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Bio-optics and Ocean Colour - One Ten East Log

30 May 2019



RV Investigator

One Ten East Logs from the IIOE-2 voyage aboard RV Investigator will be posted on the WAMSI website during the month long voyage.

It's getting warmer and we are loving it!

- Captain Micheline Jenner

Log from One Ten East

The *RV Investigator* is currently undertaking oceanographic research along the 110°E meridian off Western Australia as part of the second International Indian Ocean Expedition. The voyage is led by Professor Lynnath Beckley of Murdoch University and the research is supported by a grant of sea time on *RV Investigator* from the CSIRO Marine National Facility.

Date: May 30, 2019	Time: 1200 AWST
Latitude: 20°S	Longitude: 110°E
Wind direction: E	Wind speed: 5 knots
Swell direction: SW 1 m	Depth: 4133 m
Air temperature: 26°C	Sea temperature: 27°C
Notes: A minke whale swam by the vessel today to confirm our sonobuoy detections! Another nice sunny day for the optics team!	

Bio-optics & Ocean Colour

By Prof David Antoine

Studies of marine bio-optics are being conducted from the *RV Investigator* during the 110⁰ East voyage.

Marine bio-optics is the scientific study of interactions between electromagnetic radiation (near ultraviolet to the visible and the near infrared) and particles or dissolved substances of biological origin in the water.

The interaction is described through absorption and scattering, which are referred to as inherent optical properties (IOPs).

These properties only depend on the composition of the medium, and not on the way it is illuminated (e.g. sun light on a clear day versus a cloudy day etc.).

By measuring these IOPs and the quantities that determine them (e.g., particle sizes, particle composition and pigments), one can derive bio-optical algorithms.

From the ship we will make *in-situ* measurements of the IOPs using a range of instruments as well as measuring particle sizes and composition.



Dr Matthew Slivkoff (In situ Marine Optics) and Dr Wojciech Klonowski (In situ Marine Optics) indicating the components of their IOP (Inherent Optical Properties) package which they have just retrieved after collecting measurements in the south-east Indian Ocean. Photo: Micheline Jenner AM.

Satellite ocean colour radiometry is the technique by which we quantify phytoplankton biomass from space.

Proxies of this biomass, such as chlorophyll concentrations can be derived from the satellite observations of the ocean.

The launch in 1978 of the first satellite carrying an ocean colour sensor, revolutionized the way oceanographers saw phytoplankton dynamics in the ocean.

The obvious advantage of this satellite technique is the provision of uninterrupted data sets over the world's oceans which can be used in a wide range of science studies and applications.



*Prof David Antoine (Curtin University) holds a C-OPS profiling radiometer prior to deployment to measure the underwater light profile along the 110°East meridian.
Photo: Micheline Jenner AM*

A major transition is currently underway from science-driven satellite missions of limited lifetime (5 to 10 years) to more operational satellite programmes designed to provide consistent and continuous observations over many decades.

The recently launched European Copernicus program is one such example.

During the 110°E voyage we are collecting data for validation of the monitoring products delivered by the Copernicus "Sentinel3/OLCI" mission.



Charles Kovach (NOAA, USA) prepares to deploy a HyperPRO in-water profiling radiometer for establishing the underwater light profile in the tropical south-east Indian Ocean. Photo: Micheline Jenner AM.

Be sure to follow the daily posts of our Log from One Ten East at <https://ioe-2.incois.gov.in> and www.wamsi.org.au



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