

ANTARCTIC CIRCUMNAVIGATION EXPEDITION

INDICATIVE TRAVEL PLAN



SWISS POLAR INSTITUTE



Swiss Federal Institute for Forest, Snow and Landscape Research WSL

ETH zürich



Universität



Paulsen

Project #1

“A bio-optical approach to understanding long term changes in phytoplankton abundance and composition in the Southern Ocean and their impact on the biological productivity”

A 3-month expedition,
3 main groups involved:

(Curtin Uni., Perth, Australia)

PI: D. Antoine

(CSIR, Cape Town, South Africa)

PI: S. Thomalla

(NASA, GSFC, USA)

PI: S. Hooker



Lisbon, Portugal,
15-18 May

Objectives

Basically: trying to improve the knowledge of “bio-optical” relationships in the Southern Ocean and use this to improve interpretation of satellite OCR observations; then reanalyse satellite archives in search of long-term changes in phytoplankton and productivity

How: en route measurement of optical properties, radiometry, and the BGC quantities that influence them

The whole science team:

An awesome team of 5 onboard:

- All 3 legs: **Nina Schuback** (Curtin), **Hazel Little** (CSIR), **David Berliner** (CSIR), **William Moutier** (CSIR),
- 1 leg each: **Thomas Ryan-Keogh** (CSIR), **Charlotte Robinson** (Curtin), **Alexandra Olivier** (BioSpherical)

Plus the following PIs:

David Antoine, Curtin Uni. Perth, Australia, **Sandy Thomalla**, CSIR / UCT, Cape Town, South Africa, **Stanford Hooker**, NASA GSFC, Greenbelt, USA, **Peter Strutton**, Uni Tasmania, Hobart Australia, **Nick Hardman-Mountford** CSIRO, Perth, Australia, **Emmanuel Boss**, Uni Maine, Orono, USA, **Séverine Alvain**, CNRS-LOG, France, **Julia Uitz**, CNRS-LOV, France, **Yannick Huot**, Uni Sherbrooke, Canada, **Nicolas Metz**, CNRS-LOCEAN, Paris, France

Project 1: Sampling Program

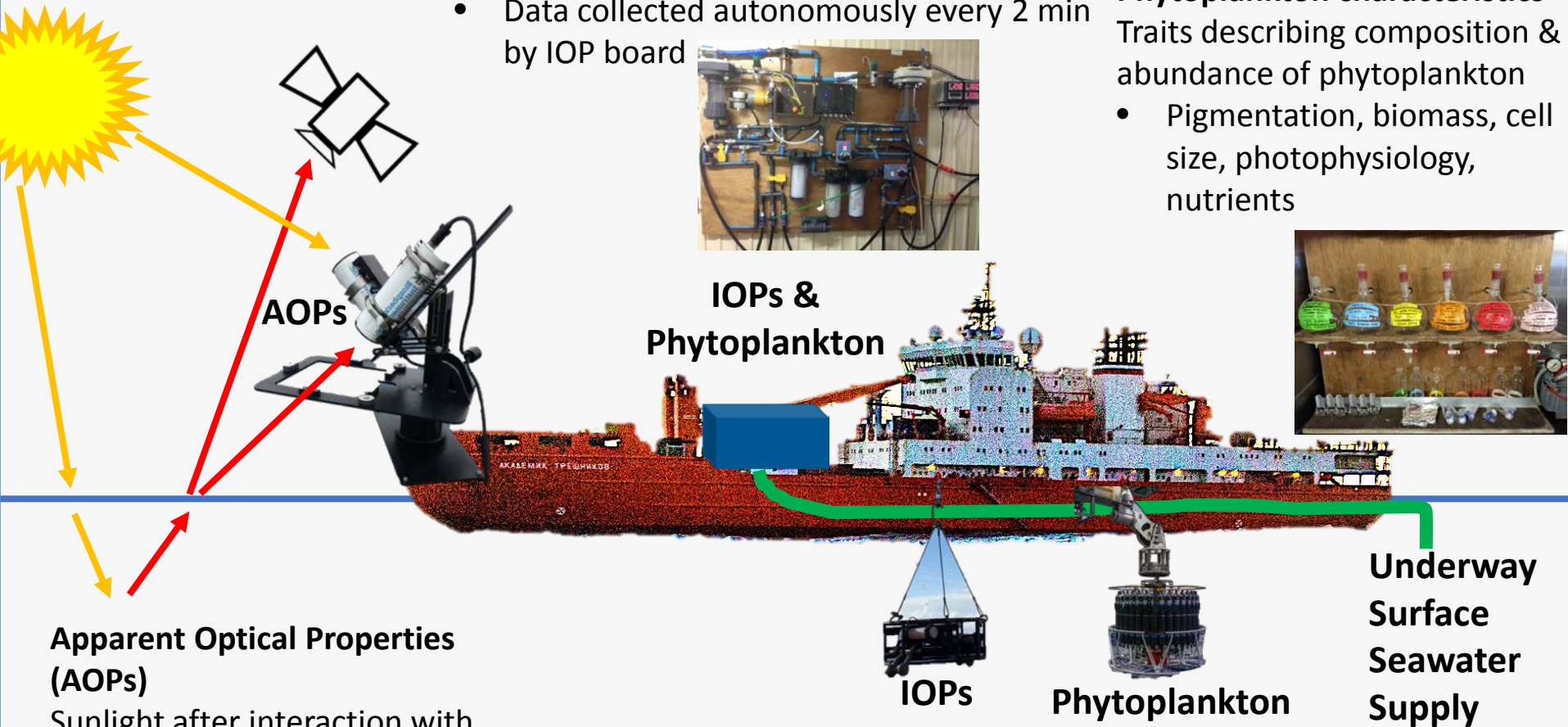
Inherent Optical Properties (IOPs)

Absorption & scattering of light

- 24 h continuous measurement of light attenuation, absorption & scattering
- Data collected autonomously every 2 min by IOP board



IOPs & Phytoplankton



Apparent Optical Properties (AOPs)

Sunlight after interaction with surface ocean

- Periodic measurements of sky radiance & water leaving radiance during daylight hours

3 hourly sampling of Phytoplankton characteristics

Traits describing composition & abundance of phytoplankton

- Pigmentation, biomass, cell size, photophysiology, nutrients



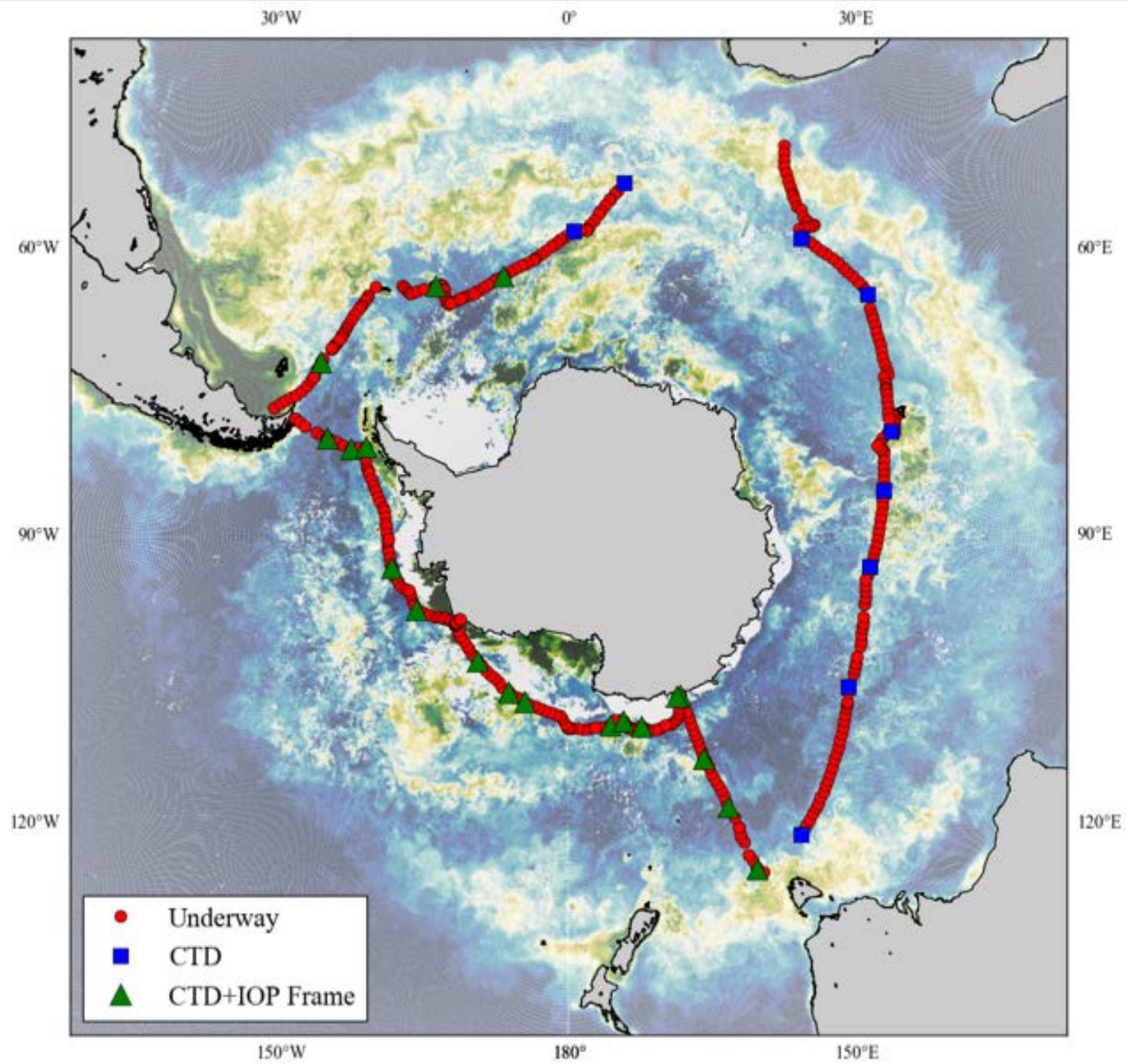
IOPs

Phytoplankton

Underway
Surface
Seawater
Supply

Vertically resolved IOPs and Phytoplankton characteristics

- IOP instrument package
- Sampling from CTD rosette



Project 1 efforts on board:

- Team of 5 operated 24 h/day on shift
- Operated 15 instruments
- Sampled 27 CTDs for 5 types of samples
- Sampled 320 underway time points for 7 types of samples
- Deployed the IOP package 21 times
- 131 Above water radiometry measurements
- Continuous instruments have collected 1,200 + h (50+ days) of data
 - approximately 33,300+ data points for each instrument
- Filtered 2,000 L or 2 Tonne of seawater over 1,000 h
- Collected 320 measurements of phytoplankton physiology
- Collected 320 measurements of particle size
- Climbed 2,616 stairs a day just to sample

