

Evolution of the Manabí forearc basin in Ecuador: from the accretion of oceanic allochthonous terranes to the uplift of the Andes and Coastal Cordilleras

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Along the Ecuadorian convergent margin, the onshore Manabí sedimentary forearc basin is bounded to the east by the foothills of the Andes, while to the north and west, it is limited by the Canandé and Jama fault systems. The fault systems limit basement blocks resulting from the fragmentation of an oceanic plateau topped by island arcs, which were accreted against the continental margin during the Late Cretaceous to Eocene times. From the interpretation of 2D seismic reflection profiles we identify the syn- and post-accretionary tectonic phases recorded in the Manabí basin area. We recognize 9 seismic units (S1 to S9) above the acoustic basement (Ub) separated by 9 unconformities (U1 to U9), which were dated by the correlation with the Ricaurte-1 well and regional stratigraphy.

Seismic units S1-S2 (Late Cretaceous to Eocene) onlap irregular basement topography interpreted as inheritance of eroded island arcs prior to accretion. S1 is deformed by low angle NE-dipping thrust faults, which were sealed by regional unconformity U1. This unconformity is tentatively dated ~75 Ma and correlated with an early stage of collision. Then, E-dipping reverse faults were developed in the foothills of the Andes and are associated to an erosional and sedimentary hiatus (U2, Early-Middle Eocene), marking the last stage of accretion. The development of the modern forearc basin is marked by S3 deposition (Oligocene), which extends beyond the current edges of the basin. Then the overlying S4 depocenter (Early Miocene) migrated eastward as a result of the higher subsidence and depositional rates associated to the orogenic building effects of the Andean reliefs. An extensional stage is evidenced by a fan shape of S5 (17.8 -15.9 Ma) against the Jama fault. After U5 (top dated 15.9 Ma) and up to U8 (~5 Ma), a sedimentary platform was built by NW sedimentary progradation, thus marking a remarkable change in the mode of basin filling. The Coastal Cordillera uplifts during a Pliocene compressional stage (post S8) marked by a antiform development along the Jama fault system, and the uplift of the footwall block of the Canandé fault. Synchronously, Santo Domingo fan developed at the foot of the Andes causing the eastward down flexing of flat erosional surface U9. This stage coincides with the arrival in subduction of the Carnegie ridge.

Mots-Clés : Subduction, Ecuador, Manabí forearc basin