THE SBE 61 CTD: MEASURING THE BOTTOM HALF OF THE OCEAN

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For nearly two decades, the Argo program, a global array of robotic profiling floats, has been providing invaluable observations of upper ocean physical and biogeochemical properties. Profiling down to 2000 m, the floats can be equipped with a suite of oceanographic sensors. However, the mean depth of the ocean is ~3800 meters, leaving a large volume of ocean unexplored by the current fleet. Expanding upon the current program, Deep Argo pairs new float and sensor technology to reach below 2000 m. In conjunction with scientists and float manufacturers, Sea-Bird Scientific has developed the SBE 61 Deep Argo CTD for this purpose. Designed to profile from the surface to 7000 m, the SBE 61 rivals the accuracy of shipboard CTDs (±0.0002 S/m, ±0.001 ºC, ±4.5 dbar), but is shrunk to the size of a moored CTD. The ~60 instruments that have already been deployed are providing an unprecedented data set, giving long-term measurements of temperature and salinity in some of the deepest parts of the ocean.

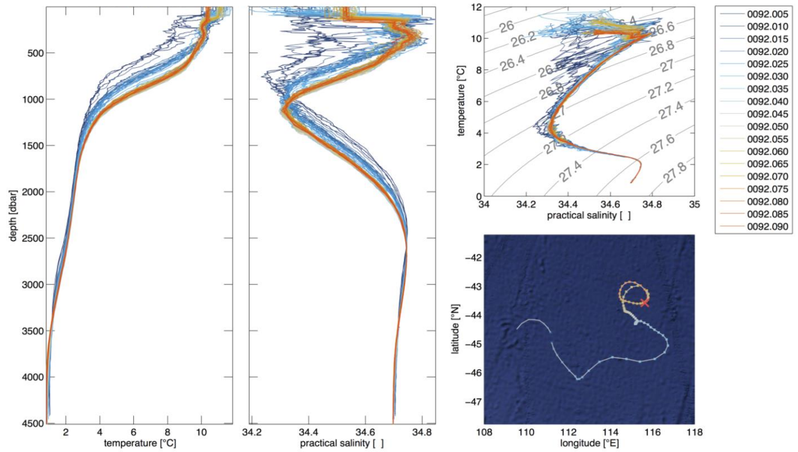
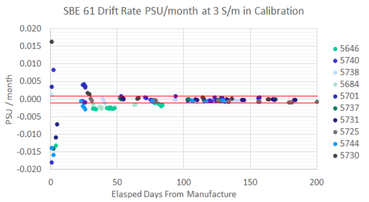


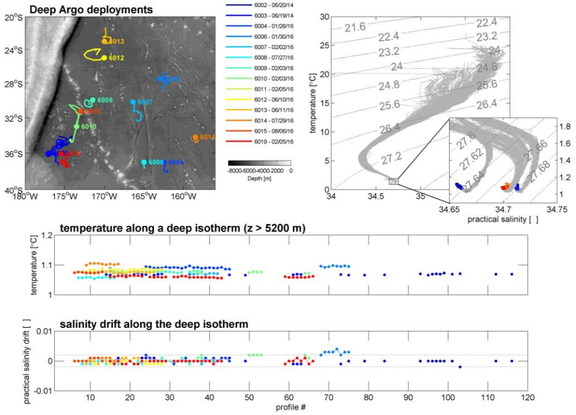
Photo courtesy of Teledyne Webb Research

The SBE 61 has a continuously pumped CTD that makes measurements of temperature, conductivity and pressure at 1 Hz during ascent and/or descent (above). Deployed on Teledyne Webb Deep Apex floats (left) and SIO/MRV Deep SOLO floats (right), integration is via RS-232 providing power and communication. After descent, the floats park at 5000 m or just above the seafloor for 10 days taking spot samples, then ascend to the surface to telemeter data via satellite.

Photo courtesy of MRV Systems

To achieve the stability and accuracy needed for climate change studies on deep floats, sensors on the SBE 61 receive extended calibrations. Temperature and conductivity undergo repeat calibrations to ensure low static drift: ±0.0002 ºC per year and <0.002 practical salinity per 10 years (right). The Kistler 7000 dbar pressure sensor undergoes 12-point full-span pressure calibration with a 4-point pressure temperature compensation calibration, giving ±4.5 dbar accuracy down to 7000 dbar with stability of 0.8 dbar per year.





Data from 14 Deep Argo floats deployed in the Southwest Pacific Basin demonstrate the stability and accuracy of the SBE 61 in the field. Practical salinities tracked along deep isotherms (>5000 m) drift less than 0.002 over 40 profiles or 400 days (left). Improvements throughout the instrument's development removed deep practical salinity offsets (<0.05) seen in the first deployments from 2014 (serial numbers 6002 and 6003). Complementary analysis of temperature sensors on Moored Sea-Bird MicroCAT CTDs indicate in situ temperature drift is expected to be typically within ±0.001 ºC per year. Float lifetimes are designed to be >4 years.

Need accurate temperature, salinity and pressure down to 7000 m for your platform?

We have a CTD for that.

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