EM-APEX

Electro-Magnetic APEX Float

Measuring Motion within the Water Column in Fine Detail

Electric fields in the ocean create electric currents, which can be measured by an EM-APEX float to determine the speed and direction of moving sea water in fine detail. This data is important for understanding major weather events.

Ocean electric fields are caused by water currents, and depend on two facts: saltwater is electrically conductive, and there is a background Earth's magnetic field. Saltwater moving in the magnetic field acts like a battery and generates an electric field. This can be seen in the diagram, where moving sea water generates the electric field from one side to the other. This in turn creates an electric current that completes a circuit by returning through the slower moving, bottom water and weakly conductive bottom sediment. An EM-APEX float measures this electric current, which allows the speed and direction of the moving sea water to be calculated.

The measured electric current depends on both the ocean water velocity and depth, together with an offset from the depth averaged velocity. In practice, GPS positions taken at the surface give the underwater displacement and provide an estimate for this offset velocity. The float also rotates as it profiles to counter the offset potential of the actual electrodes used by the EM-APEX float to measure the electric field. This allows measurement of the electrode offset to be separated from the weaker field created by the moving sea water.

This technology is the result of a close collaboration between Teledyne Webb Research and the Applied Physics Laboratory at the University of Washington.

Electro-Magnetic (EM) APEX Float

PRODUCT FEATURES

- Measures speed and direction of moving water to within a few centimeters per second accuracy
- Aircraft deployable by parachute
- Programmable for surface avoidance during extreme weather events
- Deployment proven EM technology

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