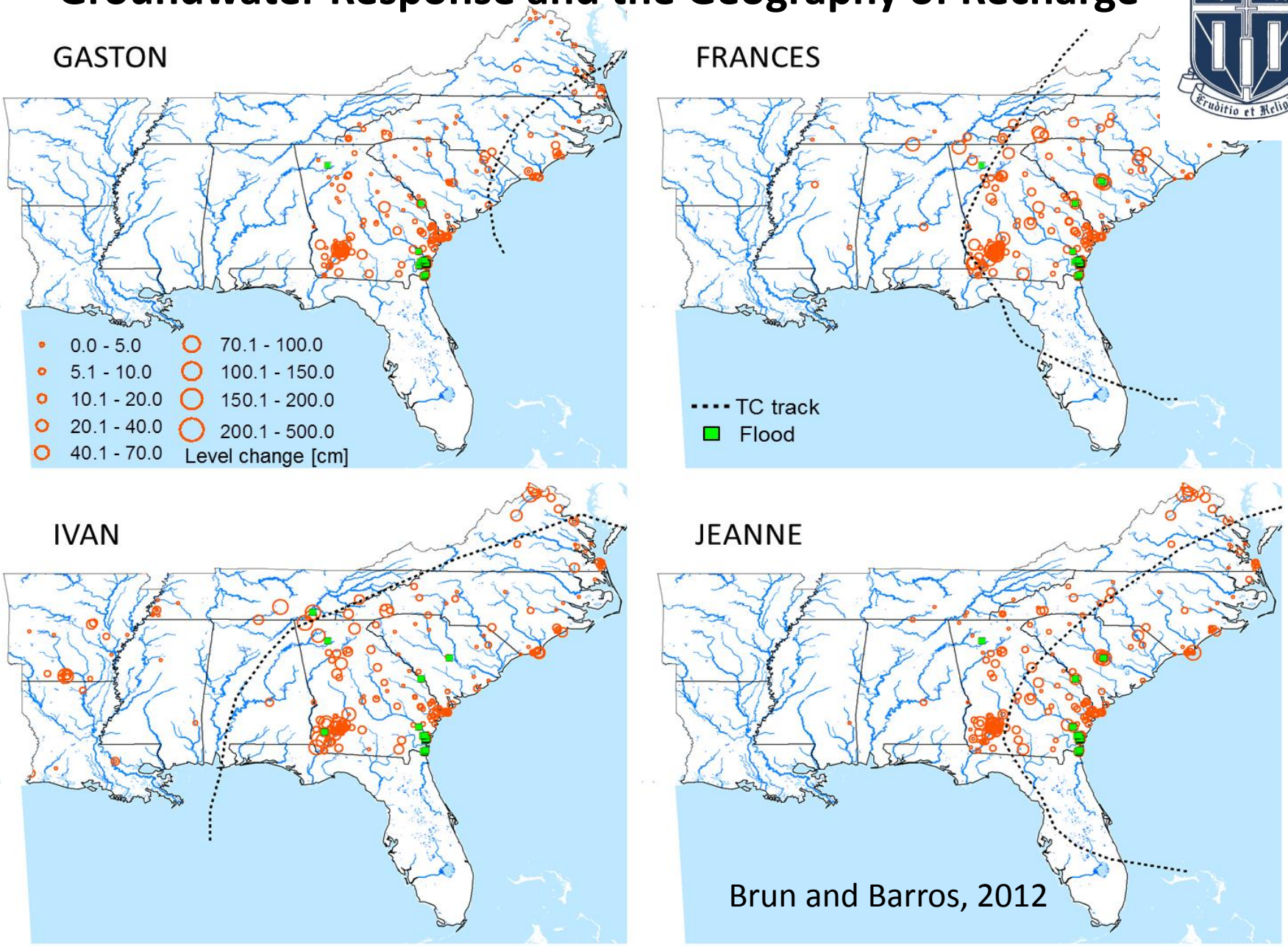
precipitation feature

elevation classes

- 1 : < 500m
- 2 : 500m - 1750m
- 3 : 1750m - 3500m
- 4 : 3500m - 4250m
- 5 : > 4250m
- 7th order watershed

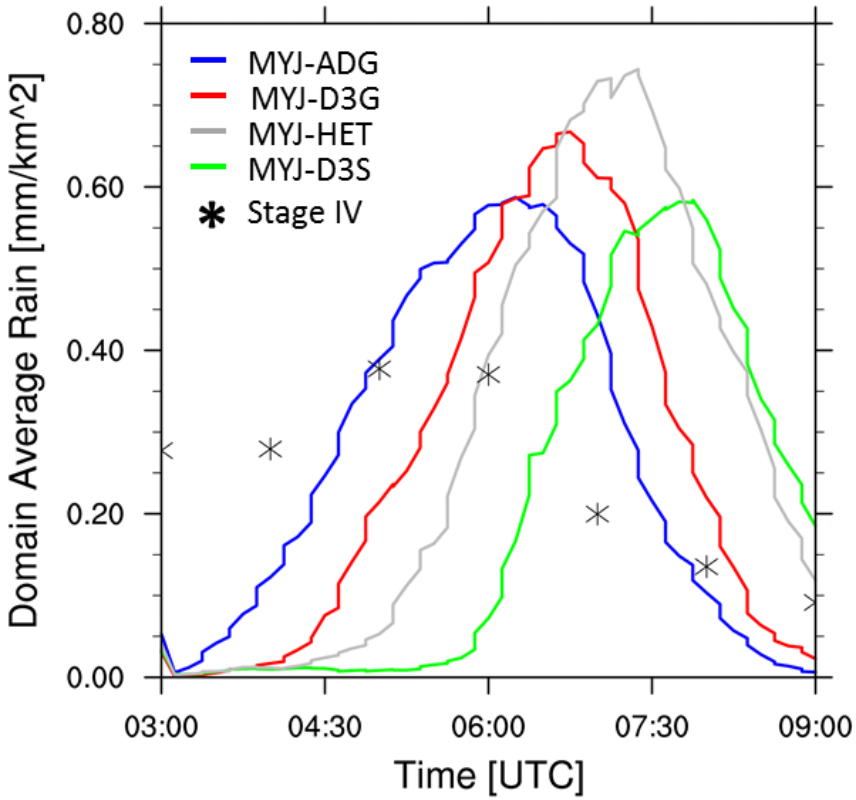
Lowman and Barros, 2012

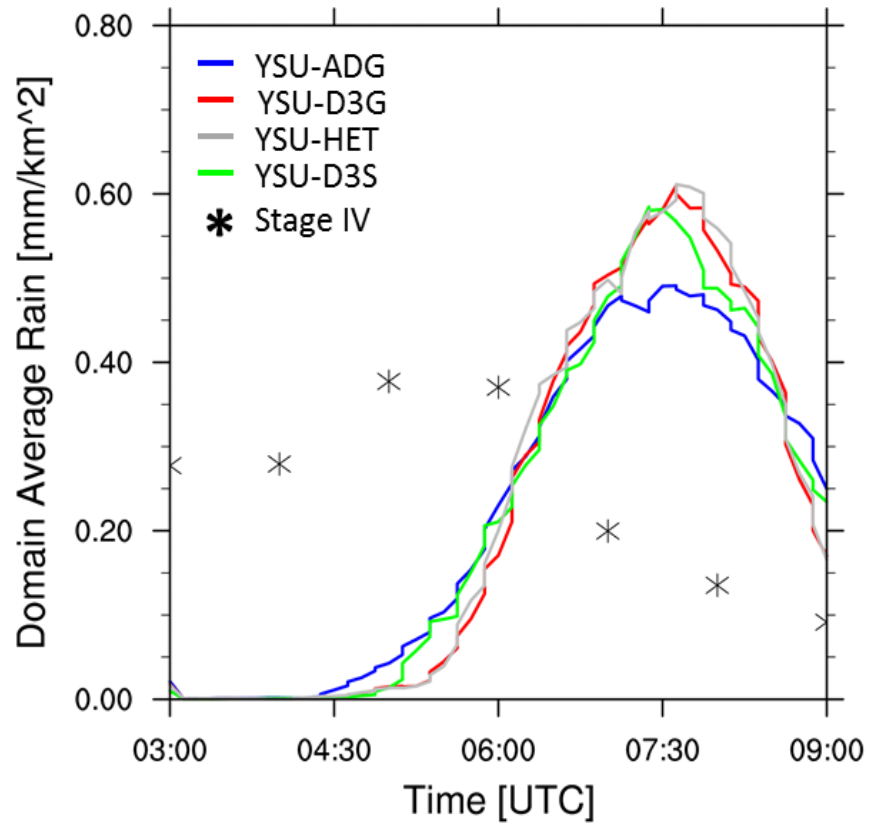
Groundwater Response and the Geography of Recharge



Brun and Barros, 2012

WRF (1 km inner domain)



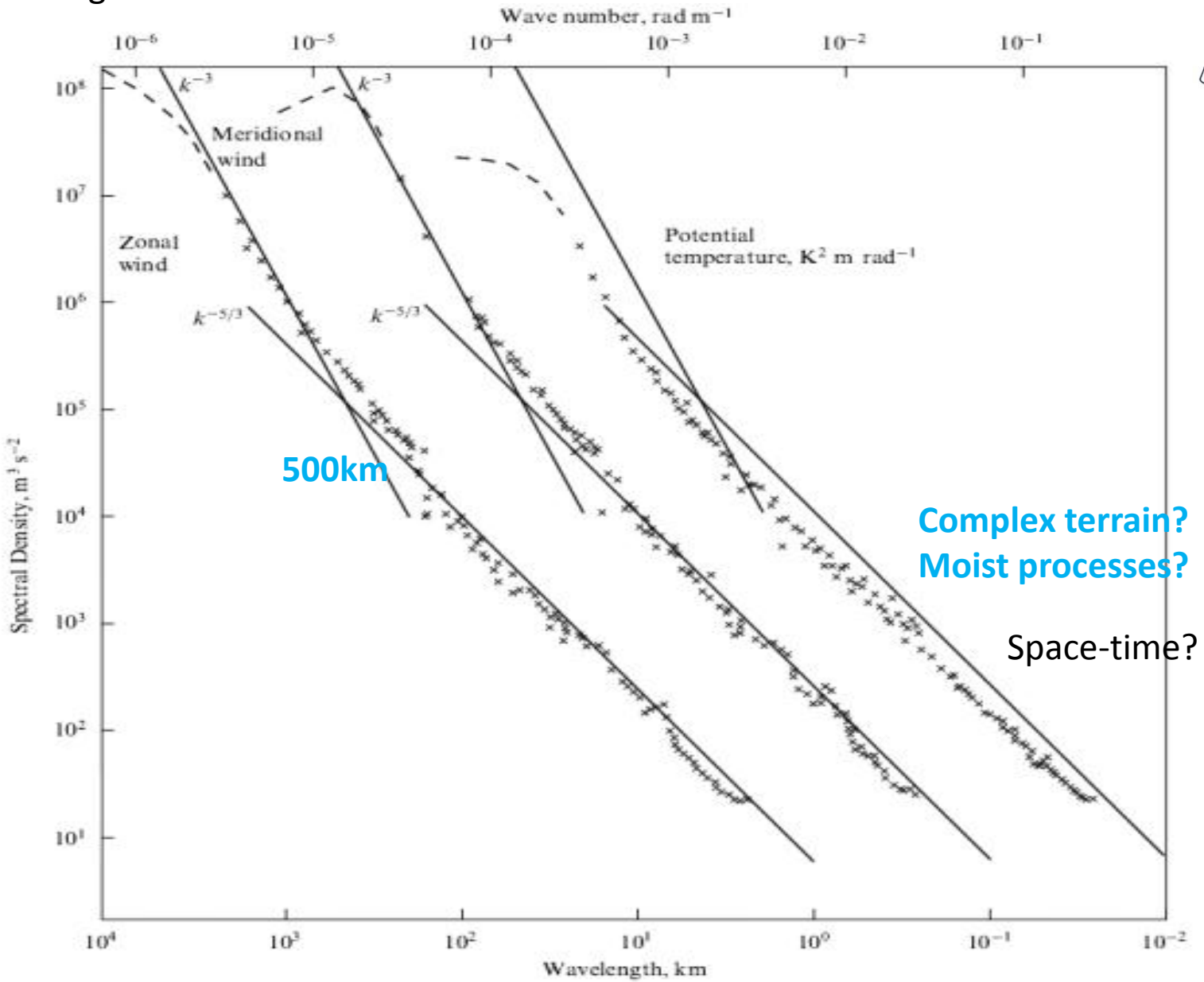


PBL parameterization,

versus removed land-atmosphere interactions, and low level shear

Erlingis and Barros, 2012

Scaling Behavior Fundamentals

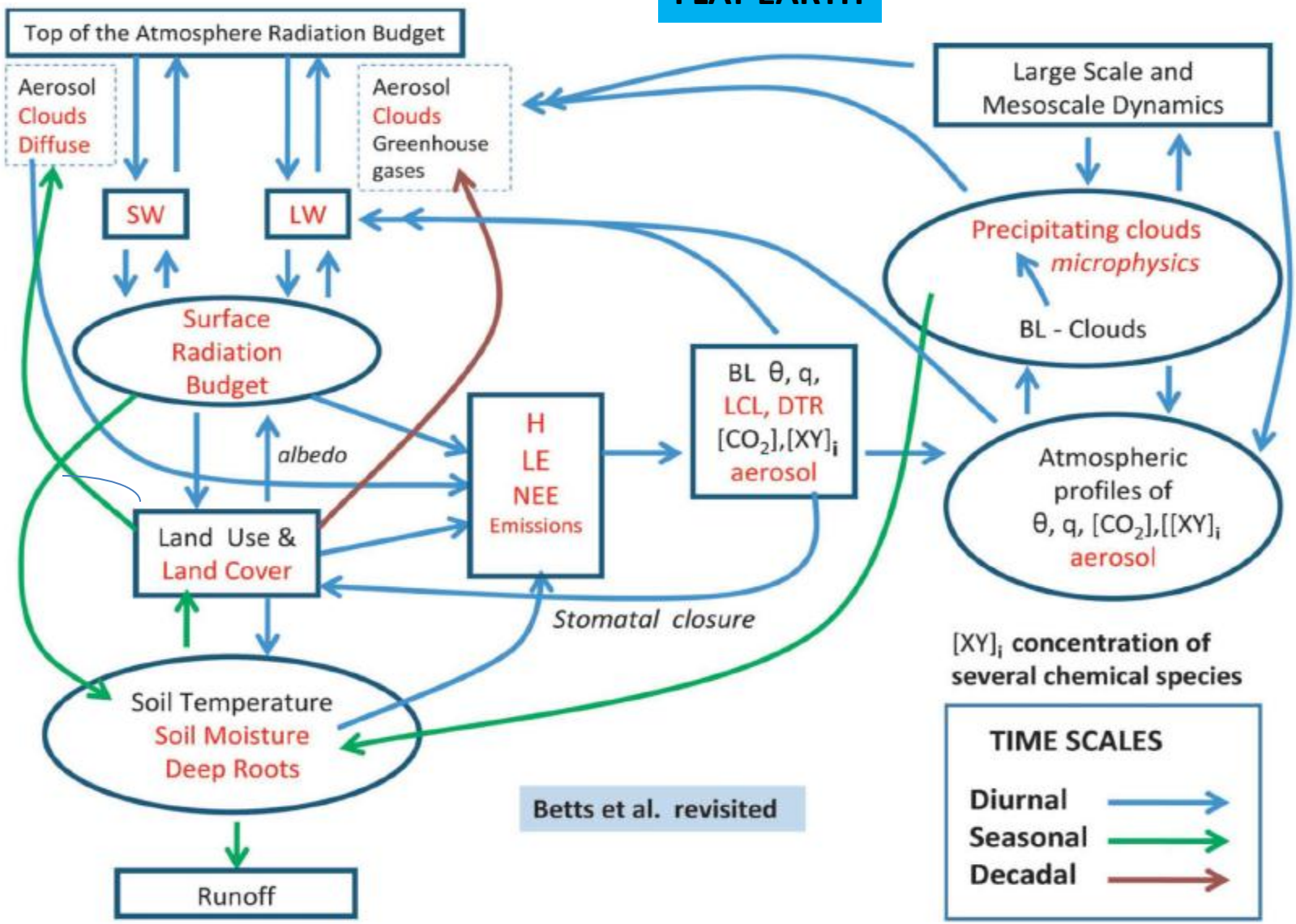


Complex terrain?
Moist processes?

Space-time?

Courtesy Shanti Bushan, U. Mississippi

FLAT EARTH



Add Landform/Terrain