

VMP 5500

Deep-Sea Vertical Microstructure Profiler

Features:

- Depth rating 5500 m;
- Up to 6 microstructure sensors;
- Fitted with sensors for P, T (SBE-3F), C (SBE-4C), SPM-38-5 shear (2x), FP07-38-5 (2x), Acceleration (3x);
- Anti-aliasing filters for high frequency channels;
- Internal data acquisition with 378 MB solid state disk, PC104 processor, LINUX OS;
- Rechargeable lead-acid battery pack for 8 hours operation;
- Ballast release mechanism with triple-redundancy emergency release;
- Battery charger and data I/O cable;
- RF beacon, Xenon flasher or optional Argos transmitter.

Description:

The *VMP5500* is a full ocean-depth, untethered microstructure profiling system for deployment down to depths of 5500 meters. The profiler consists of a main pressure case containing a PC104 computer data acquisition and communication system, anti-aliasing filters and batteries. The pressure case has a nose cone that holds up to 6 microstructure probes (any combination of shear probes, thermistors, or micro conductivity probes). The nose cone is separated from the main pressure case by a 38 mm thick bulkhead. This prevents water penetration into the main pressure case in case of a broken probe. The main pressure case contains 3 accelerometers, and 1 pressure transducer as well as the electronics for signal conditioning, A/D conversion and data logging. The data logging is performed by a PC104 computer system with a 378 MB solid-state disk drive (no moving parts).



Syntactic foam is attached to an aluminium frame at the top end of the instrument to provide flotation. The profiler collects data on the downward profiling cycle. After reaching a pre-defined depth, the profiler releases ballast weights so that the instrument becomes positively buoyant. The instrument rises to the surface with a nominal speed of 1.0 m/s. As a backup, there is a triple-redundancy emergency ballast release consisting of a corrosion trigger, time-out trigger, and pressure rate-of-change trigger.

The *VMP5500* carries a strobe light and a radio beacon for locating the instrument after it has returned to the surface and can also be fitted with an Argos transmitter. A large ring at the top end makes it easy to recover the instrument. Data are downloaded from the profiler after recovery via a cabled Ethernet FTP connection to the instrument. A separate connector is provided for charging the internal battery and for switching the instrument on and off.

User Comments:

"I have to say the VMP is an impressive instrument, and it is always a pleasure to be involved at the detail level with instruments that are designed and supported well." – Jeff Benson, National Oceanography Centre, Southampton, UK

"The data we obtained were of the high quality anticipated for the instrument. The shear probes had noise levels of $2-3 \times 10^{-11} \text{ W kg}^{-1}$ in deep, weakly stratified regimes. No attempt was made to correct for vibrationally induced noise in this estimate." – Alberto Naveira, National Oceanography Centre, Southampton, UK

"The VMP data looked as good as, if not better, than the original HRP microstructure data." – Kurt Polzin, Woods Hole Oceanographic Institution

VMP-5500 Specifications:

Sampling rate 512 Hz nominal (user configurable with software, up to 4096 Hz)
 Depth rating 0 – 5500 m

Velocity shear:

Range 10^{-10} to 10^{-4} $W\ kg^{-1}$
 Accuracy 5%
 Resolution 2.5×10^{-3} s^{-1} rms (1 – 10 Hz)

Water temperature (SBE 3F):

Range -5 – 35 °C
 Accuracy 1×10^{-3} °C (NIST traceable)
 Resolution 1×10^{-4} °C
 Stability 2×10^{-3} °C/year typical
 Time response 0.070 s ± 0.010

Conductivity (SBE 4C):

Range -0 – 7 S/m
 Accuracy 0.0003 S/m
 Resolution 0.00004 S/m
 Stability 0.0003 S/m/per month
 Time response 0.060 seconds (pumped)

Pressure (Keller):

Range 0 – 5500 dbar
 Accuracy 0.1%
 Resolution 0.005 dbar (using signal+derivative technique)

Micro Temperature (FP07):

Range -5 – 35 °C
 Accuracy N / A
 Resolution 1×10^{-5} °C (using signal+derivative technique)
 Stability N/A
 Time response 0.007 s ± 0.003

Accelerometers (IC Sensors):

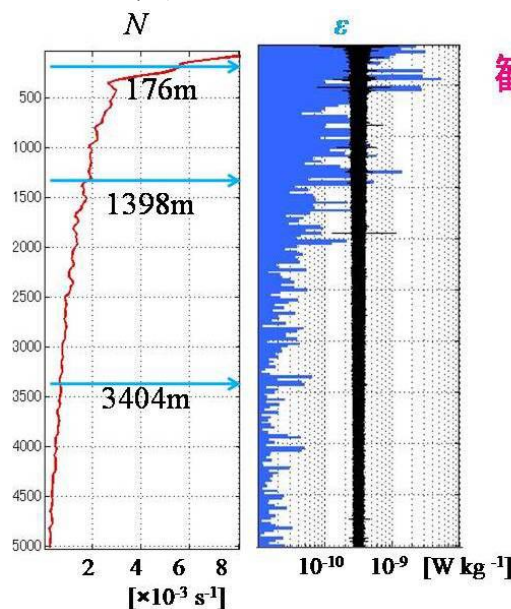
Range ±2 g
 Accuracy 0.5°
 Resolution 3×10^{-5} g (1 – 20 Hz)
 Noise 1×10^{-8} $(ms^{-2})^2\ Hz^{-1}$
 Stability / Linearity ±0.5°, ±0.01g
 Frequency response 0 – 300 Hz

Analog/Digital Converter:

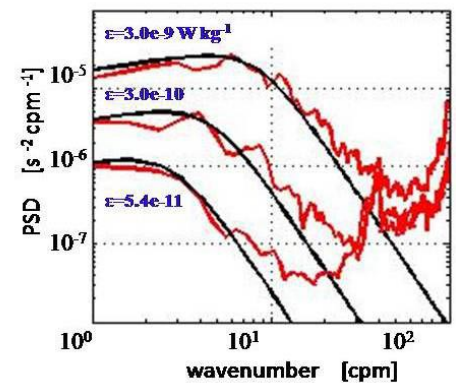
Number of channels 16
 Resolution 16 bits (true)
 Linearity 15 part per million



Photo by Lou St. Laurent



観測例 (170.5W 51N)



Data sample provided by Toshi Hibiya, University of Tokyo