The Mw 8.3 2015 Illapel afterslip imaged through a time-dependent inversion of continuous and survey GPS data

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The Mw 8.3 2015 Illapel earthquake ruptured a 190 km long segment of the Chilean subduction zone. In the past, this area ruptured several times through large and great earthquakes, the most recent event before 2015 being a Mw 7.9 earthquake in 1943. Here, we combine continuous and survey GPS ground displacements to perform a kinematic inversion of the two-months afterslip following the mainshock. We show that the postseismic slip developed South and North of the coseismic rupture, but also overlaps the deeper part of it. We estimate that two months after the large mainshock, the postseismic moment released represents 13\% of the coseismic moment (the mainshock released 3.16\times10^{21} \text{ N.m} whereas the afterslip released 3.98\times10^{20} \text{ N.m}). At a first order, seismicity and areas experiencing afterslip match together and are concentrated at the edges of the coseismic rupture between 25 and 45 km depth. One interesting feature is the occurrence of two moderate size aftershocks on November, 11\textsuperscript{th} at shallow depth North of the rupture. We investigate the relationship between the evolution of afterslip and these aftershocks. Finally, we interpret the result in the light of past earthquakes history and calculate the moment balance through the last centuries.