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The coastal El Niño-Event of 2017 in Ecuador and Peru - a weather Radar analysis

Rütger Rollenbeck, Andreas Fries, Jörg Bendix, Johanna Orellana-Alvear, Mario Guallpa, Franz Pucha, Rodolfo Rodriguez, and Rolando Celleri
Marburg, Laboratory for Climatology and remote sensing, Geography, Marburg, Germany (rollenbeck@lcrs.de)

The arid coastal region of Ecuador and Peru belong to the regions experiencing the strongest impact of the El-Niño-Phenomenon. In spite of neutral to cold conditions after the decaying 2015/16 El Niño, unexpected by internationl scientists and local authorities alike, in 2017 the region was hit by torrential rain falls causing floodings, erosion and landslides with many fatalities and significant damage to infrastructure.

RadarNetSur (www.radarnetsur.de), initiated in 2012 to 2015 forms the first weather radar network in that region and was capable of monitoring the development of the 2017 event up to its culmination, providing insight into rainfall distribution (resolution of 500 m) on a 5-minute time step. The network consists of 3 X-Band-scanning weather Radars with a range of 60 to 100 km, thus covering 80000 km² from 2° S to 4°S. In 2019 the network was extended far into Peru with a new system in Piura.

We present results of the analysis of the event and compare it to the conditions in the years 2014, 2015 and 2016, to point out spatial patterns and process dynamics, which led to this unusual coastal El-Niño during central Pacific La-Niña conditions. Apparently, the isolated warming of the Niño 1+2 regions off the coast was the main driver of these strong rainfalls, but the local expression of weather patterns is shaped by topographic conditions interacting with the synoptical situation (West wind bursts) and small-scale circulation systems like the sea-breeze and mountain-valley breeze. Most intense rainfall is associated with disturbances in the divergence field which are intensified by changes of the synoptical flow direction. We assume, that either the conventional understanding of the ENSO-impact on the regional scale is insufficient, or, the ENSO-phenomenon is slowly transitioning into a more complex behavior.