The subduction of the Nazca Plate beneath the South American Plate along Chile has led to some of the largest earthquakes recorded on modern seismic instrumentation. These include the 1960 M 9.5 Valdivia, 2010 M 8.8 Maule, and 2014 M 8.1 Iquique earthquakes. Slip heterogeneity for both the 2010 and 2014 earthquakes has been noted in various studies. In order to explore both spatial variations in the continued aftershocks of the 2010 event, and also seismicity to the north along Iquique prior to the 2014 earthquake relative to the high slip regions, we are expanding the catalog of small earthquakes using template matching algorithms to find other small earthquakes in the region. We start with an earthquake catalog developed from regional and local array data; these events provide the templates used to search through waveform data from a temporary seismic array in Malargue, Argentina, located ~300 km west of the Maule region, which operated in 2012. Our template events are first identified on the array stations, and we use a 10-s window around the P-wave arrival as the template. We then use a waveform cross-correlation algorithm to compare the template with day-long seismograms from Malargue stations. The newly detected events are then located using the HYPOINVERSE2000 program. Initial results for 103 templates on 19 of the array stations show that we find 275 new events, with an average of three new events for each template correlated. For these preliminary results, events from the Maule region appear to provide the most new detections, with an average of ten new events. We will present our locations for the detected events and we will compare them to patterns of high slip along the 2010 rupture zone of the M 8.8 Maule earthquake and the 2014 M 8.1 Iquique event.
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