

## Post-Doctoral Research Associate – Southern Ocean bio-optics and satellite ocean colour

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**Faculty:** Science and Engineering

**School:** Earth and Planetary Sciences

**Location:** Curtin University, Bentley Campus, Bentley (Perth), WA 6102

**Academic Level:** A or B, depending on profile

**Supervisor:** Prof. David Antoine

**Co-supervisors:** Prof. Pete Strutton and Prof. Philip Boyd (University of Tasmania; UTas)

**Start:** as soon as practicable, ideally first semester 2022.

**Duration:** two years

### Position summary, overall research questions:

The proposed project aims at further improving our understanding of bio-optical properties and relationships in the Southern Ocean based on field observations, which is needed to subsequently improve interpretation of satellite ocean colour observations in this Ocean. The other aim is to explore new capabilities from the upcoming NASA hyperspectral PACE mission (<https://pace.gsfc.nasa.gov>). In essence, the goal is to better derive information on phytoplankton biomass and community composition from satellite ocean colour remote sensing in this remote, yet critically important oceanic region, and ultimately assess long-term changes in this critical compartment of the ocean carbon cycle and of marine food webs.

### Context:

This position is part of the ARC Australian Centre for Excellence in Antarctic Science (ACEAS), a national-scale, University-led, international centre focused on helping the world community prepare for climate risks emerging from East Antarctica and the Southern Ocean by integrating knowledge of the ocean, atmosphere, cryosphere and ecosystems, and their interplay. ACEAS will grow to support the activities of around 150 researchers, administrative staff, and students, with exciting opportunities to collaborate across disciplinary and institutional boundaries.

The successful candidate will contribute to ACEAS Program 1 — Circum Antarctic and East Antarctica, which addresses the overarching question: “How can shifts in carbon, heat and moisture transport in the Antarctic and Southern Ocean system be better constrained to improve projections of future climate and sea level changes?” with connection to Program 3 – Sub-regional and Regional Antarctic Margin which addresses the overarching question “What is the risk of ice mass loss from key subglacial basins over the next decades to centuries, and what are the consequences for the local oceans and ecosystems?”.

Further information on ACEAS is available at <http://antarctic.org.au/>

### The work:

As a PDRA, you can steer the research in a preferred direction, in agreement with your supervisor. We expect the activity to contribute to the following main topics/activities:

- Analyse field bio-optical and biogeochemical data in connection with other field data sets and satellite ocean colour observations, in search of bio-optical relationships.
  - The available field datasets of bio-optical and biogeochemical properties are from the

“Antarctic Circumpolar Expedition” (ACE; December 2016 – March 2017; <https://spi-ace-expedition.ch>) and the SOLACE research voyage (December 2020 / January 2021; lead P. Boyd, Utas). Other field datasets are also accessible through our international network of collaborators, and through publicly available datasets such as the BGC-Argo network. Satellite data sets are all available publicly, e.g., from NASA or ESA archives.

- The field data sets include radiometry measurements, inherent optical properties (absorption and backscattering), chlorophyll fluorescence, phytoplankton pigments and absorption, cytometry data, particle size distributions, Fast repetition rate fluorescence data, particulate organic carbon.
- Explore the potential of hyperspectral measurements from PACE for mapping of phytoplankton functional groups in the Southern Ocean (field data plus radiative transfer modelling).

The research activity also implies:

- Communicating results through presentations and peer-review publications.
- Interacting with, and possibly contributing to supervision of, a PhD student working under the same project.
- Interacting with your peers within ACEAS.

#### **Selection criteria:**

- PhD or equivalent qualification in a relevant area (e.g., satellite ocean colour remote sensing, field bio-optics and biogeochemistry, phytoplankton productivity).
- Evidence of independent research work, including publications in peer-reviewed high-rank scientific journals.
- Excellent skills in processing and analysing field bio-optical data sets and possibly also satellite remote sensing data sets.
- Excellent oral and written communication skills.
- Demonstrated ability to work collaboratively in a research team covering multiple disciplines and achieve collective as well as individual outcomes.
- Demonstrated programming skills in a Unix/Linux environment (e.g., use of shell scripts, Fortran, Python, R or Matlab programming).

#### **Other desirable criteria:**

- Knowledge and practice of radiative transfer in the ocean.
- Understanding and analysis of hyperspectral radiometry (field and satellite).
- Willingness and ability to travel interstate and overseas.