Andex Meeting 2018

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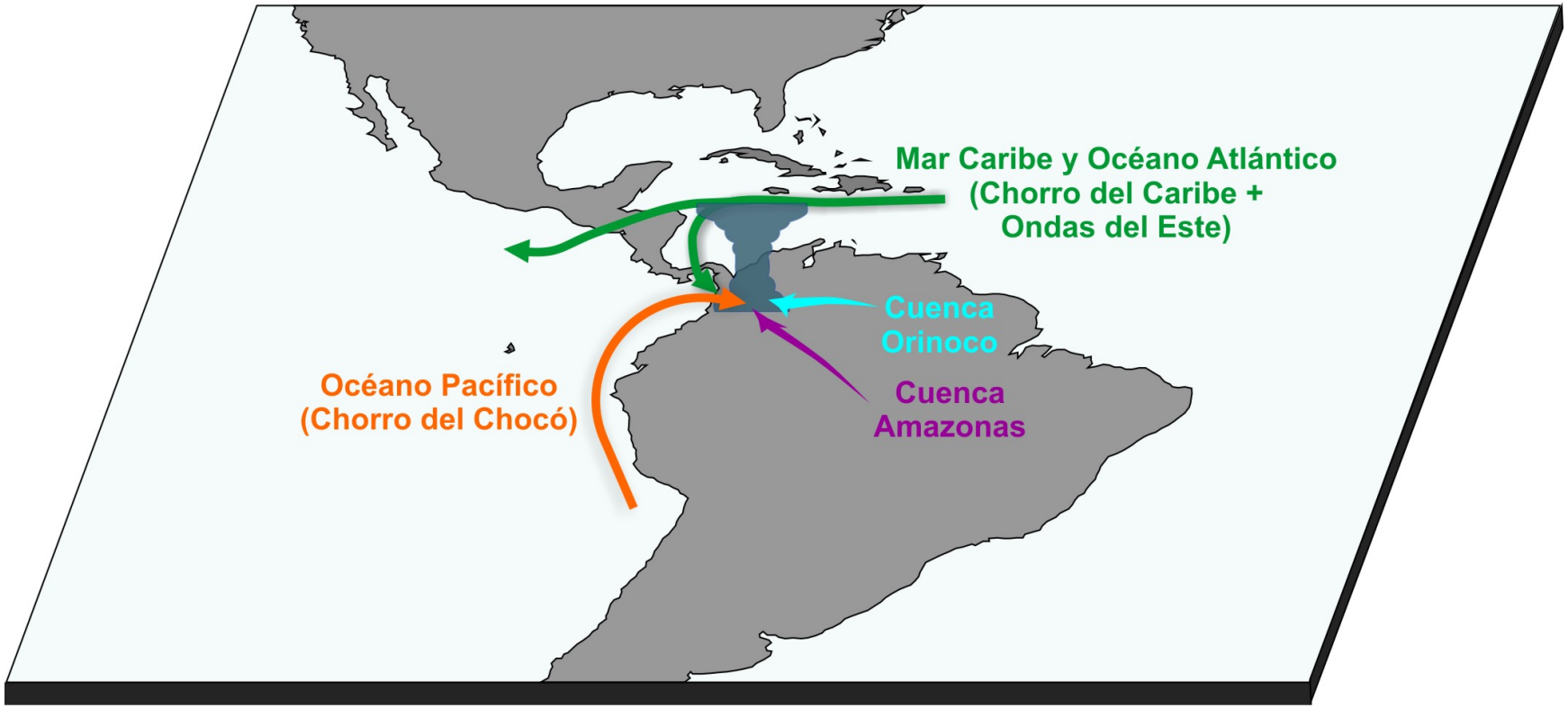
Knowledge gaps and relevance:

Atmospheric moisture transport processes: observations (isotopes) vs. Models

Low-level jets and mesoscale convective systems: modeling perspective

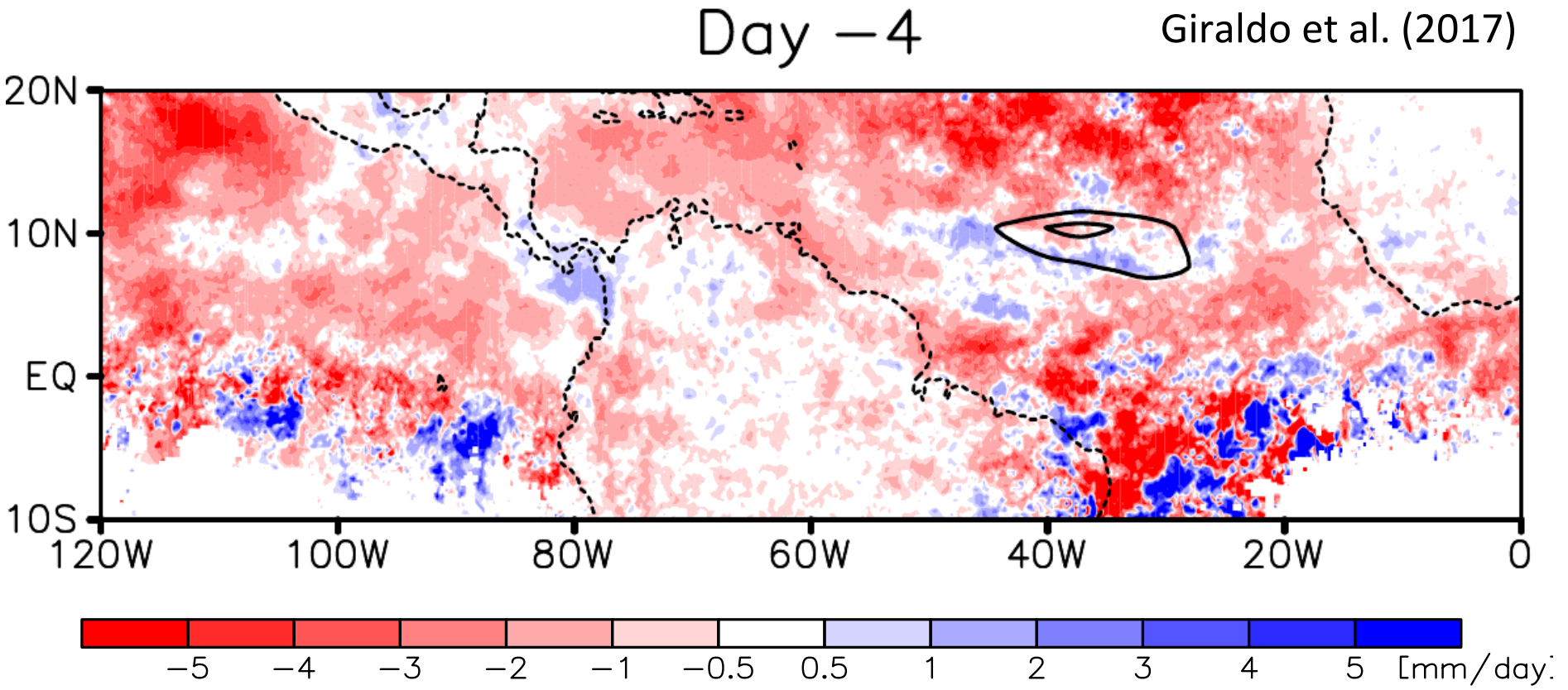
Atmospheric moisture sources to northern South America



Main sources of atmospheric moisture toward northern South America: the role of the local low-level jets

Validation with isotope records?

Easterly waves



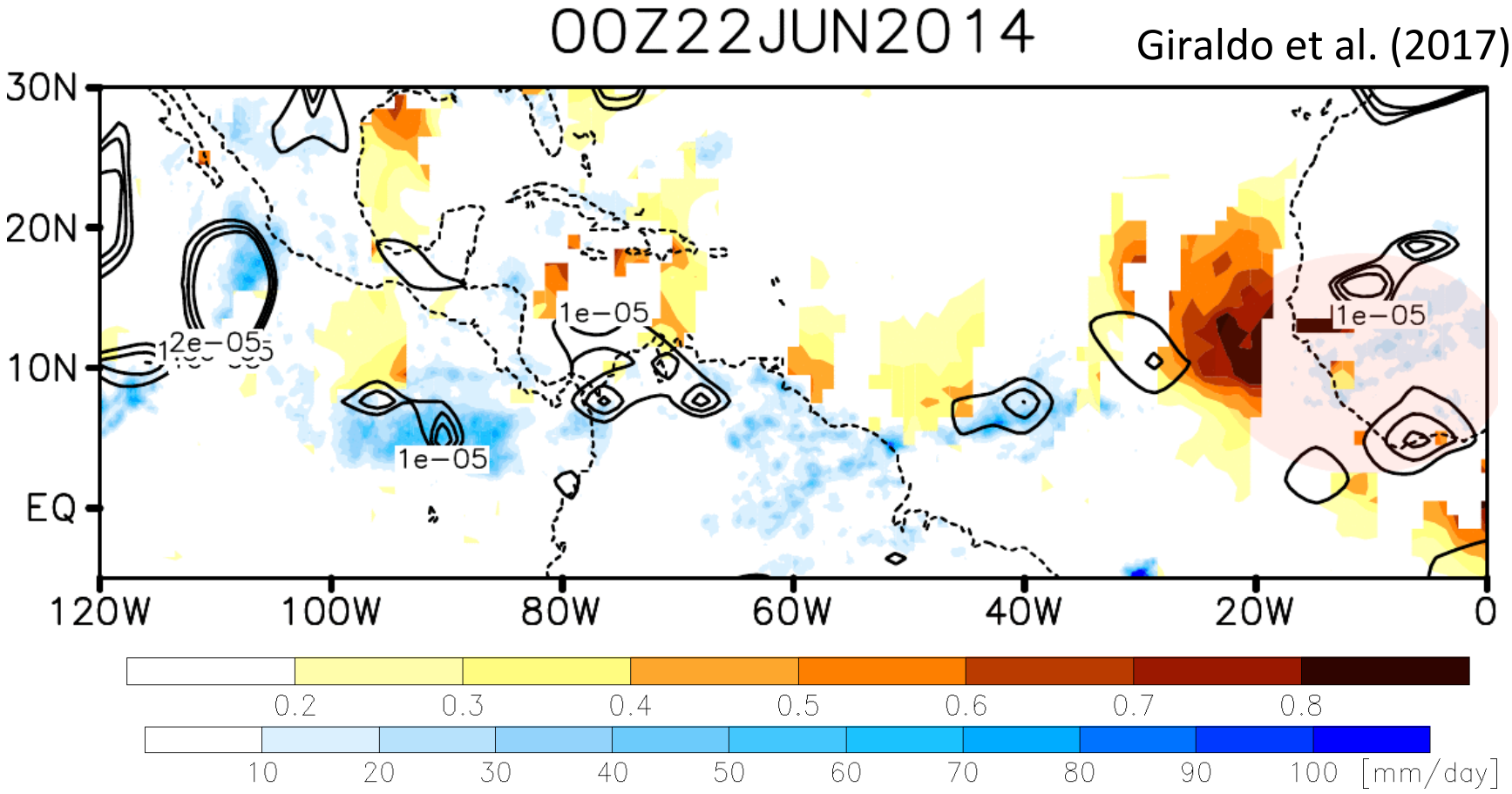
Giraldo et al. (2017)

Synoptic disturbances affecting precipitation in northern South America

Links to low-level jets and MCSs?

Orographic influence on wave displacement and precipitation features?

Easterly waves



Giraldo et al. (2017)

Links to air quality: transport of Saharan dust

Easterly waves

Links to air quality
Medellin, Colombia, June 27th 2014
Saharan dust over Medellin

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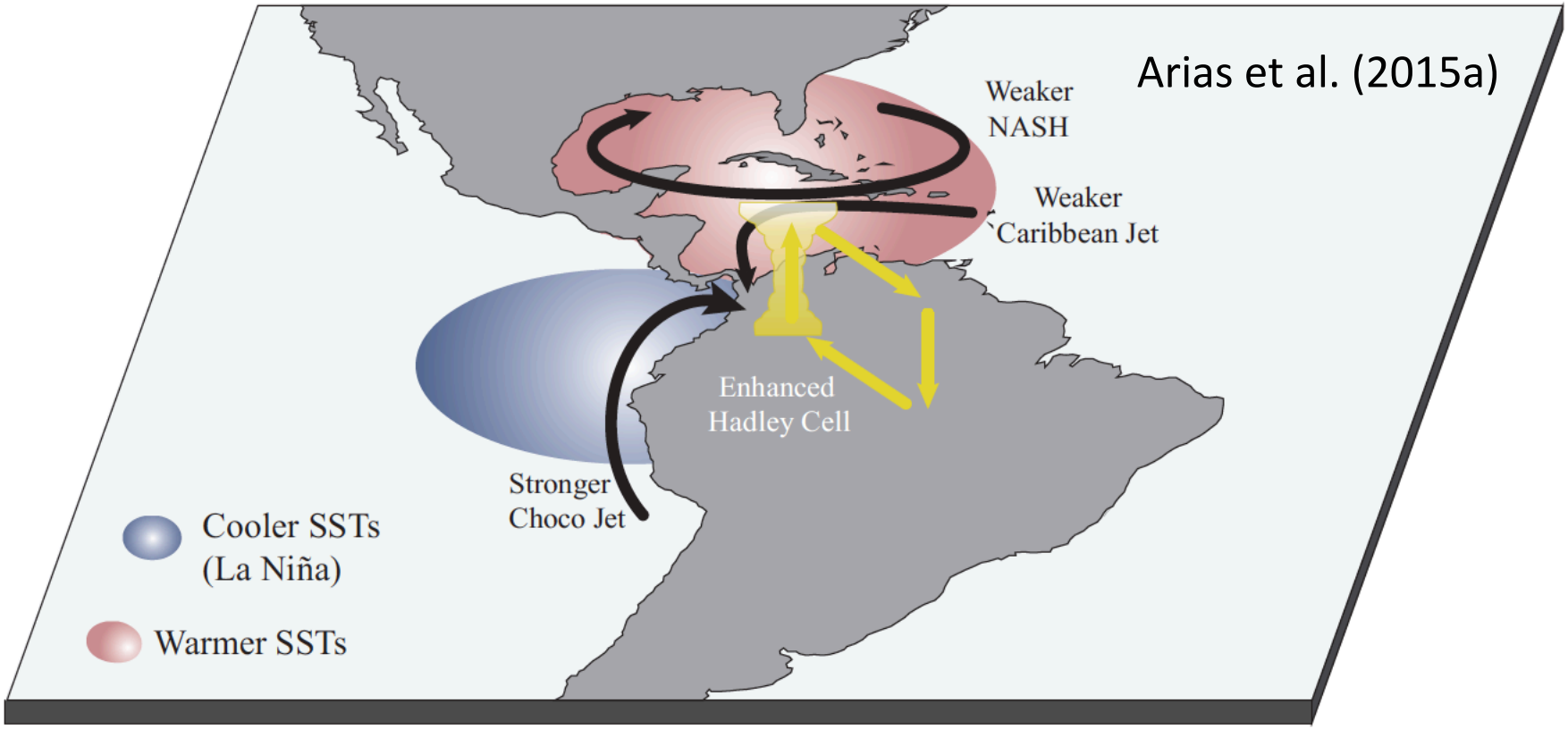
Knowledge gaps and relevance:

How are atmospheric moisture sources and precipitation affected by climate variability and change?

ENSO impacts?

Regional atmospheric circulation anomalies during La Niña 2010-2011



Atmospheric sources of moisture toward northern South America may change during ENSO events: how is precipitation affected?

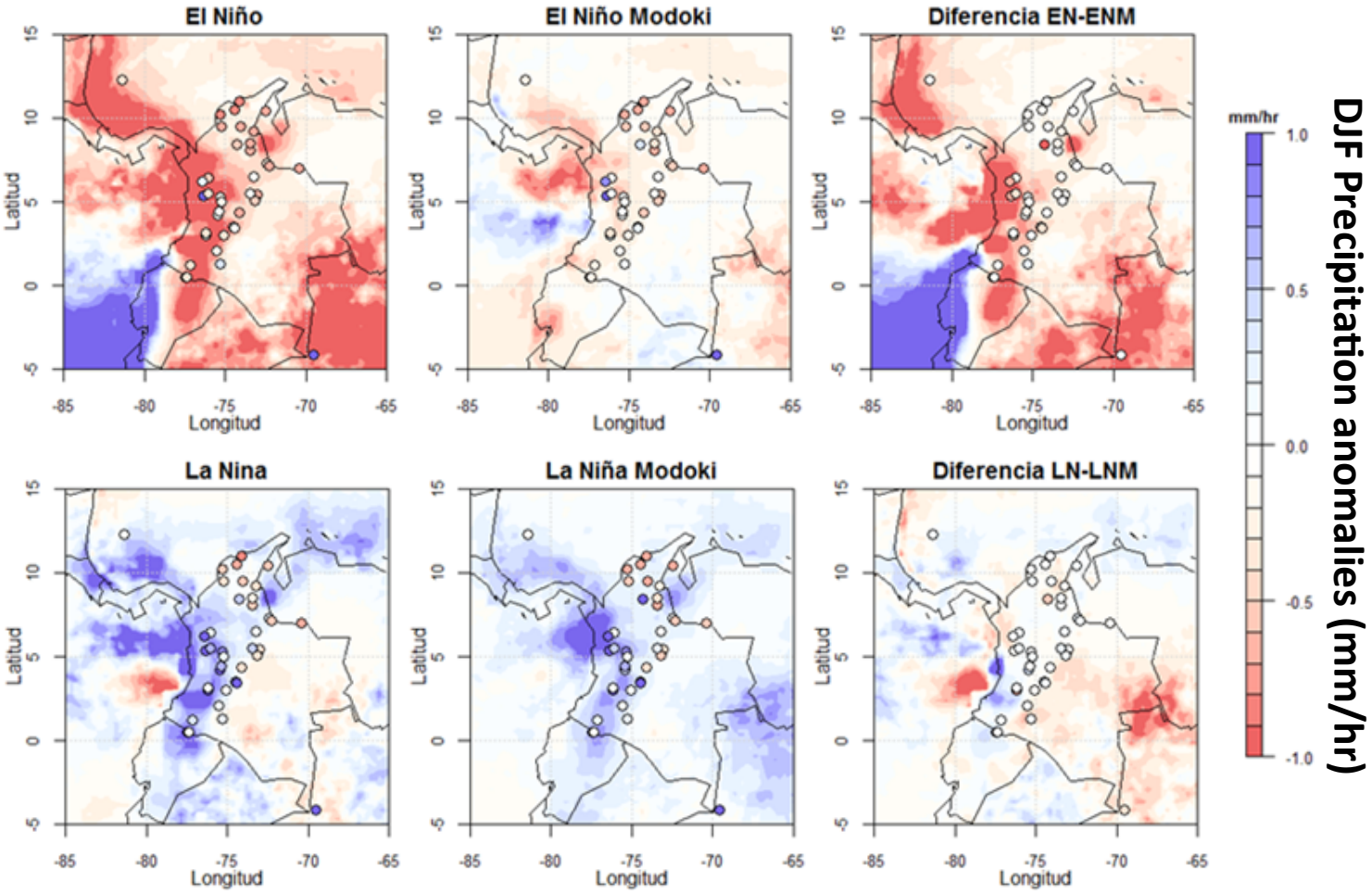
ENSO flavours: Canonical vs. Modoki modes?

Impacts of ENSO Modoki in Colombia

Navarro et al. (2018), under review RACCEFYN

El Niño

La Niña



ENSO impacts on precipitation depend not only on the region but also on the type of event (Canonical vs. Modoki)

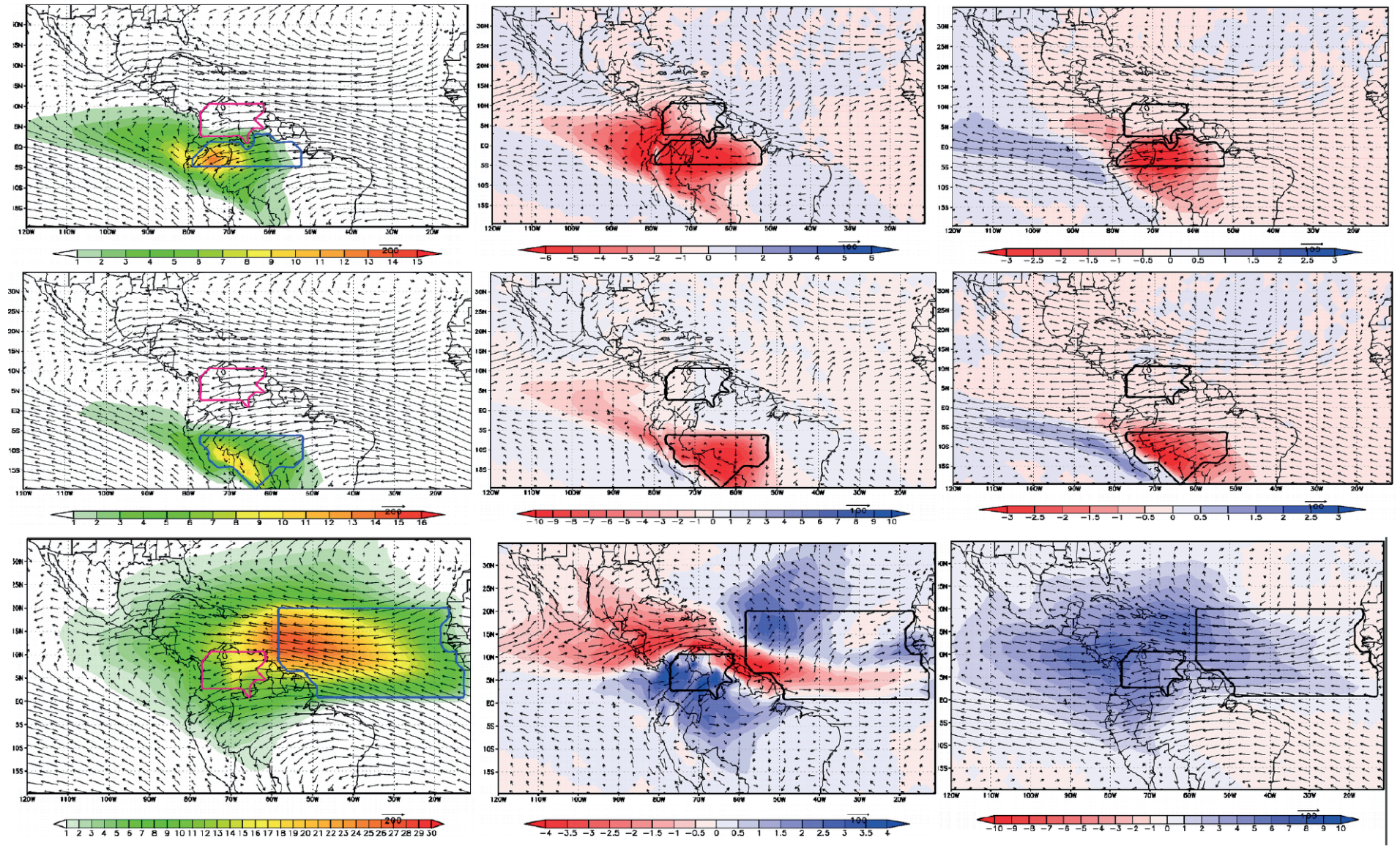
Global warming scenario

Rendón et al. (2016)

ERA- Interim (1979-2005)

MPI - ERA-Interim (1979-2005)

MPI RCP8.5-historical



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Knowledge gaps and relevance:

How does Amazon vegetation influence regional atmospheric moisture transport?

Local recycling vs regional circulation

Agudelo et al. (Clim. Dyn, 2018)

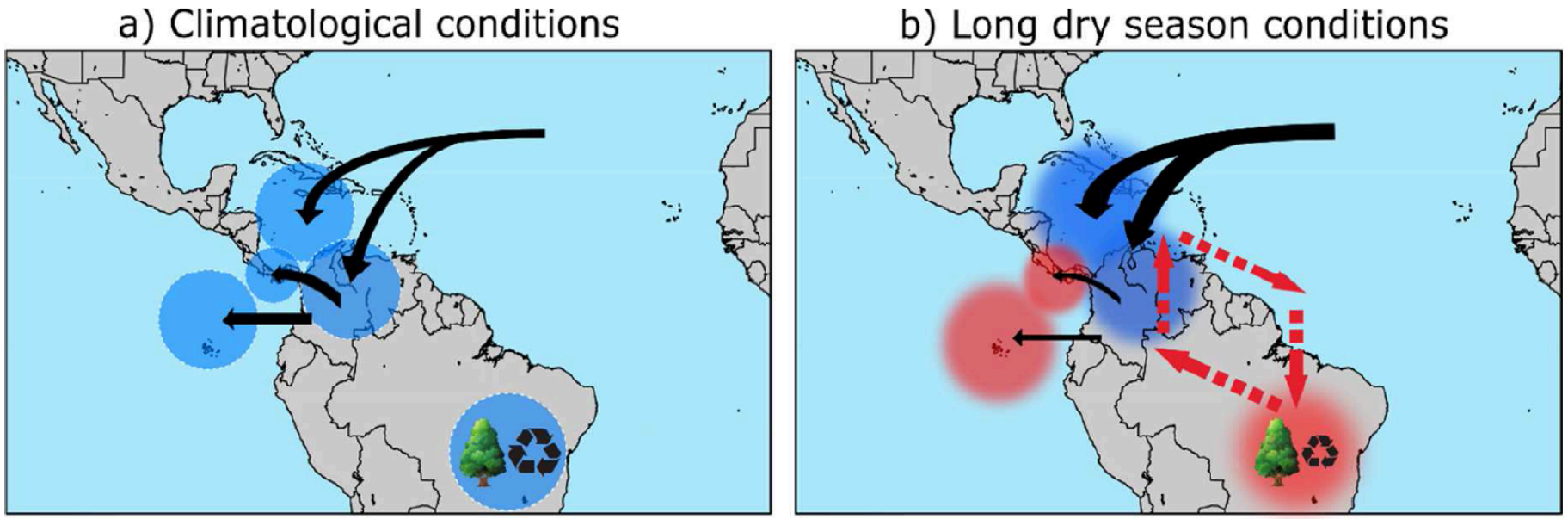

Figure 13. Schematics of the main changes of atmospheric moisture transport and recycling over the IAS region during LDS events in the Amazon forest. In a), arrows indicate climatological water vapor transport paths from source to sink regions. Tree and recycling symbols indicate moisture recycling in the Amazon. In b), blue (red) shades indicate increases (reductions) of atmospheric moisture contributions from source to sink regions, as indicated by the arrow. In general, LDS events exhibit enhanced water vapor transport from the Atlantic Ocean toward northern South America and the Caribbean whereas continental contributions from northern South America toward Central America and the eastern Pacific are reduced. In addition, moisture recycling in the Amazon weakens during the LDS events of this forest. Red dotted lines represent the observed changes in the regional Hadley circulation during LDS events, characterized by anomalous subsidence (upward motion) over the southern Amazon (IAS region).

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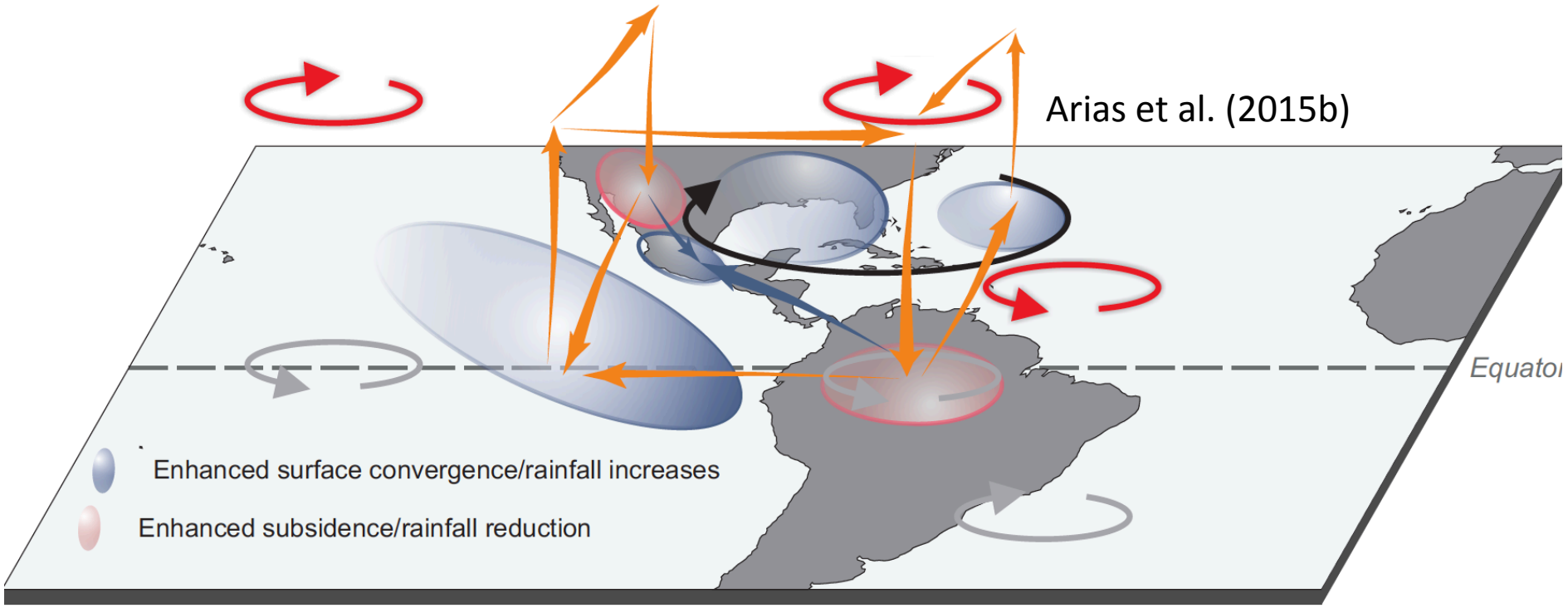
Knowledge gaps and relevance:

What are the inter-hemispheric links of atmospheric moisture transport?

From a regional circulation perspective



Mechanisms modulated by global warming, ENSO, and AMO modes

How does the Andes-Amazon system influence atmospheric moisture transport toward Central America and viceversa?

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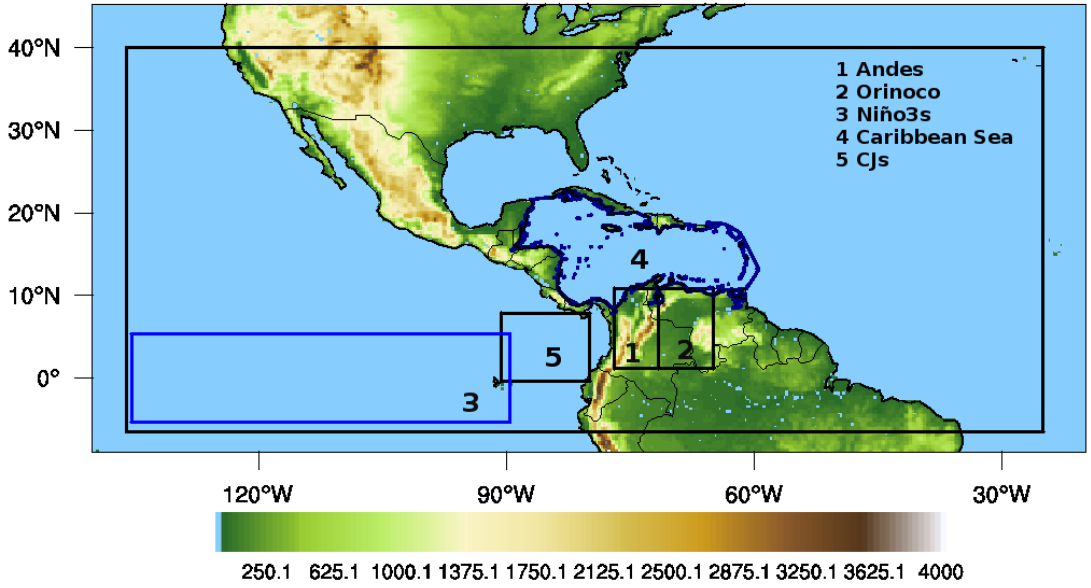
Knowledge gaps and relevance:

How do regional models reproduce the Andes influence on regional hydroclimatology?

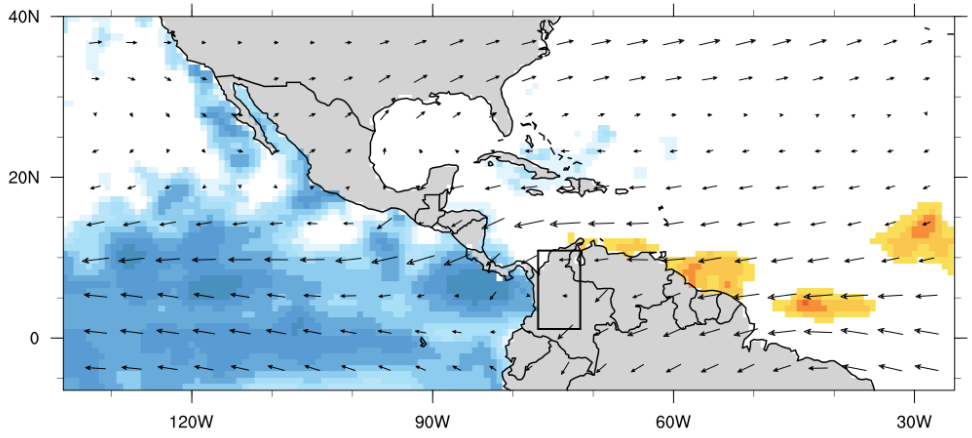
A multidecadal WRF simulation (1982-2012, 25Km)



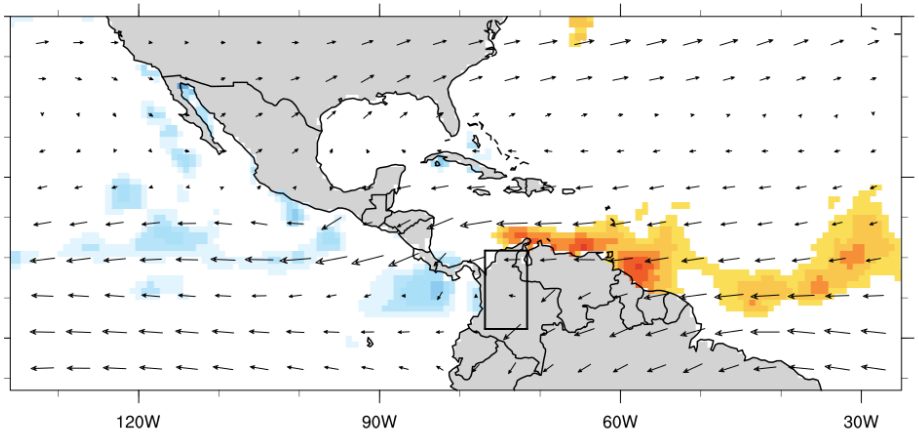
WRF lacks the link between eastern Pacific SSTs and precipitation in the Colombian Andes.

Does WRF overestimates the role of the Andes (local influence), neglecting the role of the tropical Pacific SSTs (large-scale influence)?

(a) Correlation SST - P(GPCC): Dec



(b) Correlation SST - P(WRF): Dec



Martínez et al. (Int. Jour. Climatol., in press)

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Potential activities:

Isotope network: Central American countries

Modeling efforts: high-resolution simulations

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Expected outcomes:

High resolution modeling experiments to understand the role of local features (low-level jets, orography, land cover) on precipitation and water availability

Speleothem (isotope) campaign fields