

Advanced School and Workshop on American Monsoons:
progress and future plans

Contrasting rainfall behavior between the Pacific coast and the Mexican Altiplano

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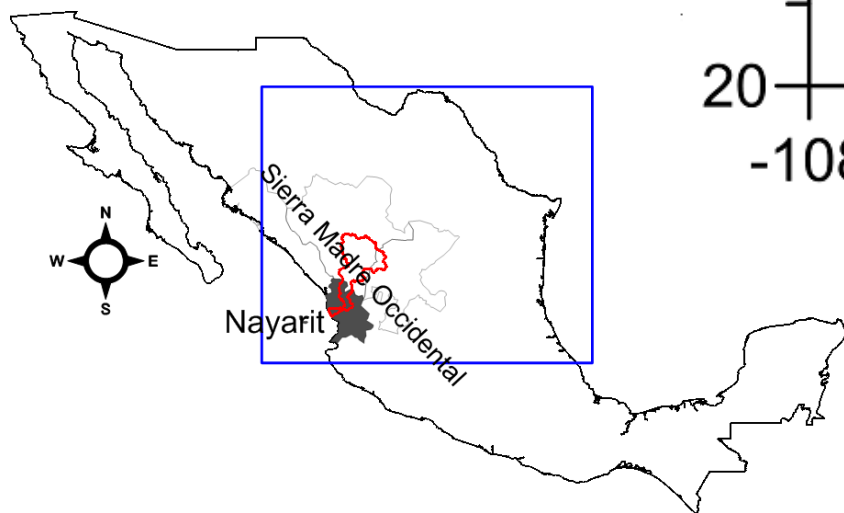
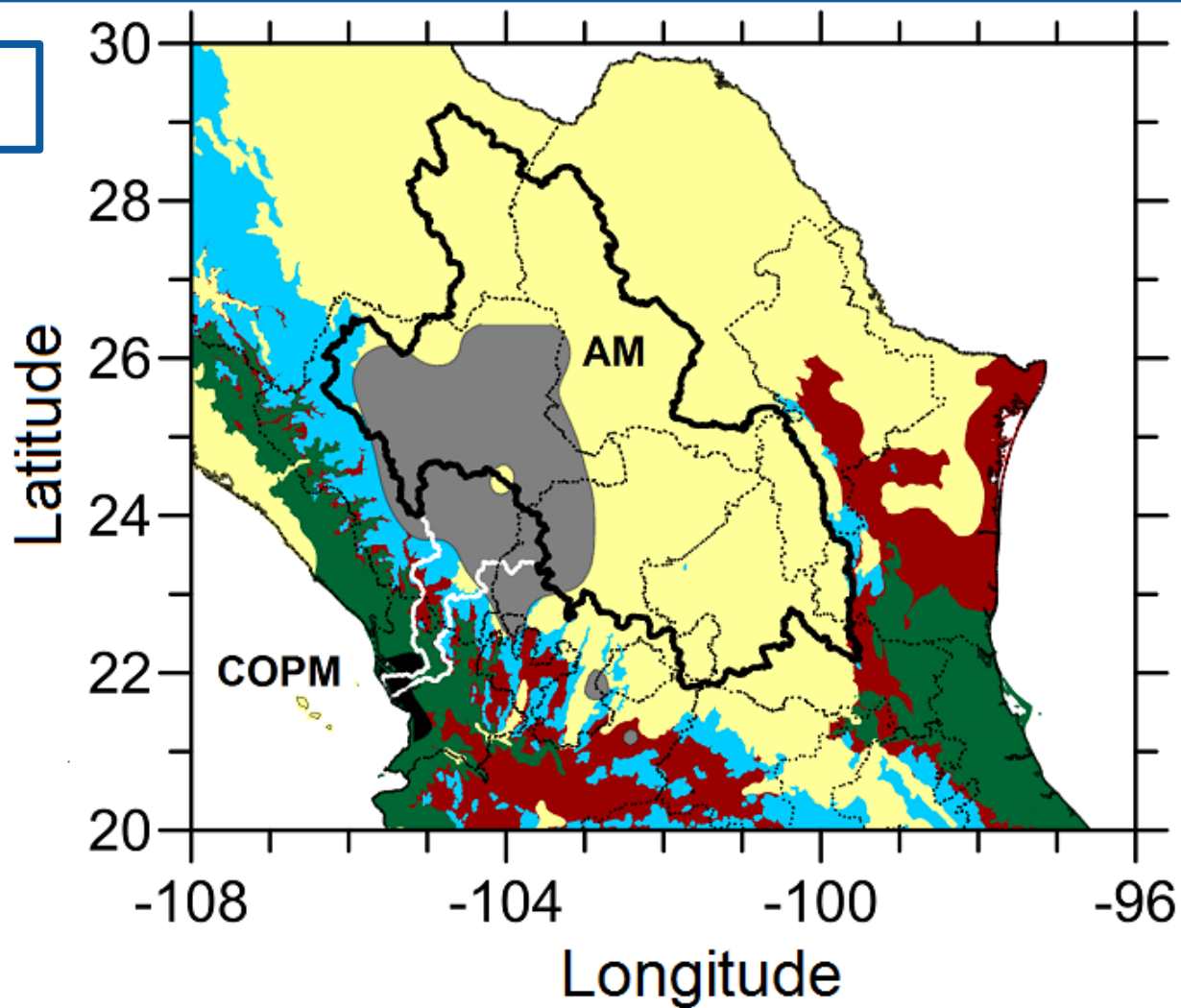
With collaboration: Brito-Castillo L; Farfán LM

São Paulo, Brazil. August 2019

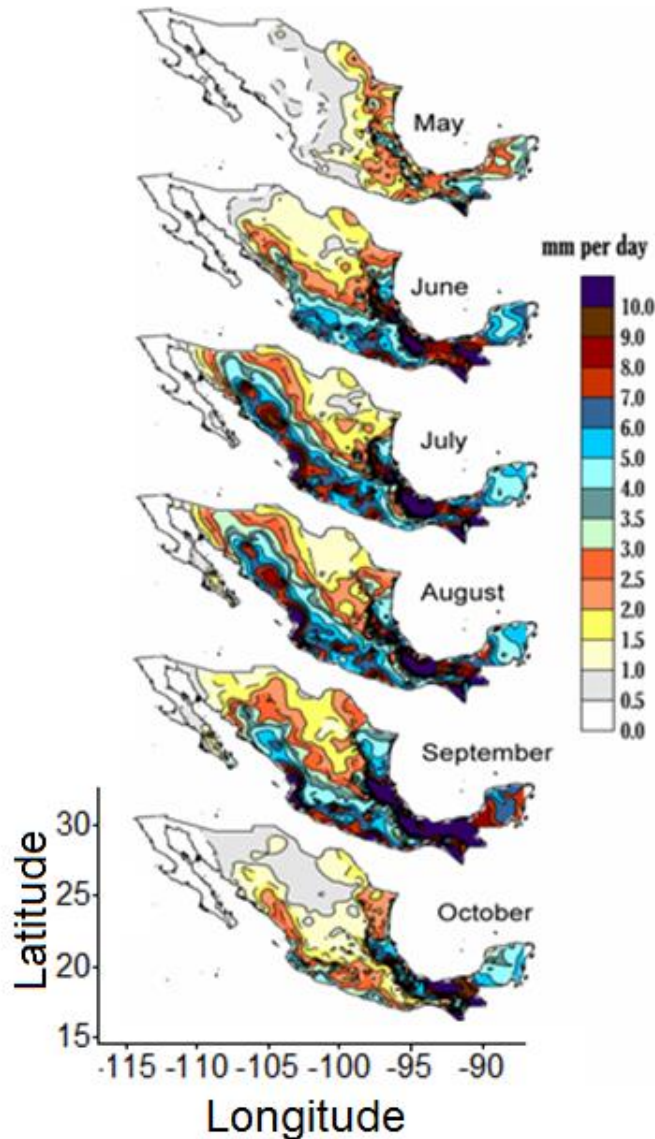
Introduction

Climates

- Tropical rainy, A
- Temperate rainy, C
- Semi-warm Subhumid, (A)C
- Dry, B



Distribution of summer rainfall



Our goal was to document the behavior of rainfall observed between the coast of Nayarit and the Mexican Altiplano.

Study Area

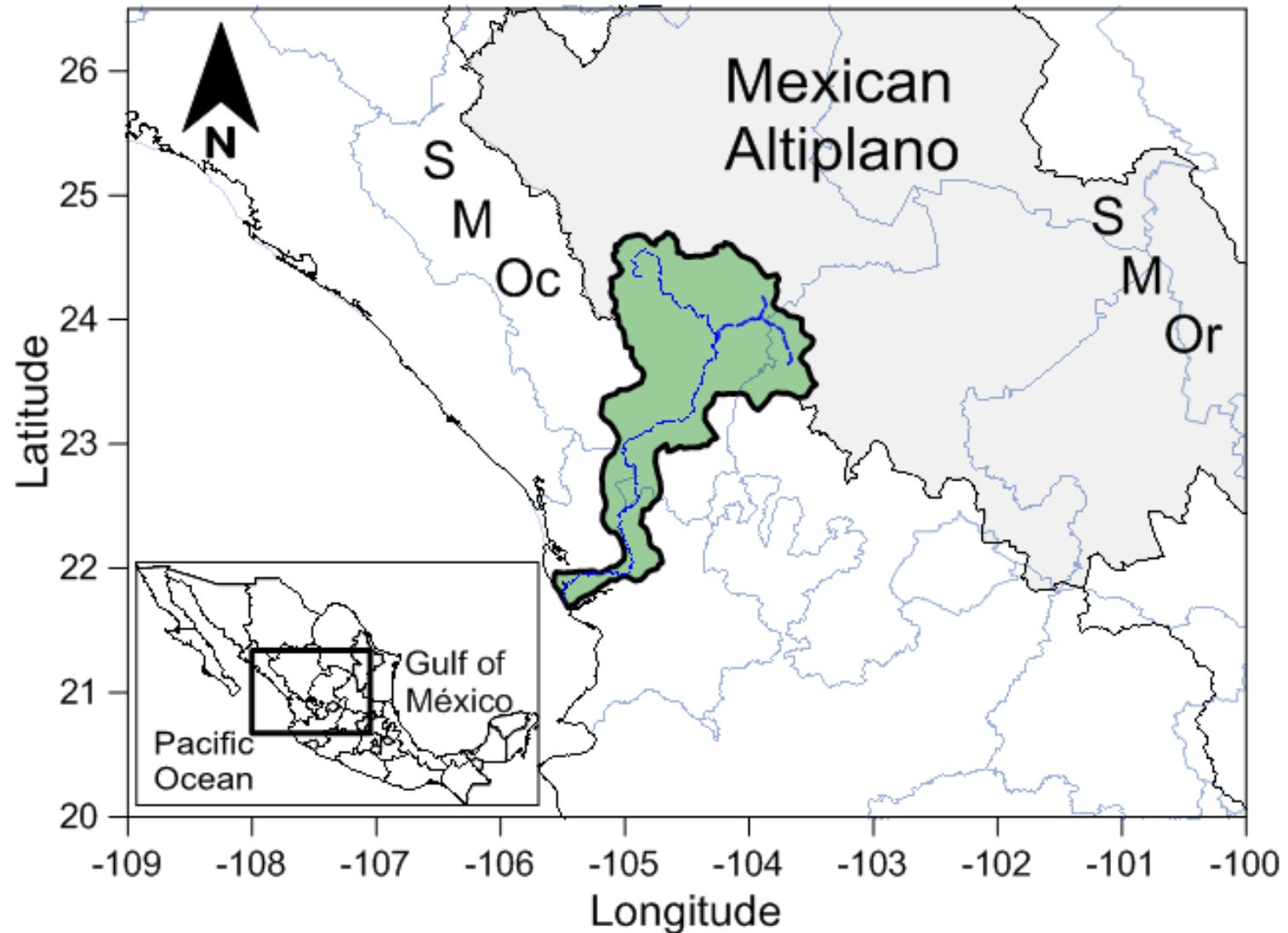
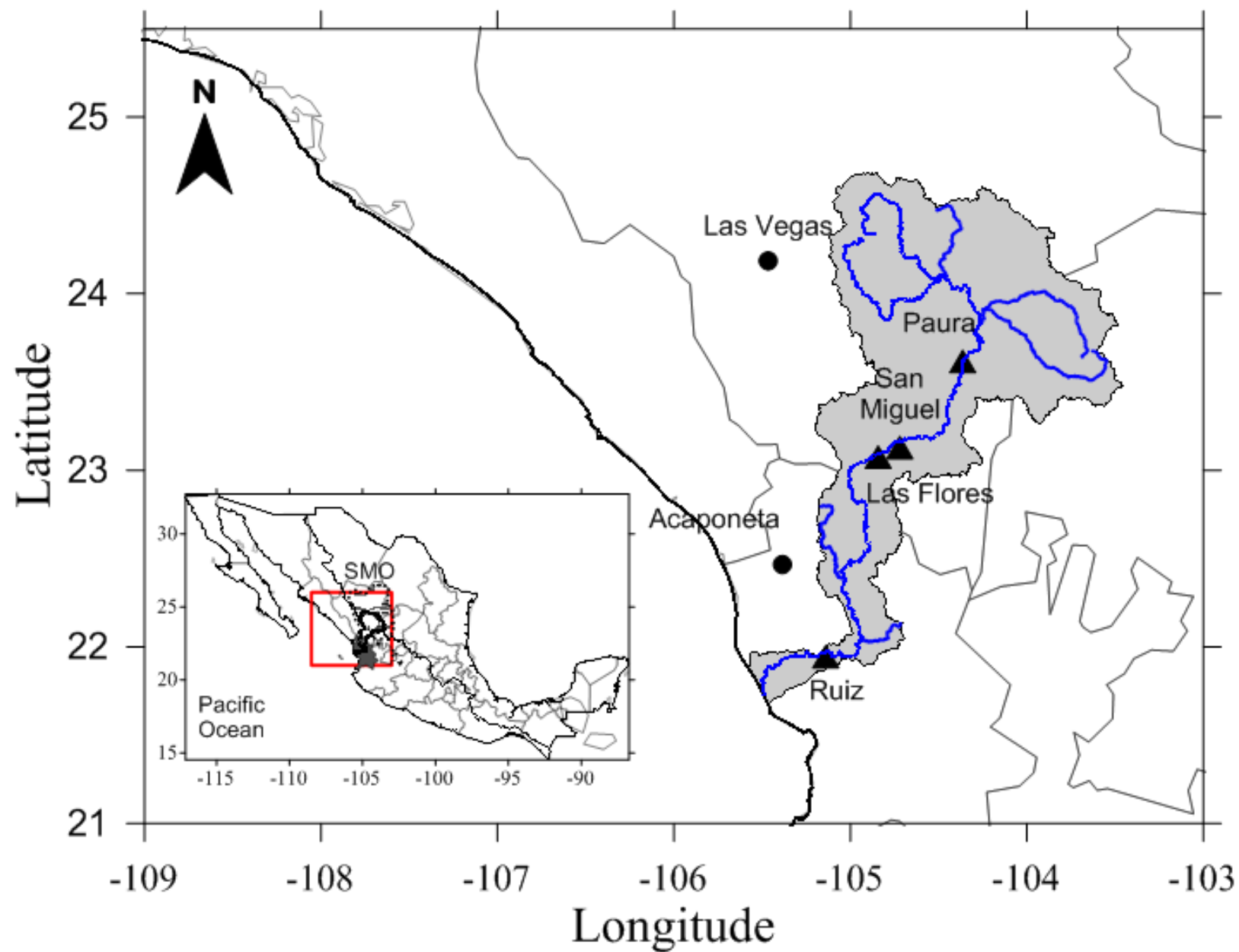


Fig. Study area and geographical locations. SMOc: Sierra Madre Occidental; SMOr: Sierra Madre Oriental





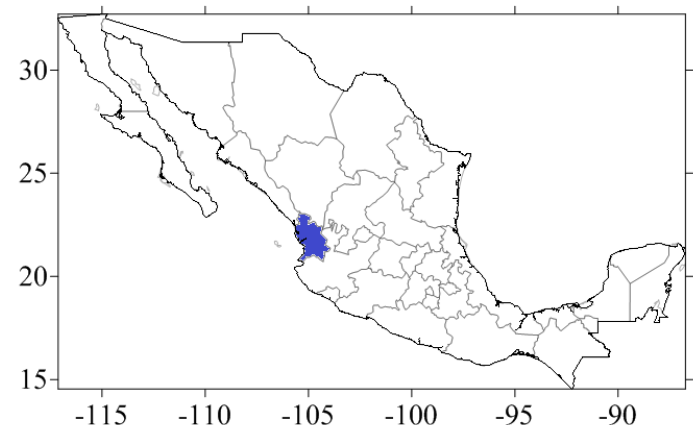
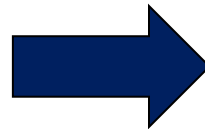
Results

CONAGUA, 2015

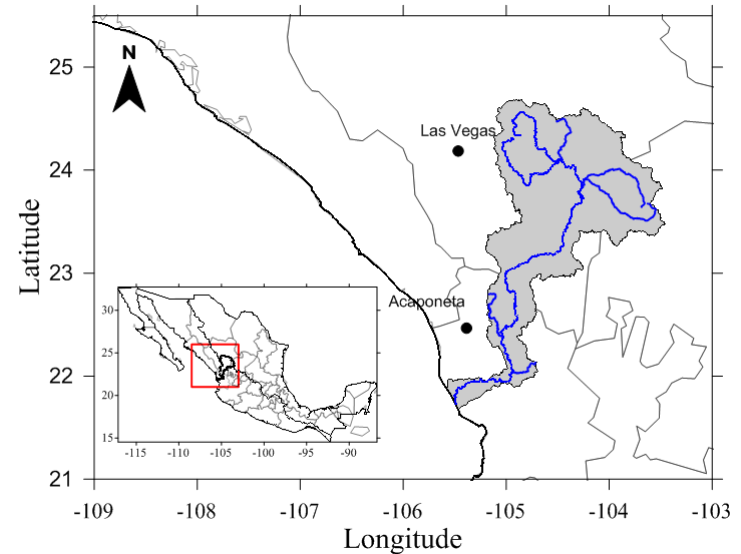
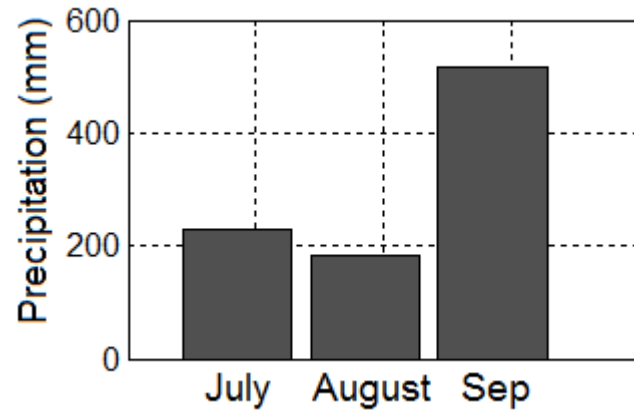
Overall the quarter July-September 2015 was ranked as the fifth quarter driest nationwide in the period 1941-2015.

Month/ Station	July		August		September		Total	
	2015	Clim	2015	Clim	2015	Clim	2015	Clim
Acaponeta	229	351	184	372	517	319	930	1042
Las Vegas	192	176	116	169	110	147	418	493
Paura	160	NA	71	NA	77	NA	308	NA
Las Flores	199	NA	230	NA	158	NA	587	NA
San Miguel	181	NA	135	NA	234	NA	550	NA
Ruiz	278	NA	411	NA	569	NA	1258	NA

September de 2015
Nayarit +

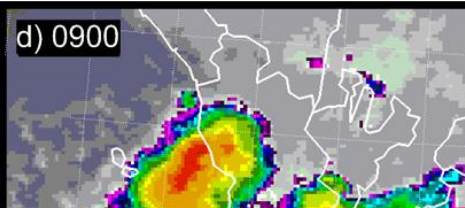
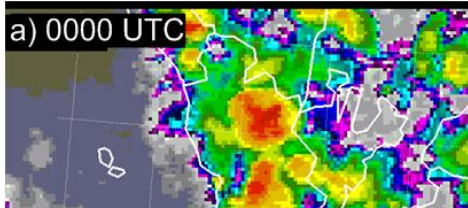


Seasonal analysis of precipitation



Month/ Station	July		August		September		Total	
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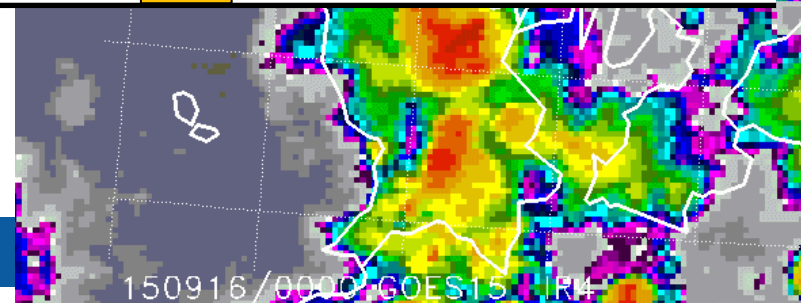
Convective activity (MCS)



Month		Day	Accumulated Rainfall (mm/24hrs)
July	1	12-13	16.51
	2	19-20	14.72
	3	30-31	78.08
August	1	02-03	43.00
	2	14-15	57.65
	3	30-31	30.13

Month		Day	Accumulated Rainfall (mm/24hrs)
Sep.	1	04-05	21.02
	2	07-08	19.81
	3	09-10	78.08
	4	10-11	74.84
	5	11-12	53.94
	6	15-16	25.39
	7	16-17	104.65
	8	17-18	112.14
	9	19-20	29.15
	10	22-23	37.33
	11	23-24	16.00
	12	24-25	52.59

Howard y Maddox, 1988
September 16, 2015



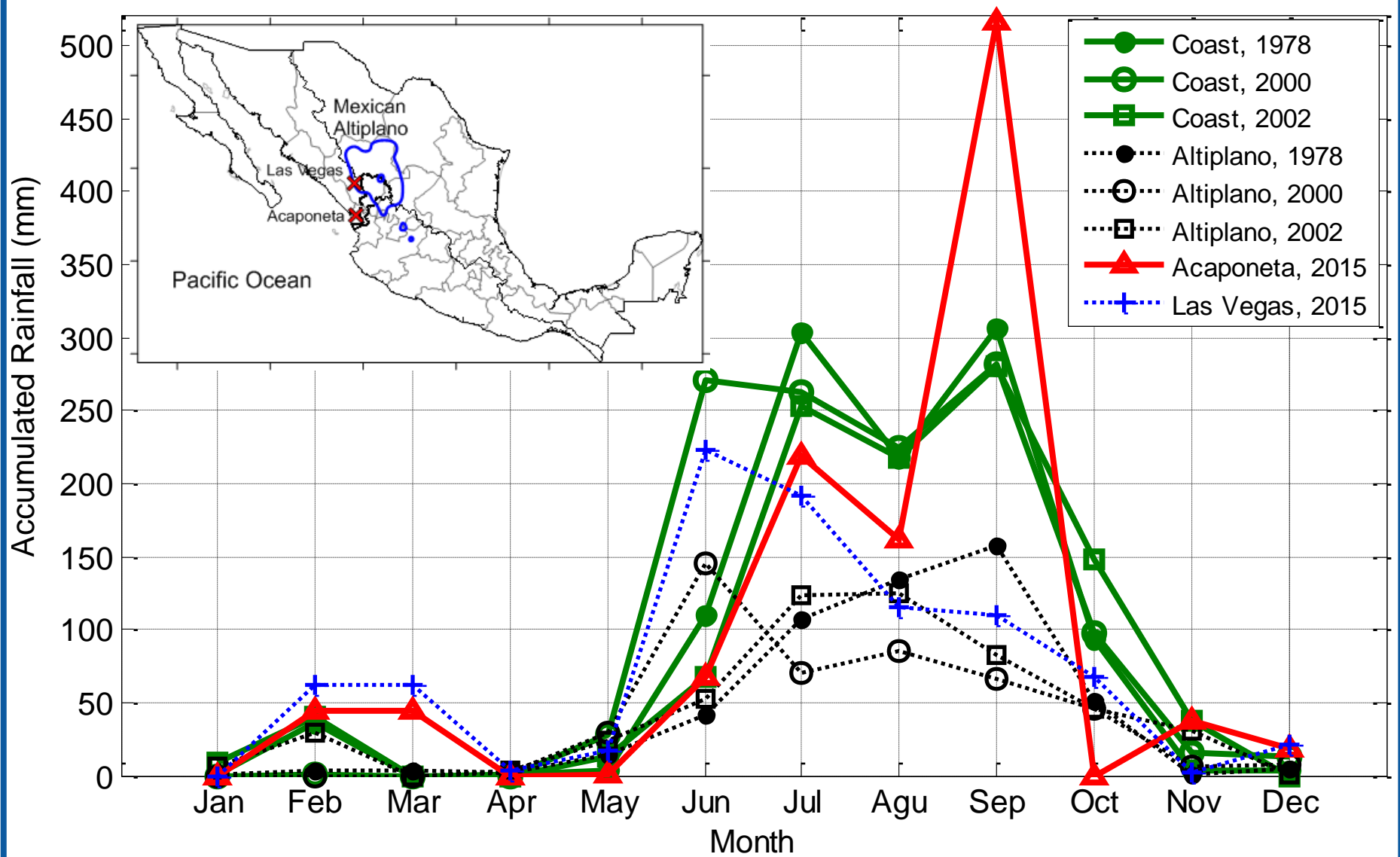


Fig. Accumulated monthly rainfall

Rainfall and wind distribution

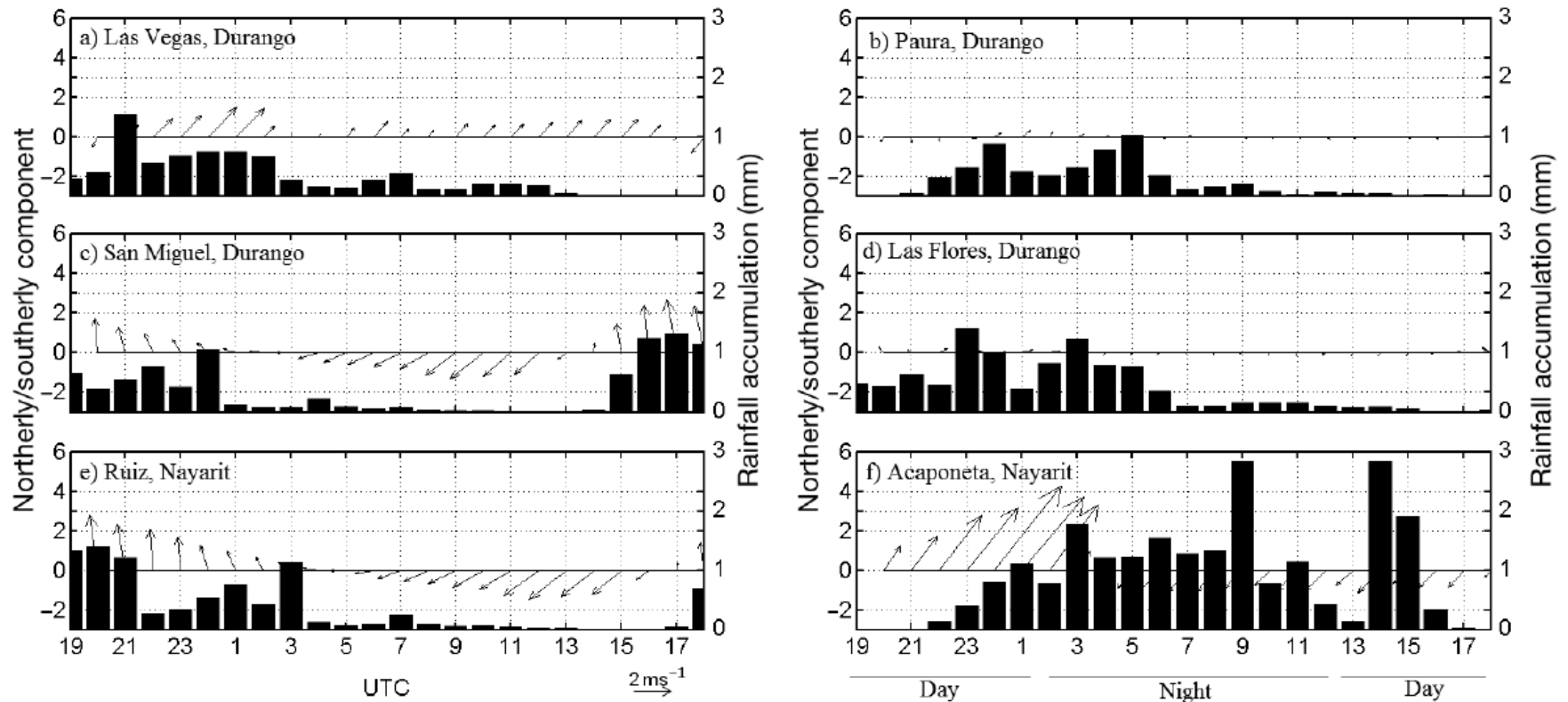


Fig. Average rainfall accumulation and wind vectors at hourly intervals from 1 July through 30 September 2015

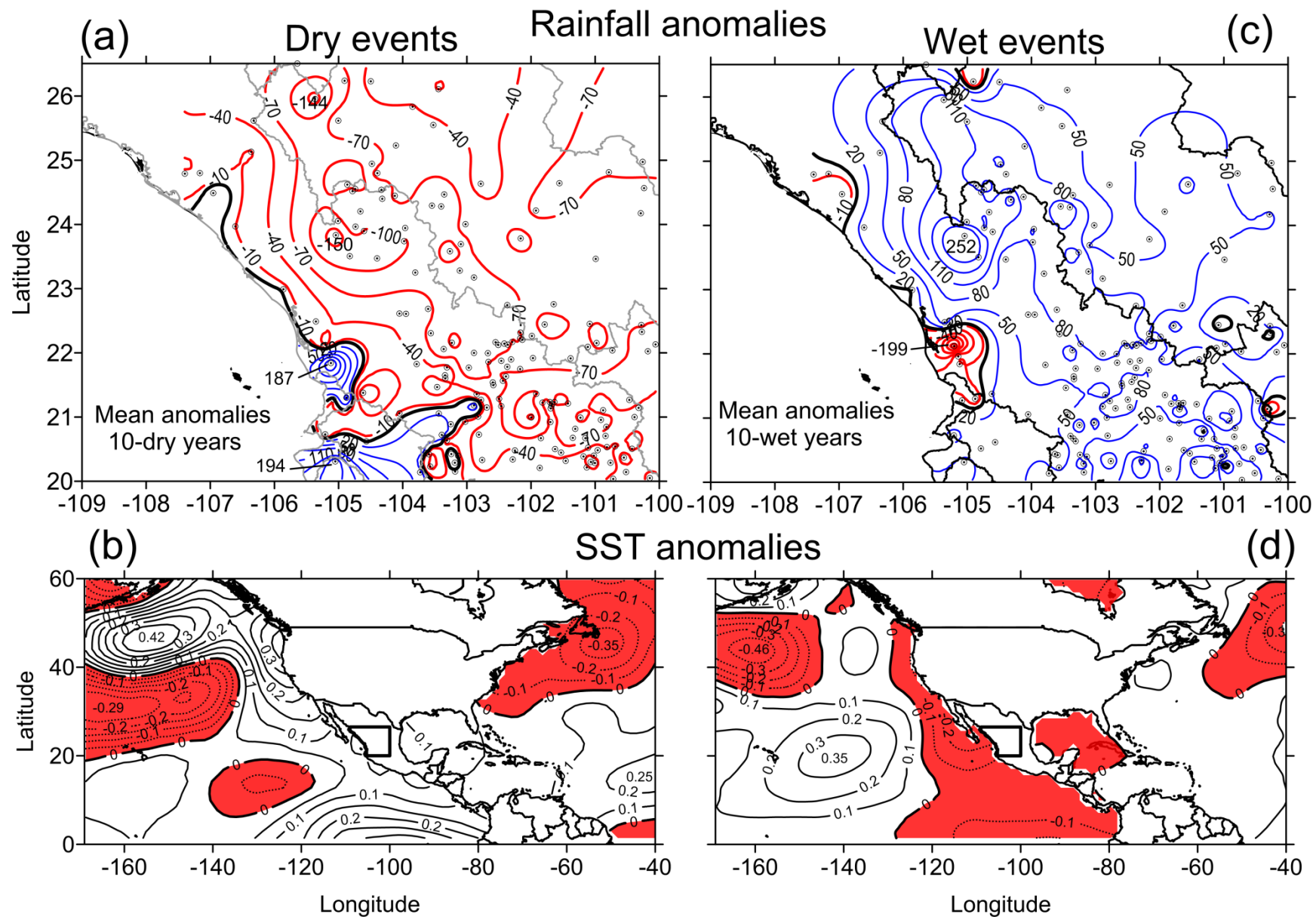
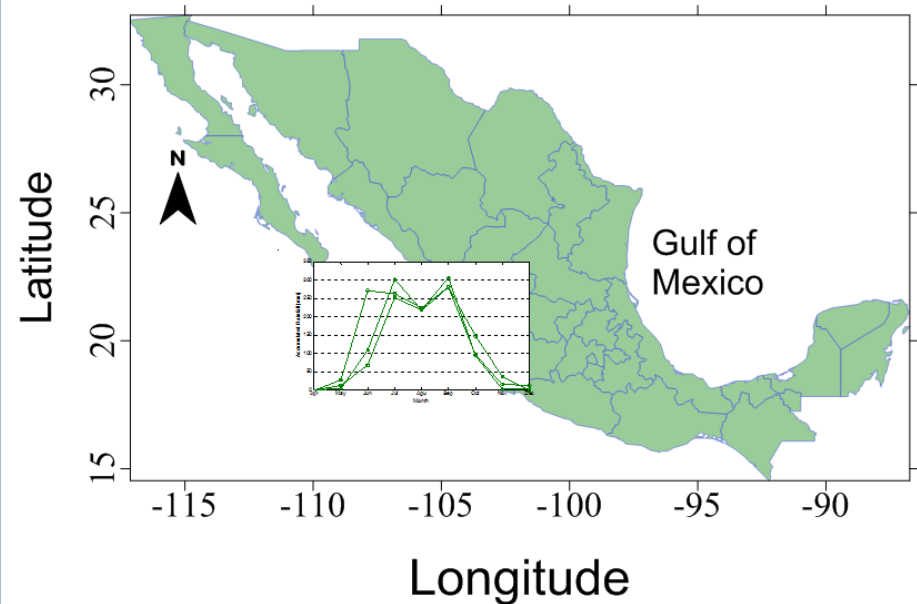


Fig. Average rainfall (a, c), and SST (b, d) anomaly contours

Summary

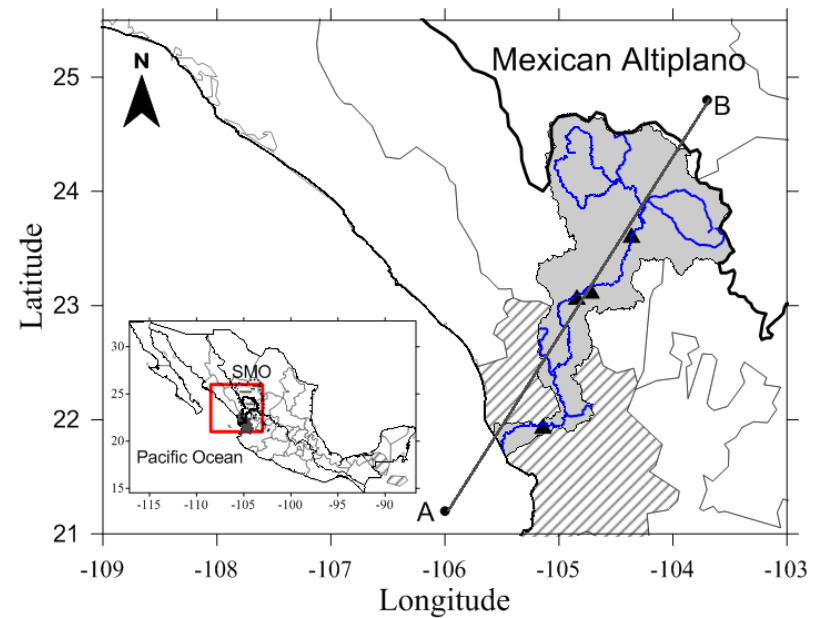
For the region between the coast of Nayarit and the Mexican Altiplano, a seesaw behavior in rainfall, with relatively dry conditions on the continent and more rainfall along the coast and vice versa, occurred during the summer of 2015. A similar condition occurred in 2000 and 2002.

This behavior resembles the midsummer drought in southern Mexico and Central America. The mechanism causing this behavior originates from the gap in the occurrence of MCSs. That is, there are environmental conditions that provide more convection and enhanced rainfall in September over the coastal areas.



Some of the moisture from the eastern Pacific coast is advected into the continent, affecting portions of Nayarit, Durango, and Zacatecas. Between Nayarit and the Mexican Altiplano, there is a seesaw behavior, primarily due to intense and severe drought conditions

(Vega-Camarena et al. 2018
doi:[10.1002/joc.5215](https://doi.org/10.1002/joc.5215)).



Thank you!

Vega-Camarena JP, Brito-Castillo L, Farfán LM (2018) Contrasting rainfall behavior between the Pacific coast and the Mexican Altiplano. *Clim Res* 76:225-240.

<https://doi.org/10.3354/cr01538>