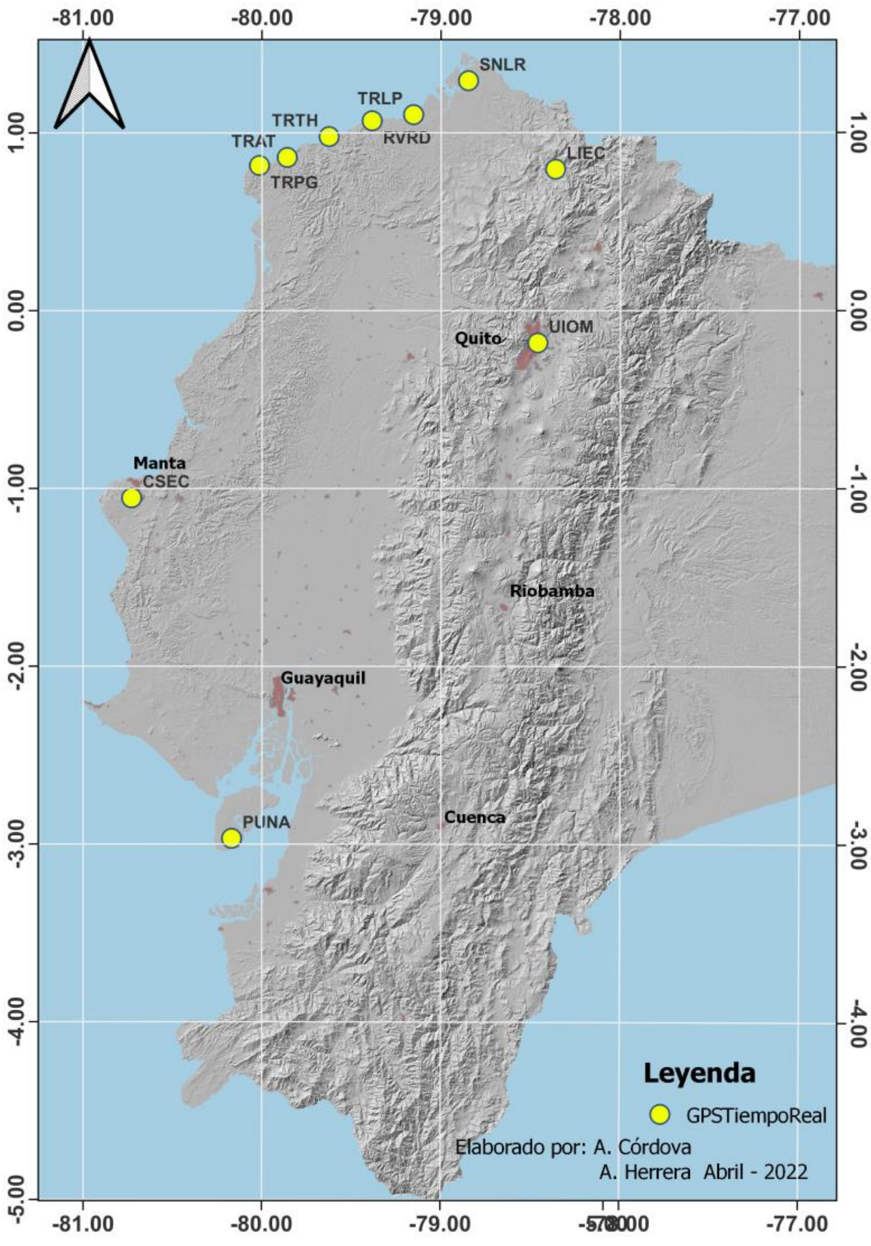
Due to strong coupling along the Nazca-South American plate interface large megathrust earthquakes in 1906, 1942, 1958, 1979 and 2016 ruptured segments of the subduction zone in northwestern South America, near the Ecuador-Colombia border. The 1906 M_w 8.6 megathrust earthquake, that ruptured a 300+ km length of the subduction interface, generated a tsunami that reached Hilo, Hawaii with a 3.6m high wave (Yamanaka and Tanioka, 2018). Another tsunami resulted from the 1979 Tumaco, Colombia M_w 8.1 earthquake and produced a 2.5m high wave. Along patches of the 300 km-long Esmeraldas-Nariño segment an annual slip deficit of ~4.5 cm is accumulating since the 1906 earthquake and equals a total slip deficit of ≥5 m; an M_w ~8 earthquake could result. Since seismic systems tend to suffer magnitude saturation above a certain magnitude, the magnitude estimate is biased low (Wu et al., 2006; Brown et al., 2011). Global Navigation Satellite System (GNSS) methods do not suffer the problem of magnitude saturation, due to the direct measurement of ground displacement (Crowell et al., 2013; Melgar et al., 2013), and therefore are reliable to obtain a good approximation of the magnitude of a local seismic event based on peak ground displacement (PGD).

In anticipation of earthquake and tsunami threats to Ecuador, a ten station real-time GPS network was installed and is functioning at critical sites along the Ecuadorian coast and at a few inland sites. Preference for station location is biased towards segments that have not had strong seismic rupture in about 50 years and strain is accumulating. Satellite and microwave systems transmit the data from the field to the IG-EPN where it is streamed, via N-Trip Caster, to several external analysis centers to provide a robust comparison of results concerning peak ground displacements (PGD) and assess tsunami potential for a specific earthquake. The IG-EPN´s next step is to locally process RT GPS data by combining seismic and GPS-RT streams with the two G-FAST (*Geodetic First Approximation of Size and Timing*) modeling modules. G-FAST algorithms calculate: 1./ seismic magnitude from the gps-derived PGD; 2./ inversion of gps-derived co-seismic displacements leading to a point-source CMT; then 3./ two fault planes are created on which to invert for slip, in less than five minutes (Crowell et al., 2016; 2018). Following a local megathrust earthquake, magnitude data from the IG-EPN´s instrumental networks is a key input for Ecuador´s National Risk Secretary to give warning of local tsunami threat and activate 180 sirens installed in population centers along the coastline. This notification must be very fast, as a local tsunami may reach the shoreline in < 10 minutes. The G-FAST program has worked reliably in Chile and is running in the Pacific Northwest, awaiting the occurrence of a Great earthquake. Further testing in Ecuador would be profitable since earthquakes of 6 to 7 M_w occur often.



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