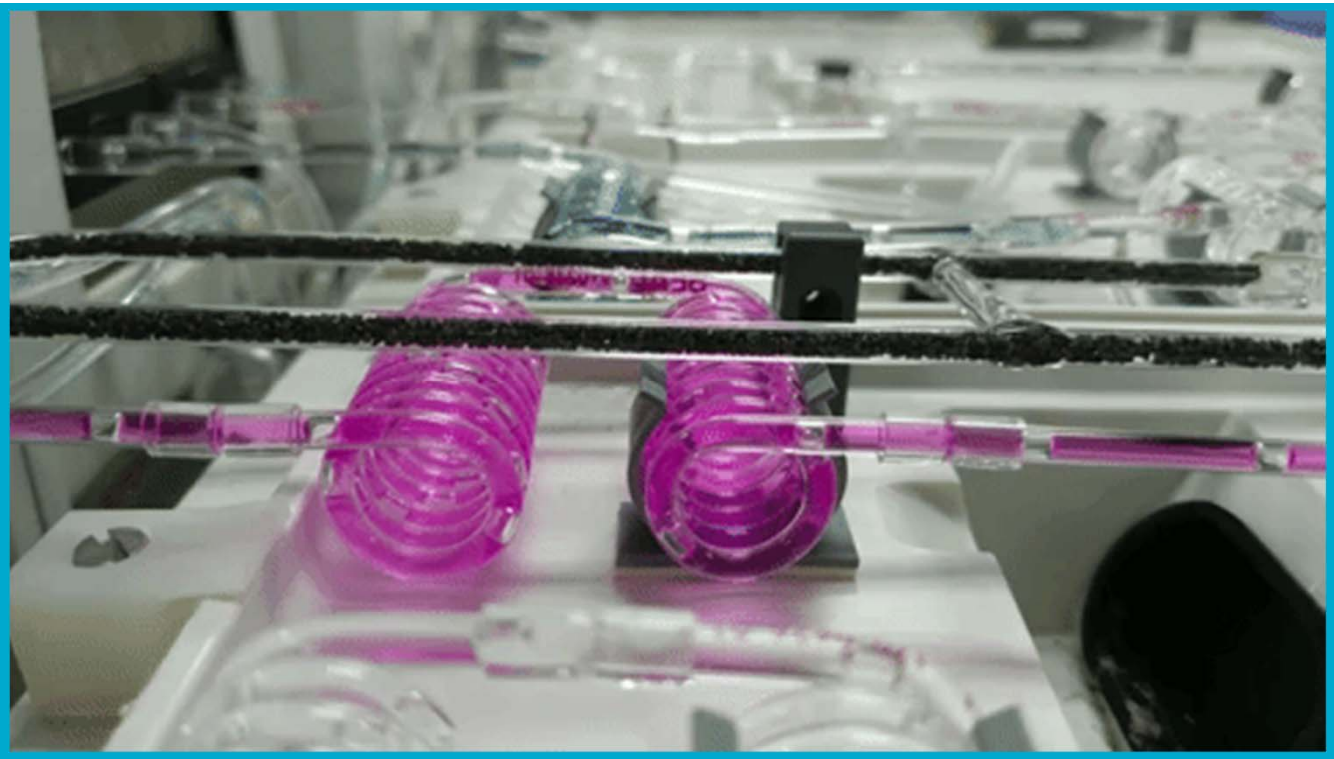


Hydrochemistry on the RV Investigator

The *Who*, the *What*, the *Why*, and the *How*

International Research Ship Operator's meeting
09 October 2019

OCEAN & ATMOSPHERE
www.csiro.au

Hydrochemistry - Who are we?

Cassie Schwanger

Christine Rees

Alicia Camac

Stephen Tibben

Merinda McMahon

Jack McDonald

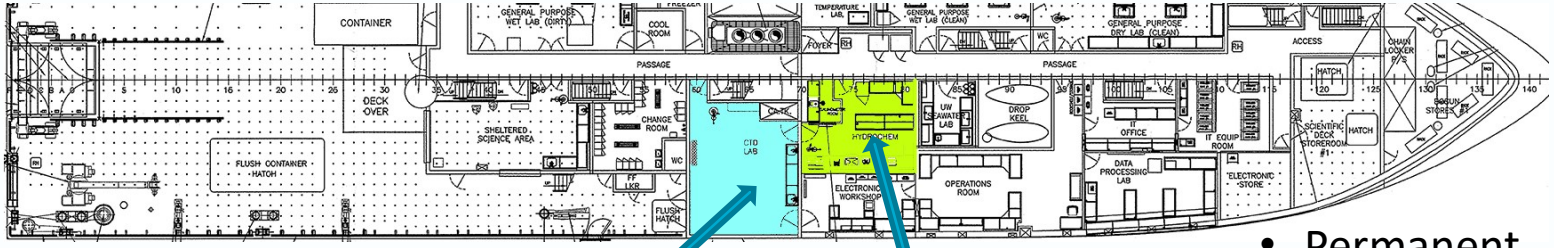
Kendall Sherrin

Julie Janssens

Peter Hughes

Our Perth resident

RV Investigator – Permanent Hydrology Lab



CTD space

Hydrochem Lab

- Permanent
- Temperature controlled
- Direct access to CTD Lab

Hydrochemistry – What is it and What do we do?

Hydrochemistry:

Chemical analysis of seawater

Specialised in the measurement of:

Nutrients from:
- CTD
- TMR
- Exp samples
- Underway

Salinity from:
- CTD
- TMR
- Underway

Dissolved Oxygen (DO) from:
- CTD
- Underway

Hydrochemistry – On the RV Investigator

- 0 – 4 hydrochemists on board
- Lab operates 24 hours
- Standardised work operations
- Accurate and precise results consistent with the world's best practice – GOSHIP.

It is crucial that:

- CTD space and lab are kept clean to **stop contamination of nutrient samples.** Source: e.g., smoke, dirty boots, biological, etc

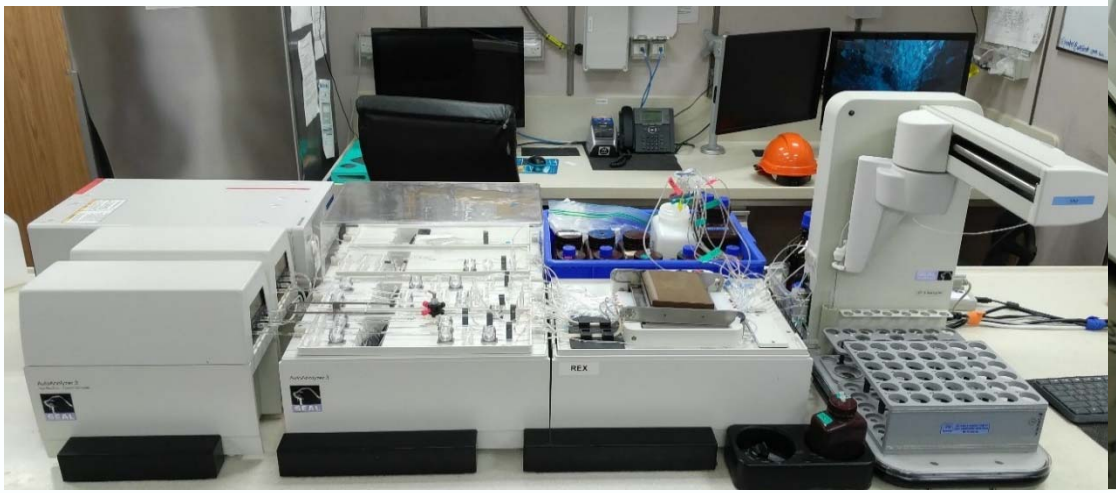
Hydrochemistry – Why do you need us?

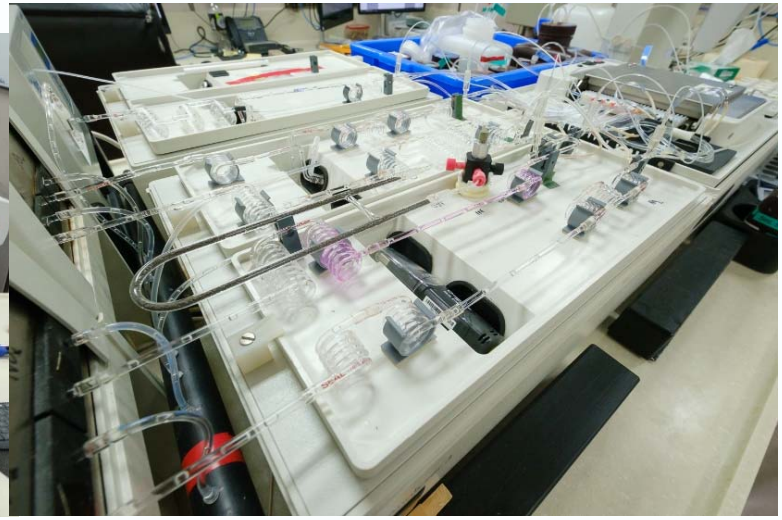
→ **Calibration** of sensors and **validation** of measurements

- Sensor drift
- Sensor accuracy
- Don't have nutrient sensors for everything (yet?)
- Frozen samples problematic
  - Silicate polymerisation
  - Phosphate variability

Hydrochemistry - Nutrients

- **Low level** nutrients in marine system**: nitrite** (NO_2^-), **nitrate** (NO_3^-), **ammonium** (NH_4^+), **phosphate** (PO_4^-), and **silicate** (SiO_4^-)
- Nutrient concentration determined colorimetrically using segmented flow analysis
- CRM (RMNS), method detection limit 0.02 µM
- Nutrient methodology and data processing (software) published L&OM

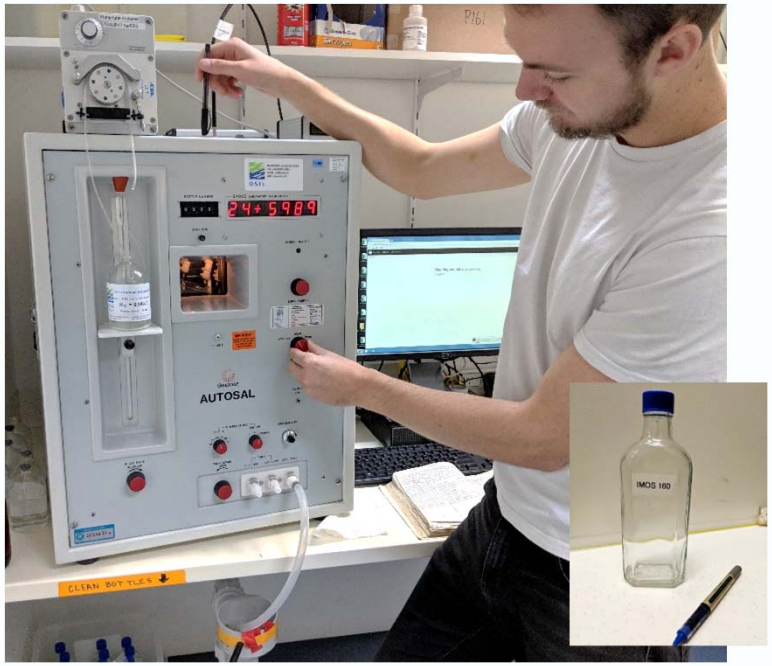




Hydrochemistry - Salinity

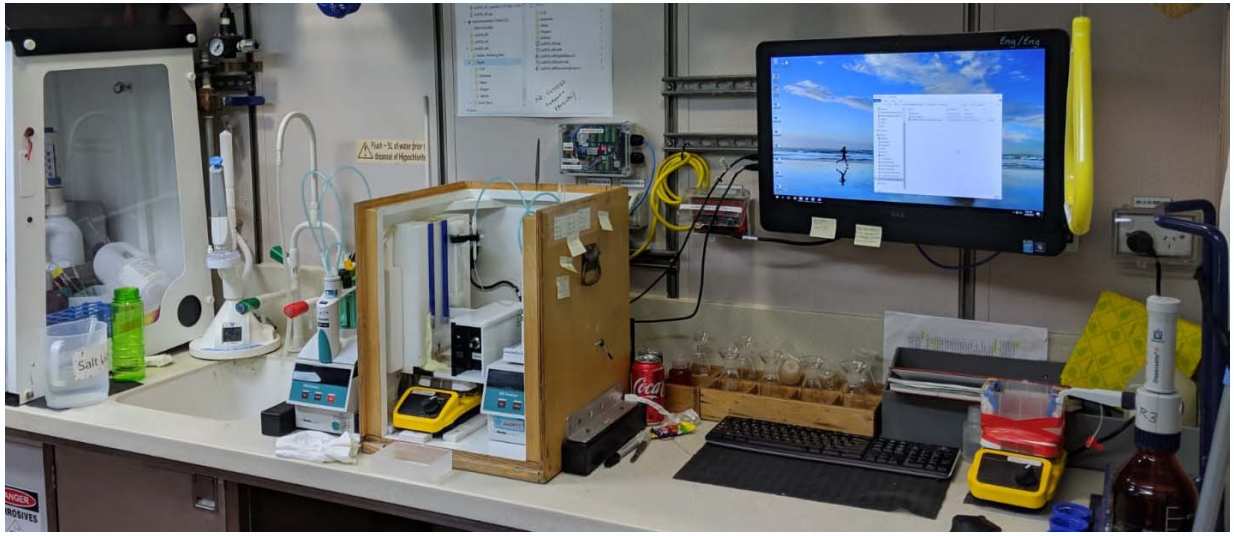
- **conductivity measurement** (not chemical analysis)
- Instrument calibrated to an internationally recognised standard before each analysis (IAPSO-OSIL)

- Results measured to **+/- 0.001 PSU**
- Underway TSG calibration



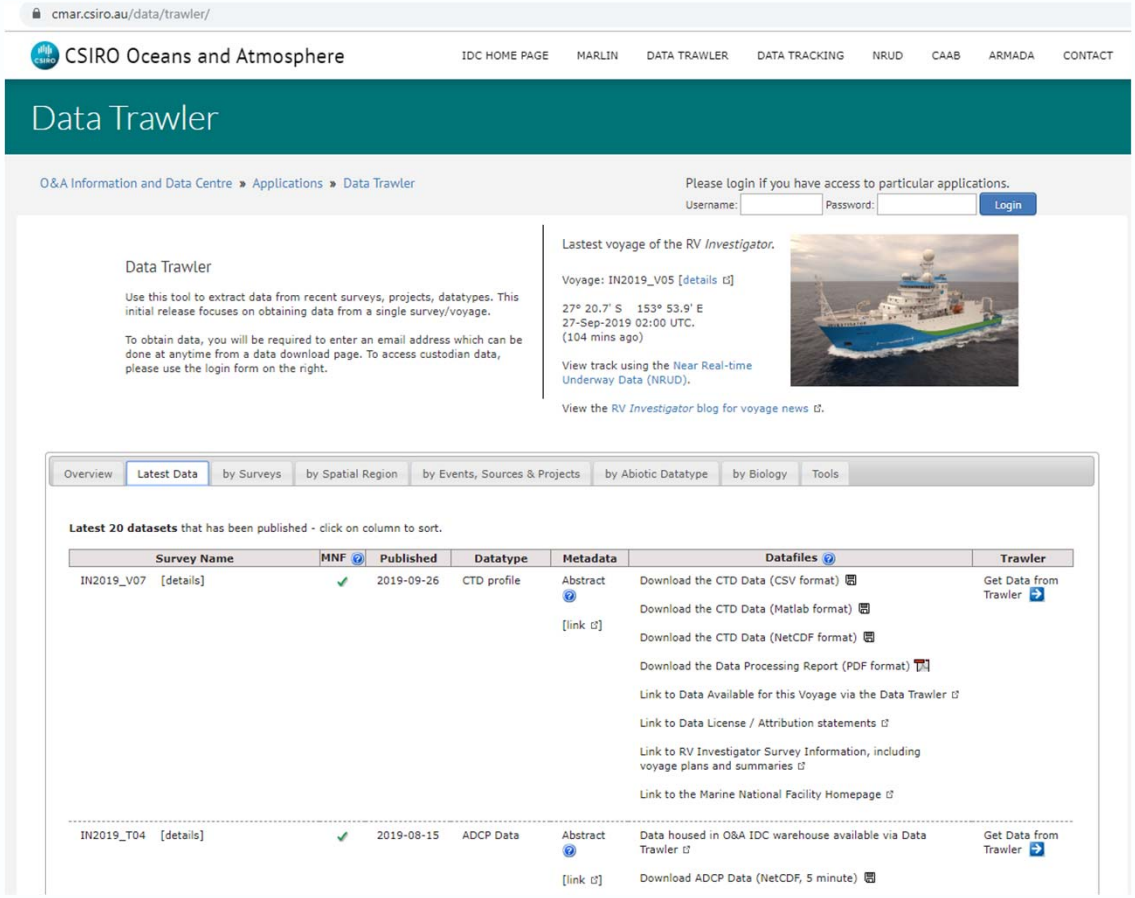
Hydrochemistry – Dissolved oxygen (DO)

- Winkler Titration
- UV detection method
- Method detection limit 0.2 µmol/L
- Uses the whole sample bottle for the analysis →one chance only
- Flasks individually calibrated for volume



Data availability

https://www.cmar.csiro.au/data/trawler/



Thank you

Oceans & Atmosphere
Christine Rees
Hydrochemistry: Who are we and do we do?

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