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The supra-detachment tectono-sedimentary record of rifted margins: the example of the Los Barriles Basin, SE Baja California Sur.

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The study of rifted margins have shown that the main controlling structures are changing from classical high-angle faults to low-angle detachment fault dominated extension when the crust thins to less than 10 km, which is the case in hyper-extended, magma-poor rifted margins. While the stratigraphic record related to classical high-angle faulting is well constrained, little is known about the tectono-sedimentary evolution of hyper-extended rift systems. A major question remains, how supra-detachment tectono-sedimentary systems are recorded in the stratigraphic record? This remains largely unexplored and must be better constrained by observations.
In our poster, we present preliminary results from our study of a rift basin floored by a low-angle detachment system exposed at the southeastern edge of the Baja California Peninsula in the so-called Los Barriles area in the Gulf of California. This area represents one of the best examples of an active transtensional rift system from which the tectono-sedimentary evolution of the rift to drift transition can be studied in the field. The syn-tectonic sedimentary sequence is floored by a detachment fault and is limited oceanward by an extensional allochthon.
The syn- to post-tectonic stratigraphy can be summarized into 4 main formations:
(1) The Pescadero fluvial fm. (no available ages) evolves upsection from poorly organized polymictic in components and faulted breccias to more granitic and stratified conglomerates. It overlies the extensional allochthon and is tilted continentwards. The channel incisions show EW paleoflows and the upper Pescadero fm. is transitional to the following Refugio fm.
(2) The overlying Refugio fm. (Lower Pliocene) occurs as thick marine sandy deposits within the basin axis, is granitic in composition and has average paleocurrents directions trending N-S. The upper part of the fm. is transitional to the following Barriles fm.
(3) The Barriles fm. (Upper Miocene – Lower Pleistocene) occurs as very coarse conglomerates of granitic composition and overlies the previous Refugio fm. only in the Southern part of the basin with NS incisions. To the North, the Barriles fm. is replaced by the San Isidoro polymictic conglomerates with divergent paleoflows as an independent sedimentary system.
These three units are syn-tectonic since they onlap the allochthon to the east, are successively tilted, indicating the occurrence of growth structures, and are deposited over the exhuming footwall. High angle faults cross cutting the detachment fault are observed in the western border of the basin. These faults control the syn-Refugio segmentation of the former basin as indicated by sedimentary process and the sourcing change. The latter Barriles fm. records the axial progradation of the Refugio's feeder fan over the opening basin.
(4) The El Choro fluvial sandy fm. (post-tectonic Pleistocene) strongly incised the previous units and occurs as a major undeformed unconformity over the whole Los Barriles basin.

Comparing the Los Barriles tectono-sedimentary evolution with those of other supra-detachment systems, such as those exposed in the Alps or in the Pyrenees, we can show that there are strong similarities as the progressive switching from local-lateral processes to more regional and axial sedimentary processes. A main remaining question is how the sub-aerial tectono-sedimentary evolution can be linked with the subsidence and the sedimentary evolution of the off-shore basins for which continental breakup and onset of seafloor spreading is interpreted to be of Mid-Pliocene age.