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The role of CO_2 hypogean fluids in marine ecosystems and carbonate buildups in an hyper-extended basin. Focus: The Aptian-Albian of the Basque-Cantabrian Basin, Spain.

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Deep fractured areas of oceanic crusts can be conducive to upward hypogean fluids circulations (water and/or gas) that can involve to mineralizations, dissolutions or establishment of ecosystems on the seabed. Among these fluids, those rich in CH_4, H_2S, Ca^{2+}, or Mg^{2+} are known to commonly lead carbonate precipitations, usually in association with prokaryote and eukaryote communities that contribute to influence porosity and permeability properties before burial diagenesis. On the contrary, hypogean fluids of marine seeps rich in CO_2 are usually known to favor carbonate dissolution around seeps, sometimes with specific biological communities. However, as clearly shown in many lacustrine to palustrine cases, such CO_2 inputs should effectively promote carbonate dissolution just around vents but would also distally promote their precipitation after assimilation of the CO_2 in the hydrosphere and biosphere, notably via photosynthesis in (relatively) shallow waters. This possibility of a partitioning between zones of dissolution and precipitation is not well documented in modern and setting and remains unproven in the fossil record.

The objective of this study is to evaluate the role of hypogean fluids, especially those rich in CO_2, in the development of large carbonate mounds above or near synsedimentary faults, in an hyper-extended basin well known for its hydrothermal/magmatic activity in deep time. Thus, we propose to investigate the Basque-Cantabrian Basin during the Aptian-Albian interval, with a special focus of large mud-mounds developing on external slopes of the Urgonian platforms.

Using a sedimentary, paleo-ecological, geochemical and diagenetic approach, we especially document the influence of Si-rich and CO2-rich acidic seeps on sedimentation and early diagenesis of the Duranguesado Platform, 30 km south-easternward of Bilbao, as firstly mentioned by Bilbao University's geologists. There, successive hypogean inputs along a synsedimentary fault promote: (i) an intrusive basaltic body into the platform, (ii) sediment disturbance (slumps, seismite), (iii) edification of pluri-metric large silicified sinters, (iv) silicisponge blooms up to 500m around sinters leading to highly porous spiculite deposits. One kilometer from these seeps, a ~ 500m-thick carbonate mudmound growths up, but arguments to link this mound with the seeps and their CO_2 inputs are indirect, and discussed in the present study.