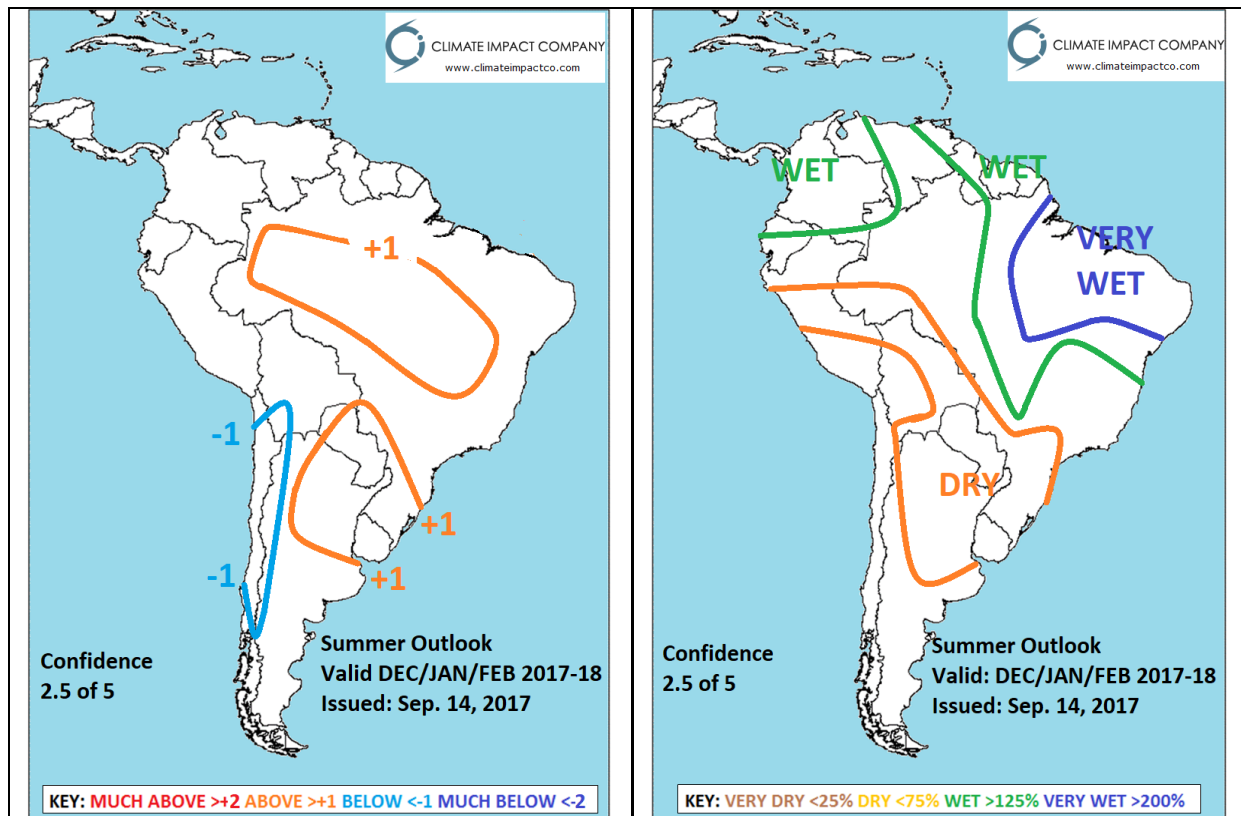


Climate Impact Company Season 1-3 Ahead Outlook for South America

Issued: Thursday, September 14, 2017

Executive Summary: The risk of La Nina developing for summer 2017-18 is increasing. The attendant climate pattern is forecast to generate mid-to-late summer based on a constructed analog. However, the onset of north/central South America rains, particularly in Brazil may emerge more quickly. The summer 2017-18 outlook is potentially very wet across central and northeast Brazil. The dryness in Brazil should erode this summer season. Meanwhile a potentially strong dry pattern emerges during summer for north/northeast Argentina to far southeast Brazil.

Meteorological Summer 2017-18 Outlook for South America



Winter 2017 review: Winter 2017 was warm and mostly dry across Brazil while patchy wet and dry areas with near normal temperatures dominated to the south of Brazil (*Fig. 1-2*). The Climate Impact Co. forecast was too warm in Argentina and too wet across western Brazil (*Fig. 3-4*).

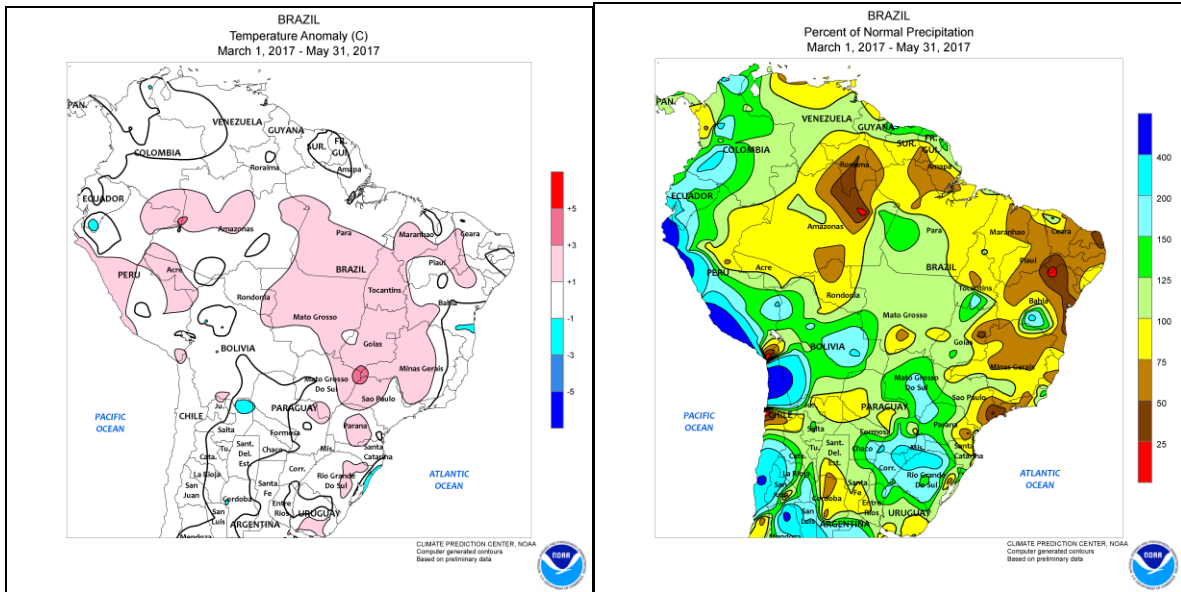


Fig. 1-2: Preliminary winter 2017 temperature and precipitation rate anomalies are indicated.

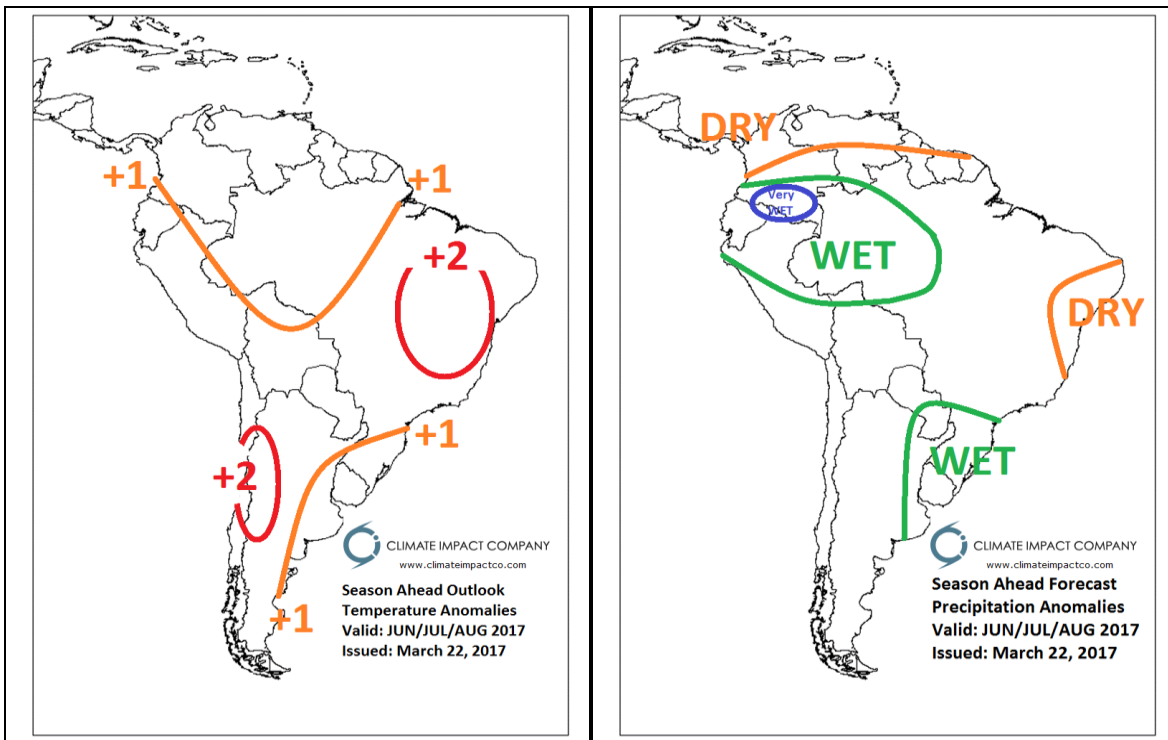


Fig. 3-4: The Climate Impact Company JUN/JUL/AUG 2017 temperature and precipitation anomaly forecast across South America is indicated.

Forecast process for the next 3 seasons: The 3 season ahead outlook is based on a constructed analog. A constructed analog takes into consideration many aspects of climate besides ENSO with regression to indicate JUN/JUL/AUG 2017 similarities before carrying the forecast process forward through autumn 2018. The constructed analog is based on similar 500 MB anomaly patterns flipped into temperature and precipitation anomalies for the forecast.

The winter 2017 prevailing upper air features across South America featured an upper ridge southeast of Brazil and a deep trough just south of the continent (**Fig. 5**). Analog years producing similar upper air results combine 2001, 2003, 2004, 2005, 2010 and 2012 (**Fig. 6**).

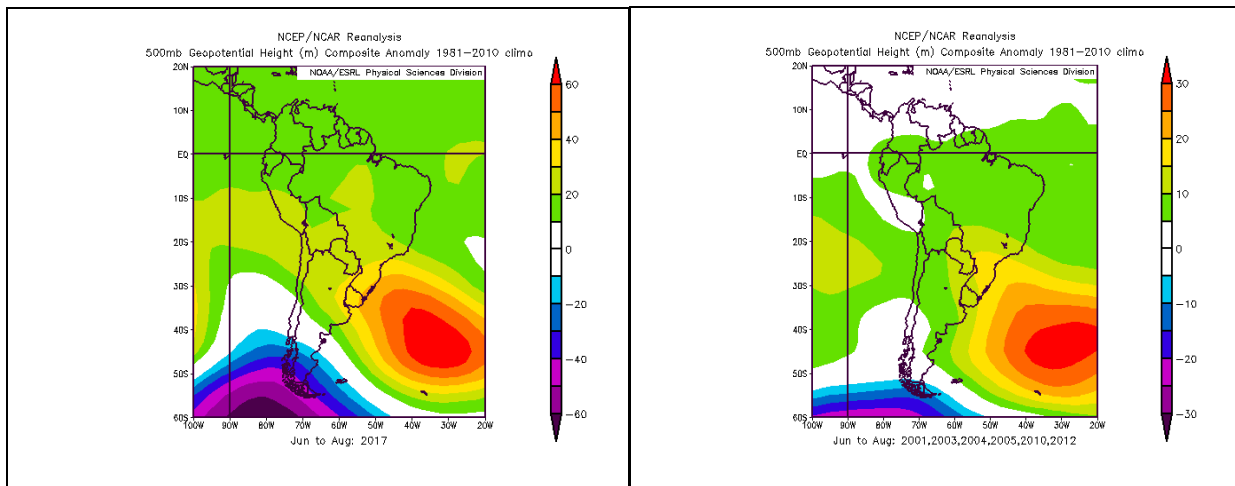


Fig. 5-6: The JUN/JUL/AUG 2017 500 MB observation (left) and forecast analog years regressed and producing similar 500 MB anomalies for winter 2017 (right).

The analog years produce neutral to weak La Nina conditions into 2018 similar to current forecasts issued by most climate centers plus the CIC analog. The ENSO forecast is best represented by the latest Bureau of Meteorology/Australia forecast which indicates a borderline La Nina (**Fig. 7**). La Nina generally favors wetter climate in central Brazil while southeast Brazil is cool.

Soil moisture will affect the summertime regime. Currently, central and northern Brazil are in drought while wet soils dominate Argentina mostly south of growing areas. Northeast Argentina to Uruguay and Paraguay have been trending drier into spring.

Southern hemisphere SSTA patterns vary widely with a cool signature off the Brazil coast while areas east of Uruguay are quite warm.

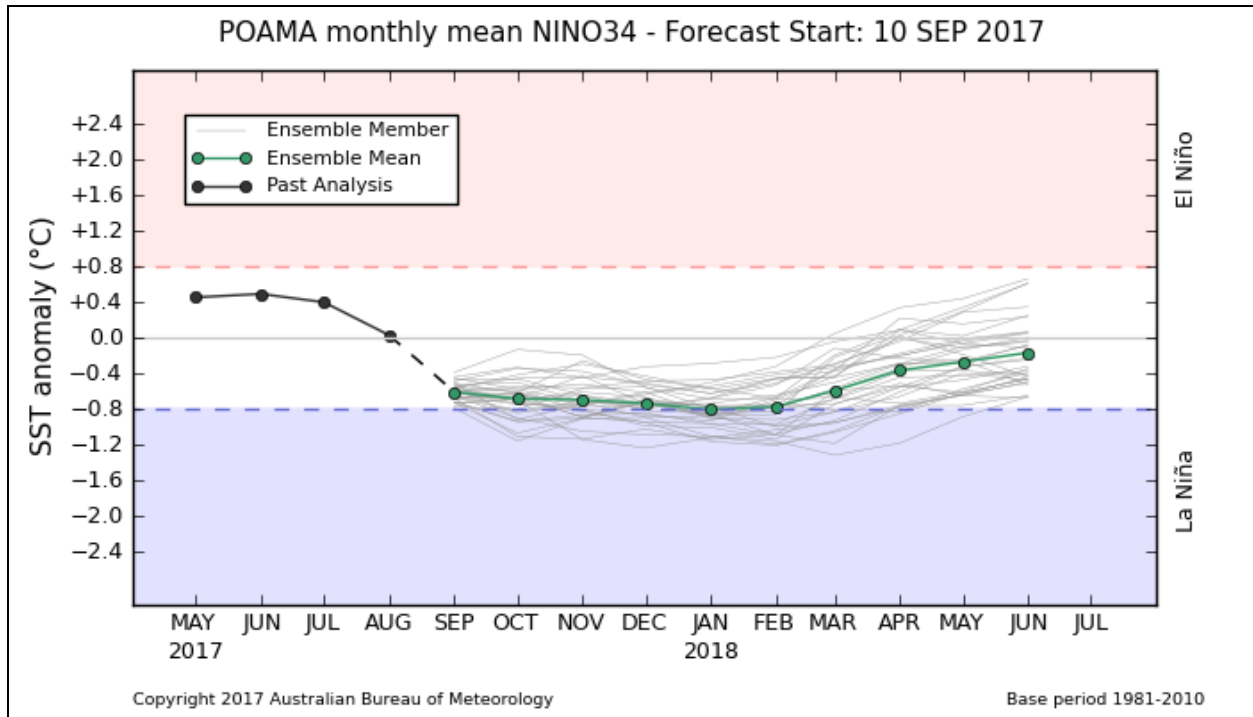


Fig. 7: Bureau of Meteorology/Australia ENSO forecast indicates weak La Nina ahead.

Climate forecast: The outlooks are generated by the constructed analog and valid for OCT/NOV 2017, DEC/JAN/FEB 2017-18 and MAR/APR/MAY 2018.

OCT/NOV 2017: The constructed analog projects a 500 MB ridge pattern across central/north Brazil and a weak trough over northeast Argentina. The mid-to-late spring temperature pattern indicates a small but potentially extreme anomalous hot weather over the dry soil region of northeast Mato Grosso and northeastward from there (*Fig. 8*). Impressive cool anomalies trail the upper trough in Paraguay to Chile.

The precipitation outlook indicates a narrow band of wetter than normal climate in northern Mato Grosso to Para just to the west of the extreme heat risk zone (*Fig. 9*). Dryness is dominant across western Brazil where drier conditions have been evolving. Mostly drier than normal climate appears in northern Argentina and eastern Brazil which is in conflict with a La Nina climate. The globally warm oceans have altered ENSO climate in recent years therefore the non La Nina-like rainfall pattern ahead of summertime is not surprising.

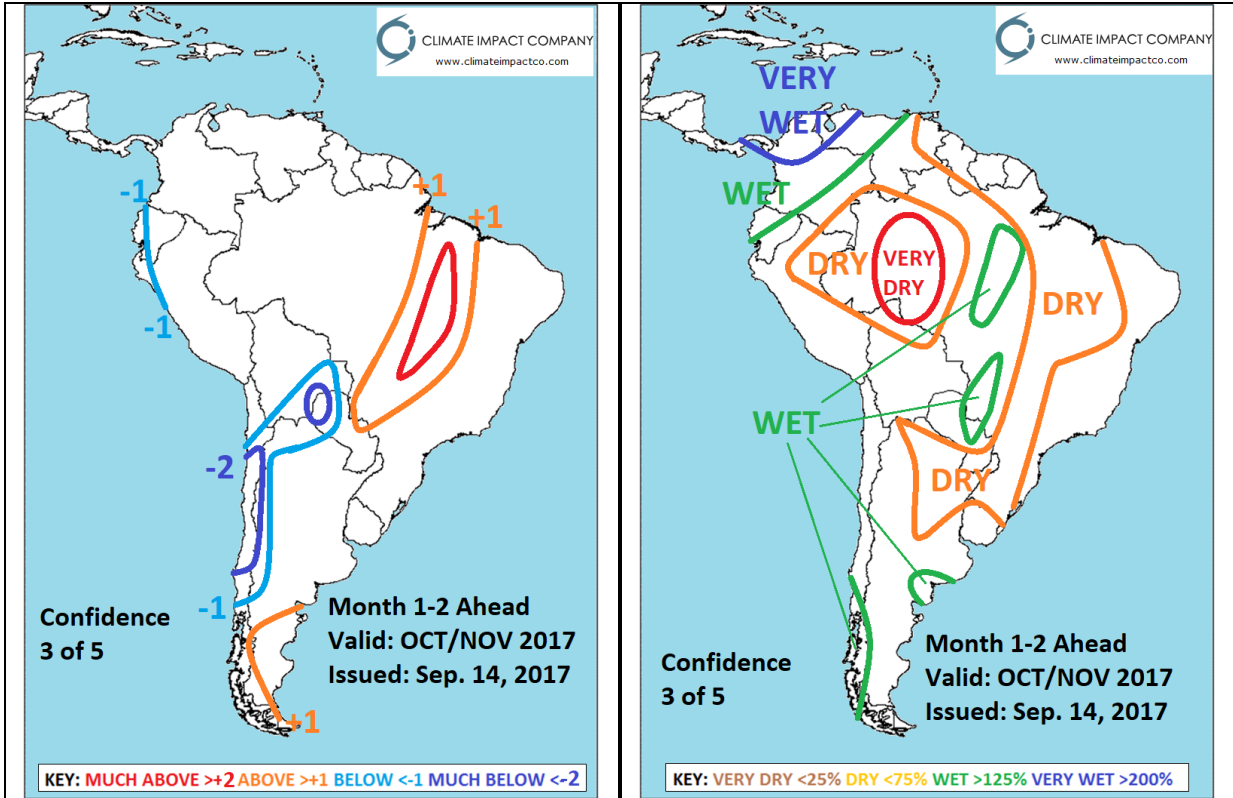


Fig. 8-9: The Climate Impact Company OCT/NOV 2017 temperature and precipitation anomaly forecast for South America.

DEC/JAN/FEB 2017-18: The summertime upper pattern is projected to feature a 500 MB ridge pattern across northern Brazil, an upper trough just off the coast of Uruguay and an strong ridge pattern across far southern South America. The summertime thermal pattern responds by producing near normal conditions based on the constructed analog. However, CIC adjusts central and western Brazil hotter than normal due to the dry soil moisture regime entering the summer season (*Fig. 10*). An eventual wet weather pattern related to weak La Nina could erase this hot anomaly mid-to-late summer.

The summertime rainfall pattern is La Nina-like into central and northeast Brazil as a wet weather regime is likely to develop mid-to-late summer (*Fig. 11*). Meanwhile a pattern change toward important dryness emerges central/northeast Argentina, Paraguay and Uruguay and southeast Brazil. This zone is likely to trend hotter than normal mid-to-late summer.

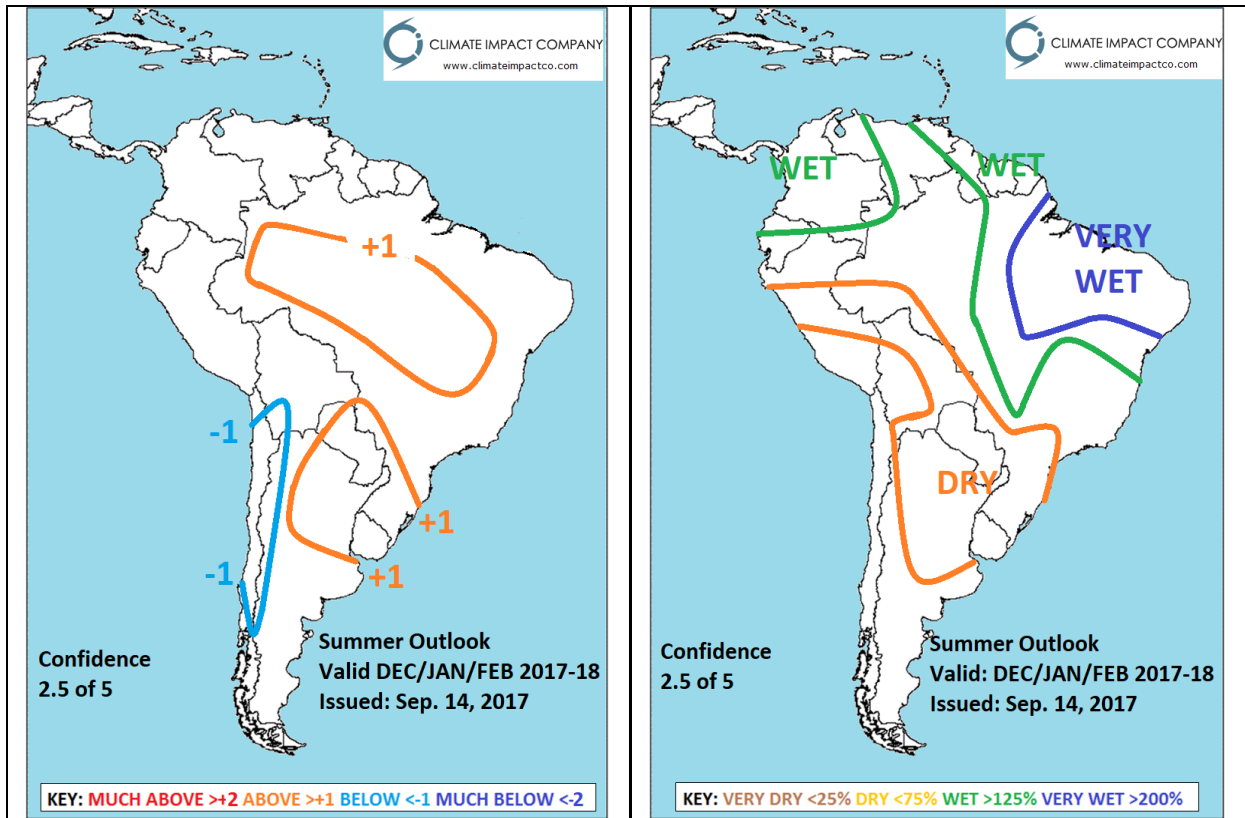


Fig. 9-10: The Climate Impact Company DEC/JAN/FEB 2017-18 temperature and precipitation anomaly forecast for South America.

MAR/APR/MAY 2018: A warmer than normal autumn is forecast across Argentina where dry conditions are present (*Fig. 11*). Northwest South America is cool. The La Nina look is maintained next autumn with wetter than normal climate forecast across much of northern South America while Bolivia to southeast Brazil are drier than normal (*Fig. 12*).

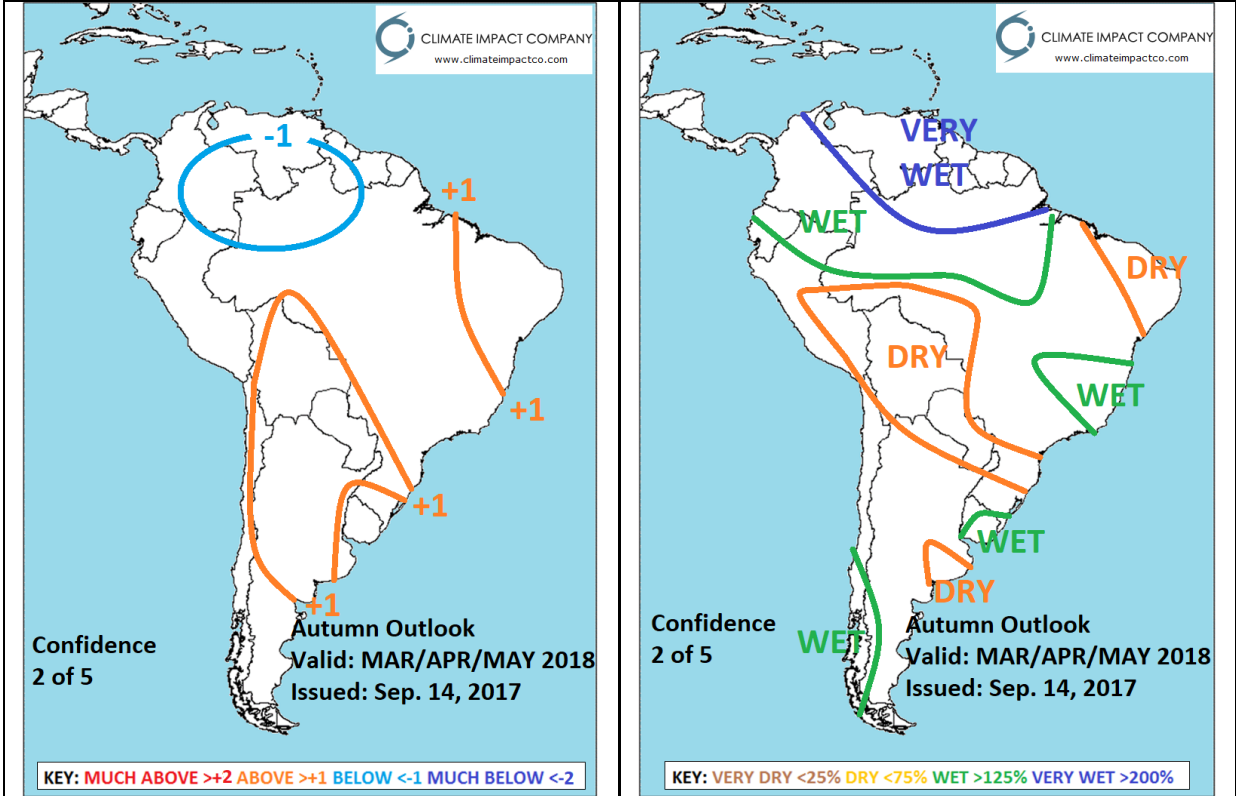


Fig. 11-12: The Climate Impact Company MAR/APR/MAY 2018 temperature and precipitation anomaly forecast for South America.