THE SUBDUCTION SQUEEGEE

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As saturated seafloor sediments enter subduction zones at convergent margins, high fluid pressures generated by sediment loading weaken faults and sometimes initiate mud volcanism. Fluids driven by the pressure transport dissolved chemicals that feed a deep biosphere, promote diagenesis, and affect global mass budgets. ODP has installed seven seafloor wells in subduction zones. Well data, together with drilling observations, seismic profiles, vent flow rates, and heat flow, provide constraints on the fluid flow systems. Numerical modeling of these disparate data types enables us to investigate driving forces, pore pressures, flow rates, and mass budgets. This talk will provide an overview of hydrologic processes in subduction zones with a detailed look at the northern Barbados subduction-accretion complex. Geochemical and thermal anomalies show that fluids flow along shallow faults to the seafloor from deep within the complex. Modeling of these anomalies indicates that the high permeability fault conduits shift in time and space. Dr. Bekins sailed as a shipboard hydrologist on Legs 171, to investigate pore fluid pressures, and 201, to examine how fluid flow provides nutrients to buried microbes.