Residence Time of Atmospheric Moisture Sources in Colombia

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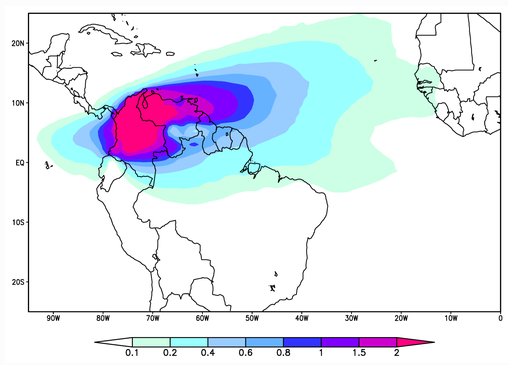
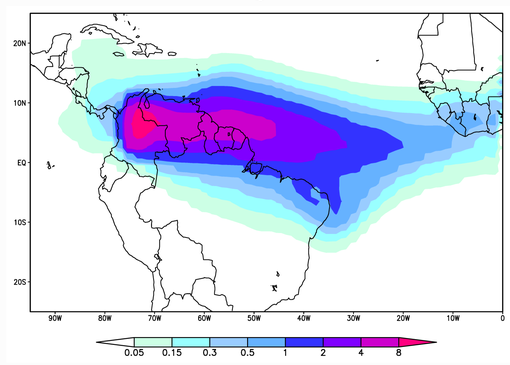
1. Defining the regional moisture sources from the DRM, the FLEXPART and the QIBT models

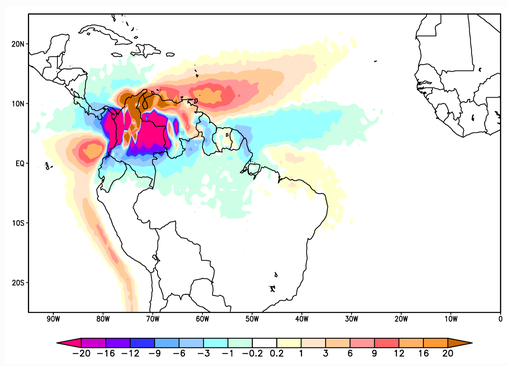
a. DRM



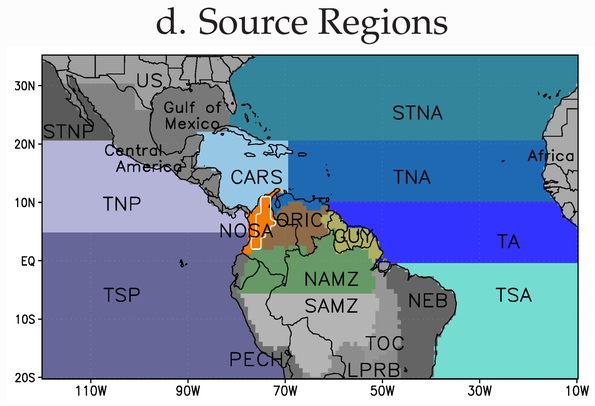
b. QIBT



c. FLEXPART

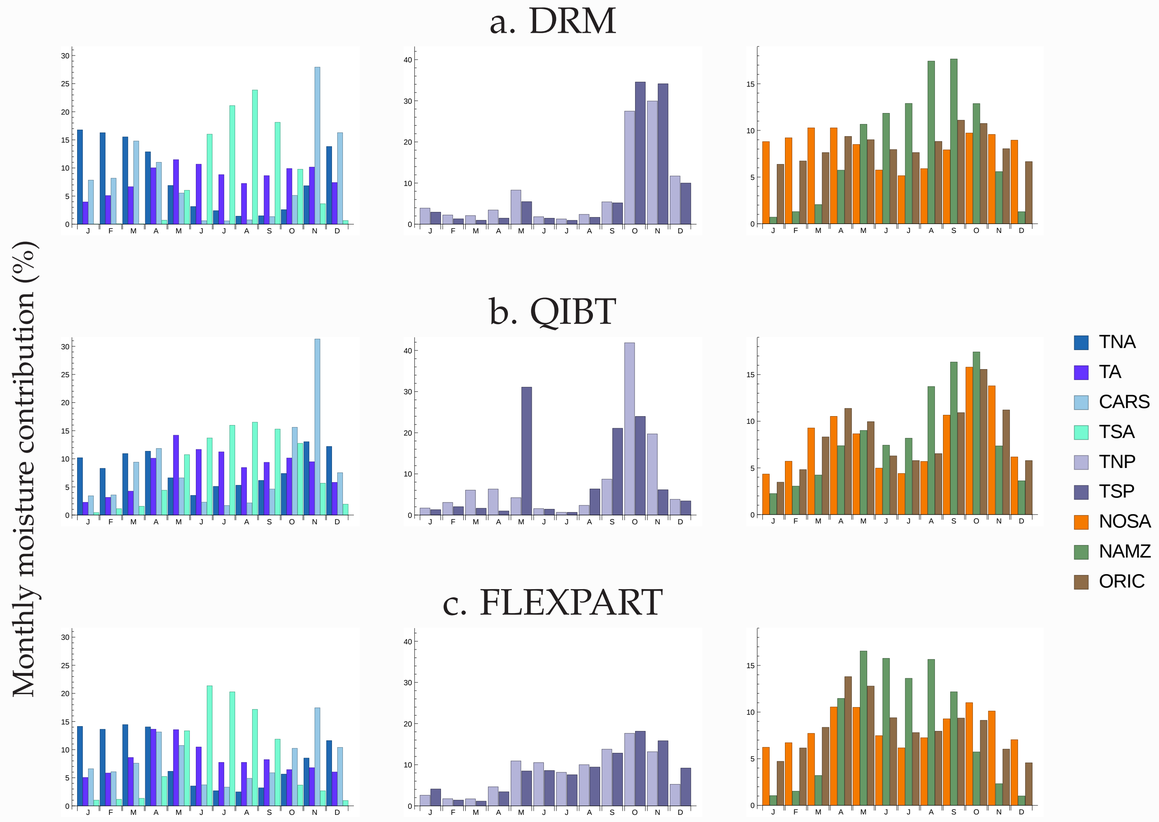


d. Source Regions



Climatology of moisture sources that contribute to precipitation over Colombia (NOSA) as it is represented by a. DRM (Dominguez et al., 2006), the fraction of evaporation reaching the target area from each grid cell (mm), b. QIBT (Dirmeyer and Brubaker, 2007), evaporated moisture that precipitates (mm/month), c. FLEXPART (Stohl and James, 2004), E-P (mm/day) in backward mode and d. Moisture source regions.

Moisture from the Atlantic Ocean, adjacent Tropical Pacific and terrestrial recycling are the most important regional sources, show the influence of long-range cross-equatorial flow from the Atlantic Ocean into the target region and the regional sensitivity to land-surface processes of surrounding basins.



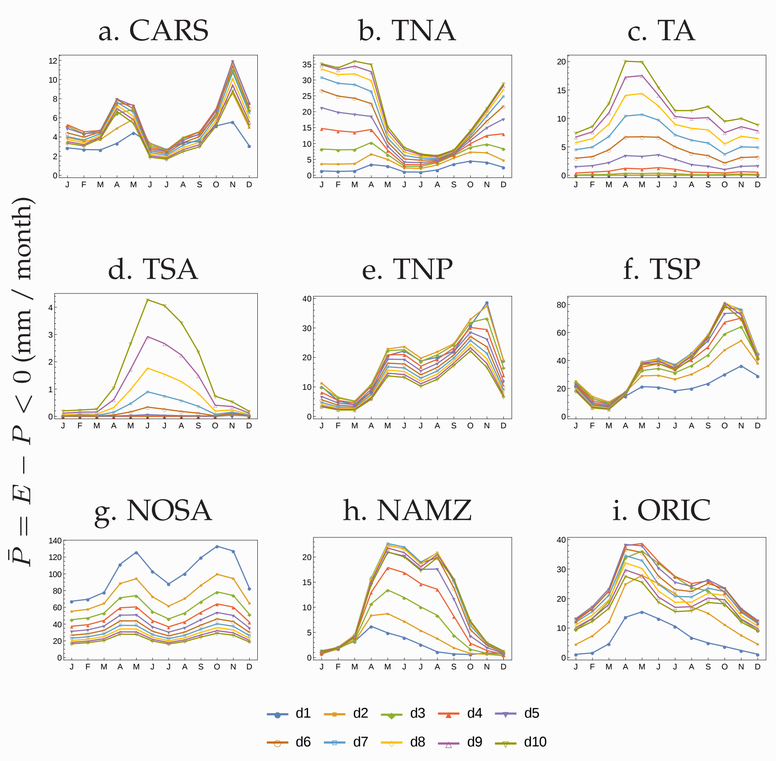
2. Characteristic time of moisture transport

The residence time of water vapor (RT-WV) from each source-region is determined by measuring the integration time of the trajectory for the maximum moisture transference in the FLEXPART model.

Region	Maximum moisture contribution time (days)
CARS	3 - 5
TNA	10
TA	> 10
TSA	>10
TNP	2
TSP	2 (JFMA), 6-7 (MJJASOND)
NOSA	1
NAMZ	5 (NDJFM), 7 (AMJJAS)
ORIC	4

The RT-WV varies among sources and differs from the 10-day average atmospheric residence time (Numaguti, 1999).

The annual cycle of the diagnostic precipitation $\bar{P}$ ($\bar{P} = E - P < 0$), strongly depends on the selected integration time of the trajectories.



3. Concluding remarks

- The regional RT-WV depends of the dynamical processes underlying in the transport mechanisms (intensity of advective and convective processes and the mechanisms that cause precipitation), the distance between source and target region and the seasonality related to general circulation.
- Recycling from terrestrial sources has shorter RT-WV compared with far Atlantic sources while Pacific sources have a markedly seasonal RT-WV.
- The characterization of regional RT-WV is useful to minimize the under/over estimations of moisture contributions related to time integration since the shape of annual cycle and the amount of precipitation are strongly linked to the moisture transport processes in tropical areas.

4. References

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Acknowledgements

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