Controlled-source EM data constrain porosity and fluid budget of the outer rise and forearc slope offshore Nicaragua

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Controlled-source electromagnetic (CSEM) soundings provide important constraints on the electrical structure of the uppermost oceanic lithosphere. Since the conductivity signature of porous media is strongly dependent on the presence of saline fluids, CSEM data can be used to quantify porosity. Here, we present results from the Middle America Trench offshore Nicaragua, the first CSEM survey across a subduction margin. The results document the capacity of CSEM observations to image a variety of relevant convergent margin processes, including fluid pathways associated with faulting and subducted sediments along the plate interface. In the outer rise, several sub-vertical conductive channels occur along the trace of bending faults. This suggests localized hydration and the development of a heterogeneous pattern of crustal alteration. Our porosity estimates constrain the fluid budget of the incoming crust, indicating significantly more pore fluids are subducted than previously thought. Seismic implications will be discussed.

