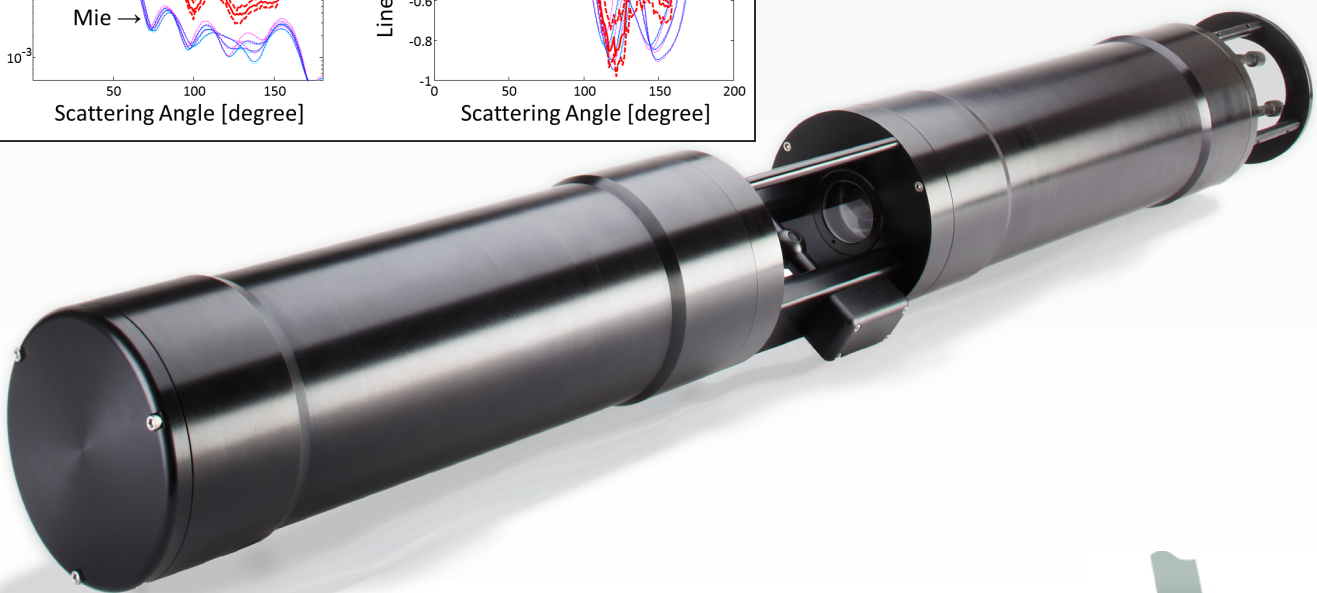
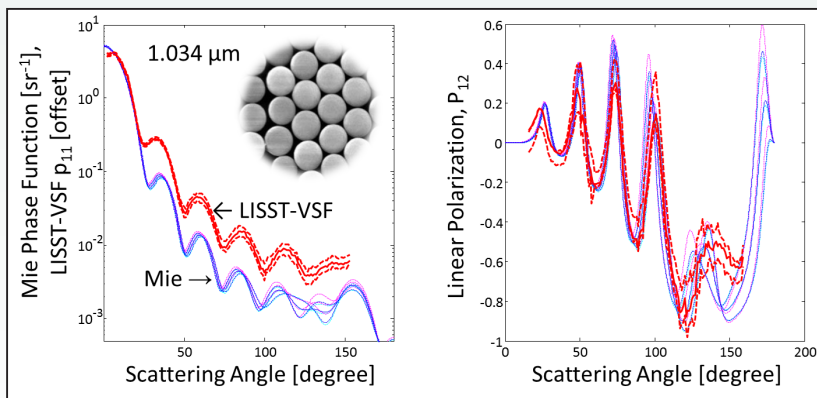


LISST-VSF

MULTI-ANGLE POLARIZED LIGHT SCATTERING MEASUREMENTS

VSF • DoLP • Beam Transmission • Depth • Temperature

On the market since 2012, Sequoia's LISST-VSF is a submersible instrument for measuring the volume scattering function (VSF) *insitu* with some polarization discrimination capability. The instrument covers the angular range from 0.1° to 150° in water by combining a standard LISST ring detector with a rotating 'eyeball' optic. Polarization of the incident laser beam is alternated between horizontal and vertical, the received scattered light is split into its two linear polarization components and sensed by separate photomultiplier tubes permitting calculation of the particulate VSF and degree of linear polarization (DoLP). The LISST-VSF is programmable and externally-powered.



FEATURES

- In-situ measurements of P11 (VSF) and P12 (DoLP) elements of the scattering Mueller matrix from 15-150° in water
- VSF (P11) at small angles, 0.1 to 15° in 32 logarithmic angle steps
- Integration of 0.1-150° VSF provides a good estimate of total particle scattering coefficient bp
- Beam attenuation cp measured with LISST-100X optics
- Roving Eyeball optics permit 1° resolution in angles between 15 -150°
- Approximately 2 seconds per measurement set (2 polarizations of incident laser beam)
- Daylight rejection by laser modulation
- Extension of dynamic range in VSF measurements using control of laser power and photomultiplier gain
- Data from small and large angles in a single data stream, including depth and temperature
- External, submersible battery pack included.

SPECIFICATIONS subject to change without notice

Parameters Measured

- Small-angle VSF in 32 log-spaced angles, from 0.1° to 15°
- VSF and P12 (DoLP) from 15° to 150° in 1° steps
- bp estimate from VSF integration over 0.1° to 150°
- Temperature @ 0.01 °C resolution
- Depth @ 0.08 m resolution
- Beam attenuation

Measurement Ranges

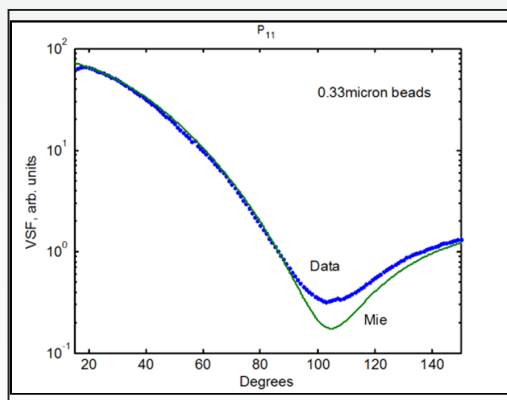
- Temperature from -5 °C to 50 °C
- Operational depth 0 m to 50 m
- Beam attenuation > 0.1 m⁻¹

Technology

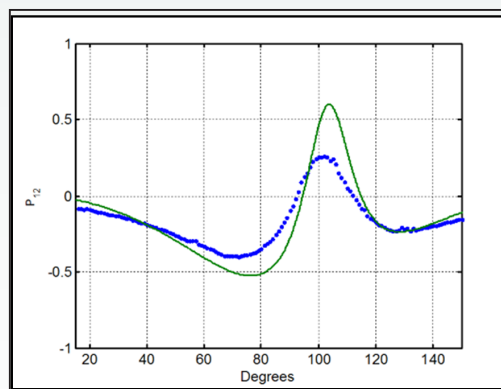
- Solid state diode laser @ 515 nm

Mechanical and Electrical

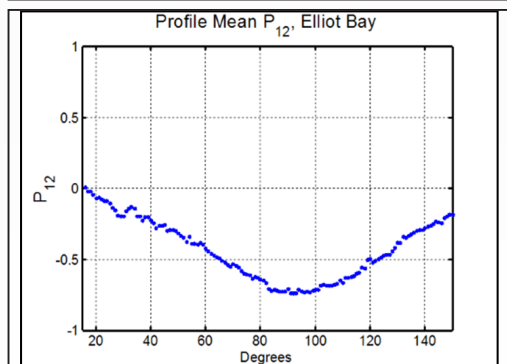
- Dimensions [Ø × L]: 12.7 cm × 95.7 cm (5.0" × 37.7")
- Weight [air]: 13.1 kg (28.9 lbs)
- Depth rating: 300 m (NOTE: 50 m operational depth)
- External power supply: 12 VDC to 15 VDC
- Power drain [sampling]: 1.5 A
- Sampling rate: Approximately 2 s for a full measurement of VSF and P12
- Storage: 128 GB, equivalent to 24,000 measurements
- Rechargeable NiMH battery pack (included) @ 14.4 V nominal, 15Ah



Left: Measured P11 (VSF) of 0.33µm beads compared to Mie theory



Right: P12 (normalized by P11) of 0.33µm beads compared to Mie theory



Left: In situ P12 (normalized by P11) of water in Elliot Bay, WA, USA

Right: Detail of the LISST-VSF optics path, showing the receive optics

