Subduction zones host the primary flux of fluids to the Earth's deep interior. Additionally, the transport and release of fluids from the subducting slab has a profound impact on the suite of tectonic and magmatic processes observed at subduction zones. Yet there are several competing mechanisms that also exert important controls. Constraining the source, migration pathways, and flux of fluid reservoirs throughout the subduction system is critical to distinguishing which mechanisms ultimately govern these processes. Here, we describe the utility of electromagnetic methods for imaging subduction zone fluids. Controlled-source electromagnetic (CSEM) and magnetotelluric (MT) data are highly sensitive to the presence of fluids, and can be used to map porosity structure and quantify fluid budgets at crustal and upper mantle depths. Here we present results from the Nicaragua segment of the Central America margin - the first subduction zone application of CSEM - where several lines of evidence point to a substantial input of fluids. At the outer rise, the CSEM data image several sub-vertical conductive channels extending into the lower crust, coincident with exposed bending faults thought to trigger mantle serpentinization. Our resistivity-derived porosity estimates show the fluid budget of the oceanic crust seaward of the outer rise is on par with independent observations but is greatly enhanced by bending faults, suggesting that significantly more pore water is subducted than previously thought. Beneath the forearc slope, the CSEM data clearly image a conductive channel congruent with the geometry of the plate interface, showing the entire section of incoming seafloor sediments carried down with the subducting plate. The estimated porosity and total water budget for the channel of subducted sediments, while generally consistent with experimental compaction studies, show large lateral variations likely related to subducting topography. To conclude, we will highlight initial impressions from two marine CSEM/MT datasets acquired at the Hikurangi and Alaska-Aleutians subduction margins this past year.