Area Forecast Discussion: Punta Arenas and Resistencia
Date: Tuesday 05 March 2019
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Big Picture Perspective

The MJO is currently in phase three over the Indian Ocean but is forecasted to quickly weaken as it reaches phase four by the end of the forecast period. This global pattern may influence precipitation anomalies on the southern extent of South America. In the mid-range positive height anomalies at 500-hPa are expected over Southern Argentina. This feature is described in Matsueda and Takaya 2015 to be associated with the MJO during phases 4–7 and may be the cause of higher precipitation through the southern tip do to anticyclonic flow. Possibility of anticyclonic wave breaking and cut off in the extended may cause colder temperature anomalies over Northern Argentina but uncertainty is high. This cut off feature is consistent in the dprog/dt but there is large uncertainty in its location, ultimately affecting where the colder temperatures set up. Moisture from the South American Monsoon contributes to large moisture fluxes through Northern Argentina as shown on IVT with possible enhancement from the MJO according to Zhang 2013.

Extended Range: Day 7-10

The ridge over the southern tip will become more zonal ahead of a recently cut off shortwave moving in. The cut off is forecast to move North of an area with continuous ridge building, producing a rex block and rain on the southern tip on 13 February. The cut off low over the Andes is forecasted to weaken and start propagating eastward as a shortwave as seen on the 500 hPa map. An anticyclonic circulation off the east coast will help bring high percipitable water values southward in front of the shortwave, producing some rain in southern Brazil. The onshore flow in northern South America shifts to easterly instead of northerly by the beginning of the period, keeping northern South Africa very moist throughout the period. Afternoon convection will continue from the medium range forecast, but will shift more northward. Punta Arenas will stay dry with near climatological temperatures for most of the period before the rain comes in at the end. Resistencia will be cloudy for most of the period with slightly colder than normal temperatures and some rain towards the end of the period.

Medium Range: Day 4-6

The medium range period starts with a ridge off the southwestern coast of South America, causing a surface anticyclone just off the coast, a trough off the eastern coast. And a ridge with a surface anticyclone to the southeast of Brazil. There is also a stationary cut off low over the Andes for the majority of the period because of an anticyclonic wave break which kept the southern tip under a ridge for almost the entire period. An atmospheric river on the upstream side of the ridge in the Pacific will bring anomalously high precipitable water values to the southern tip. A shortwave trough travelling over the ridge will be able to tap into this moisture to produce widespread rain on 8 February off the southern tip through cyclonic vorticity advection and divergence associated with the poleward exit region aloft. Meanwhile, the anticyclone to the east of Brazil will cause northeasterly low level flow in northern South America, bringing moisture with it. This low level moisture transport coupled with anomalously warm surface temperatures will produce widespread instability, causing diurnal heating forced precipitation in northern South America for the majority of the period. The atmospheric river in the west will continue into the middle of the period, when another shortwave trough will cause more rain off the southern tip. The end of the period will leave the southern tip of South America under a zonal ridge with a surface anticyclone off the western coast.

Short Range: Day 0-3

Leading up to the forecast period a slight blocking pattern is present over the Southern Pacific keeping the southern tip under a wet regime. As the blocking pattern breaks up at the beginning of the period due to cyclonic wave breaking resulting in fairly zonal flow across the forecast region. Associated with this zonal flow is large values of integrated vapor transport following the jet stream pattern. Warm tropical air advected by a high pressure system over 120W contributes to vapor transport and advection of precipitable water into South America. A trough builds in the mid Southern Pacific because of CAA and CVA near the end of the period. This deep trough picks up moisture from the tropical Pacific leading to the atmospheric river that sets up during the medium range.

Probabilistic Forecast

Punta Arenas, Chile:
Day 0-3:
Max Temp: 10ºC (10th), 13ºC (50th), 15ºC (90th)
Min Temp: 5ºC (10th), 8ºC (50th), 9ºC (90th)
Precip: 1 mm (10th), 3 mm (50th), 5 mm (90th)

Day 4-6:
Max Temp: 13ºC (10th), 15ºC (50th), 16ºC (90th)
Min Temp: 4ºC (10th), 6ºC (50th), 8ºC (90th)
Precip: 3 mm (10th), 5 mm (50th), 12 mm (90th)

Day 7-10:
Max Temp: 11ºC (10th), 12ºC (50th), 13ºC (90th)
Min Temp: 5ºC (10th), 6ºC (50th), 8ºC (90th)
Precip: 4 mm (10th), 8 mm (50th), 10mm (90th)

Resistencia, Argentina:
Day 0-3:
Max Temp: 30ºC (10th), 32ºC (50th), 33ºC (90th)
Min Temp: 22ºC (10th), 23ºC (50th), 24ºC (90th)
Precip: 15 mm (10th), 25 mm (50th), 40 mm (90th)

Day 4-6:
Max Temp: 23ºC (10th), 25ºC (50th), 29ºC (90th)
Min Temp: 19ºC (10th), 21ºC (50th), 22ºC (90th)
Precip: 10 mm (10th), 15 mm (50th), 25 mm (90th)

Day 7-10:
Max Temp: 26ºC (10th), 28ºC (50th), 30ºC (90th)
Min Temp: 18ºC (10th), 19ºC (50th), 20ºC (90th)
Precip: 8 mm (10th), 15 mm (50th), 20 mm (90th)