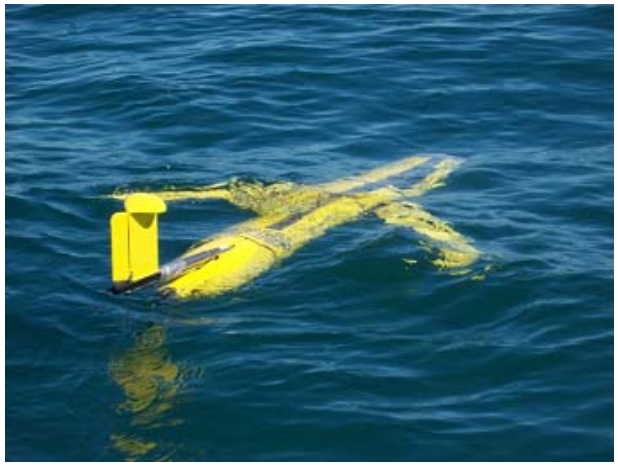
GHD CLIENTS | PEOPLE | PERFORMANCE

Coastal Oceanography of Southern Seawater Desalination Plant

Seaglider Transects (July-August 2007 and December 2007-January 2008)



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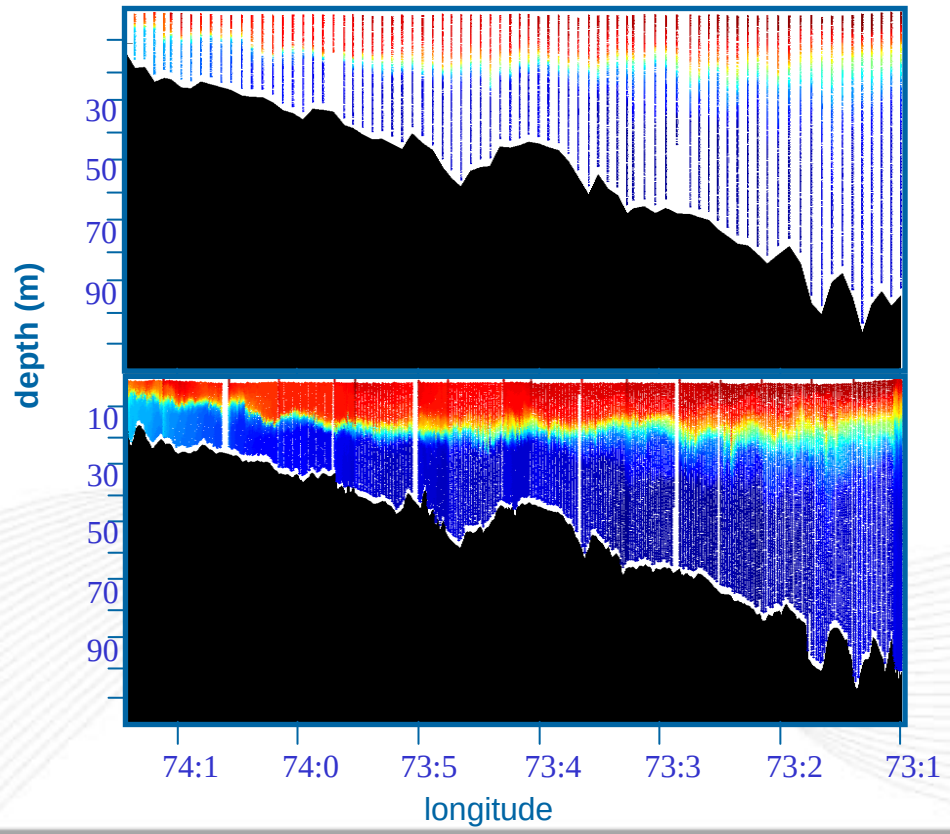
OVERVIEW

- Seaglider Technology
- Monitoring Overview
- December 2007-January 2008 Deployment (Summer)
- July-August 2007 Deployment (Winter)

HIGH TIME AND SPACE RESOLUTION

Source:Webb Research



Ship:

- 24 hours a day
- 80 casts

Glider:

- 24 hours a day.
- 681 (down) casts

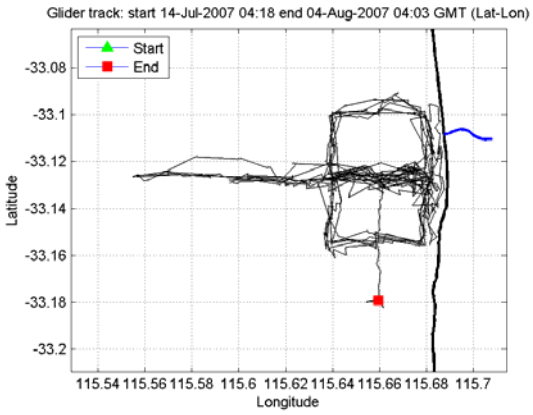
SEAGLIDER TECHNOLOGY

Animation

Seaglider flight simulation

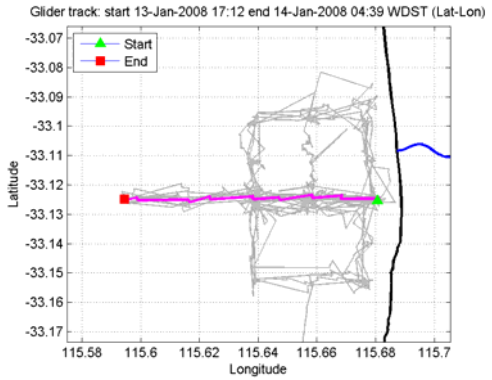
MISSION PLAN

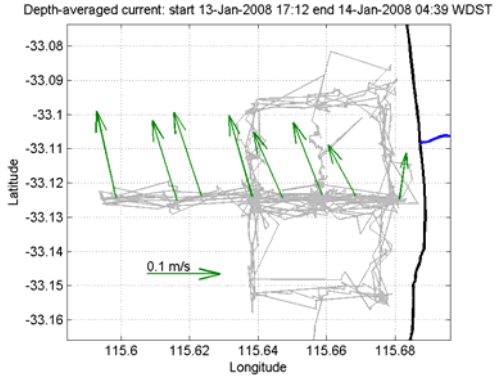
Planned and Actual Tracks

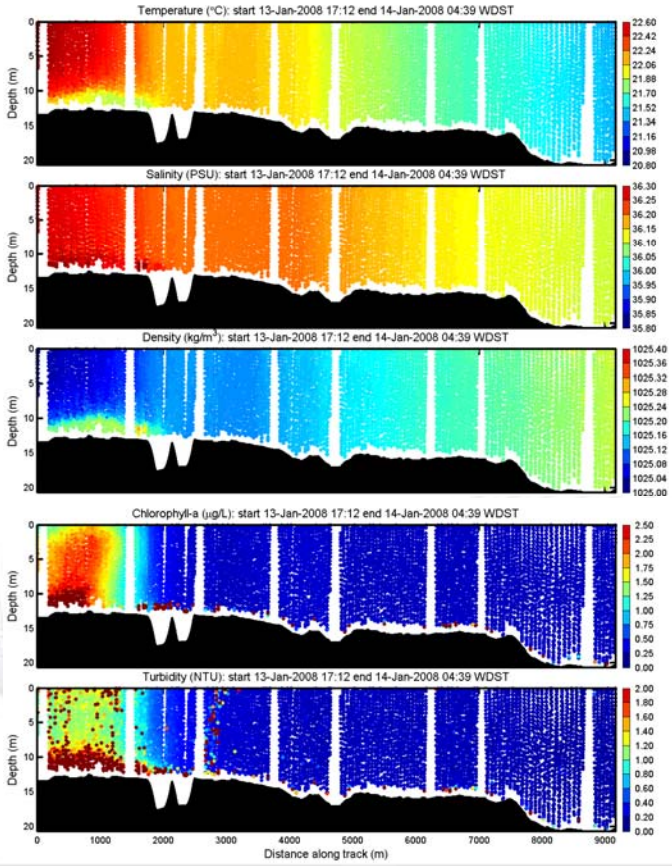


- Continuous deployment for 22 days
- Total track length 340 km
- Approximately 6800 vertical profiles (downcast only)
- Operations in 8 m swell and 25 knots wind
- Real-time tracking and data display
- Measurements (T, S, Chl-a, Turbidity, DO, vertically integrated horizontal currents)

TWO-DIMENSIONAL MONITORING (SUMMER)







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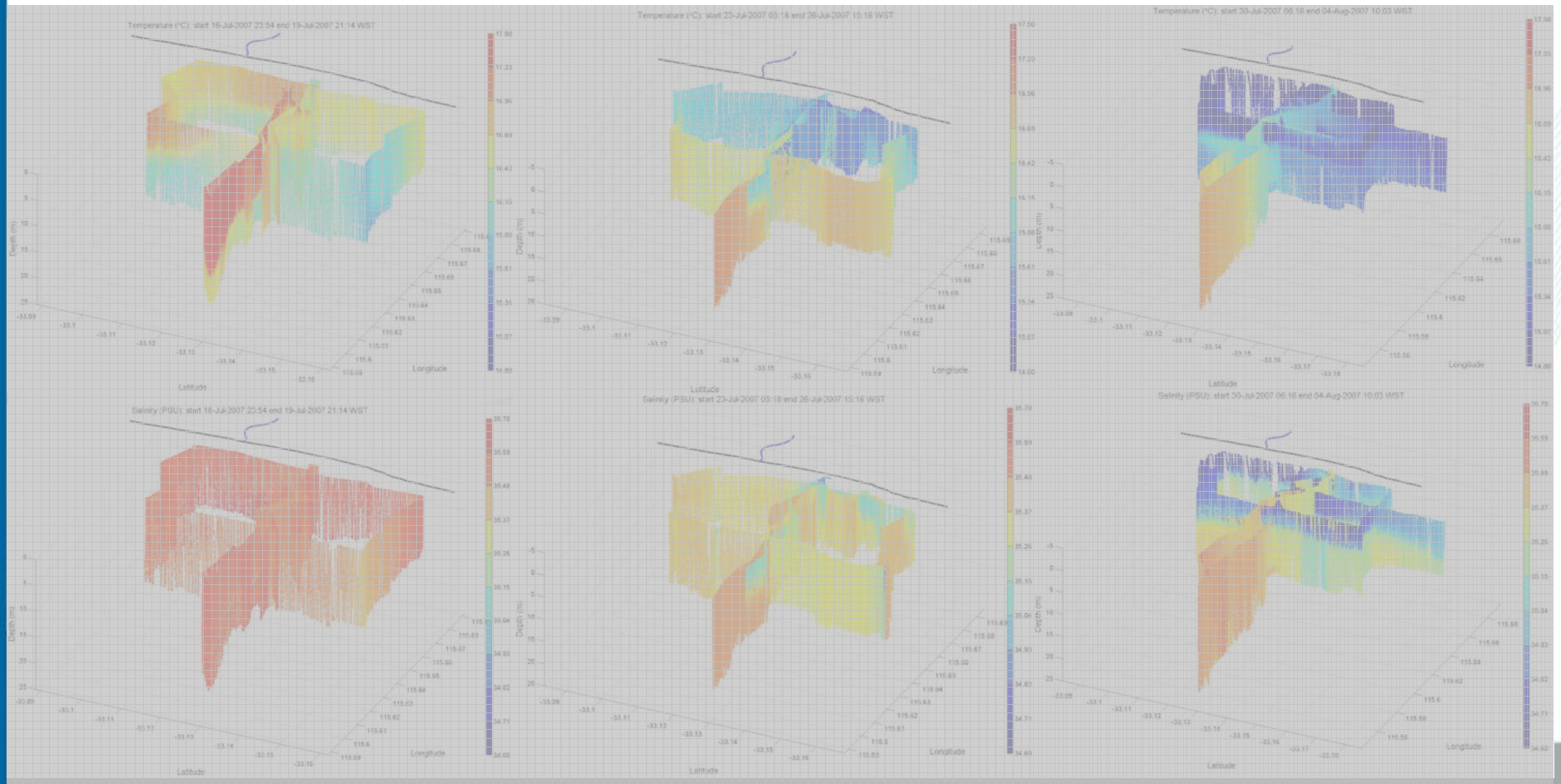
THREE-DIMENSIONAL MONITORING (WINTER)



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SUMMARY

- Seaglider provided a vehicle to continuously collect high quality coastal oceanographic data over 20 days during summer and winter over a range of conditions
- During winter deployment 3 periods identified (1 – calm winter conditions, no riverine influence, weak horizontal gradients between onshore and offshore, 2 – Winter storm conditions, resuspension of particles in inshore regions, 3 – Calm conditions with several days of salinity stratification and particle loads via stormwater discharge from the Harvey Drain that may have stimulated algal growth)
- During summer deployment less dynamic variability than winter characterised by weak gradients between inshore and offshore waters
- Served as baseline data for other components of marine studies

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ADVANTAGES

- Significant cost savings
- Effective coverage (time and space)
- Safe
- Global satellite control and data recovery
- Readily deployed and recovered
- Operations not dependent on conditions

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APPLICATIONS

Examples

- Long-term water quality monitoring
- Formation water discharge (hydrocarbons)
- Tracking dredge turbidity plumes
- Treated wastewater and desalination outfalls
- Internal wave measurements
- Ocean climate measurements
- Ocean response to tropical storms

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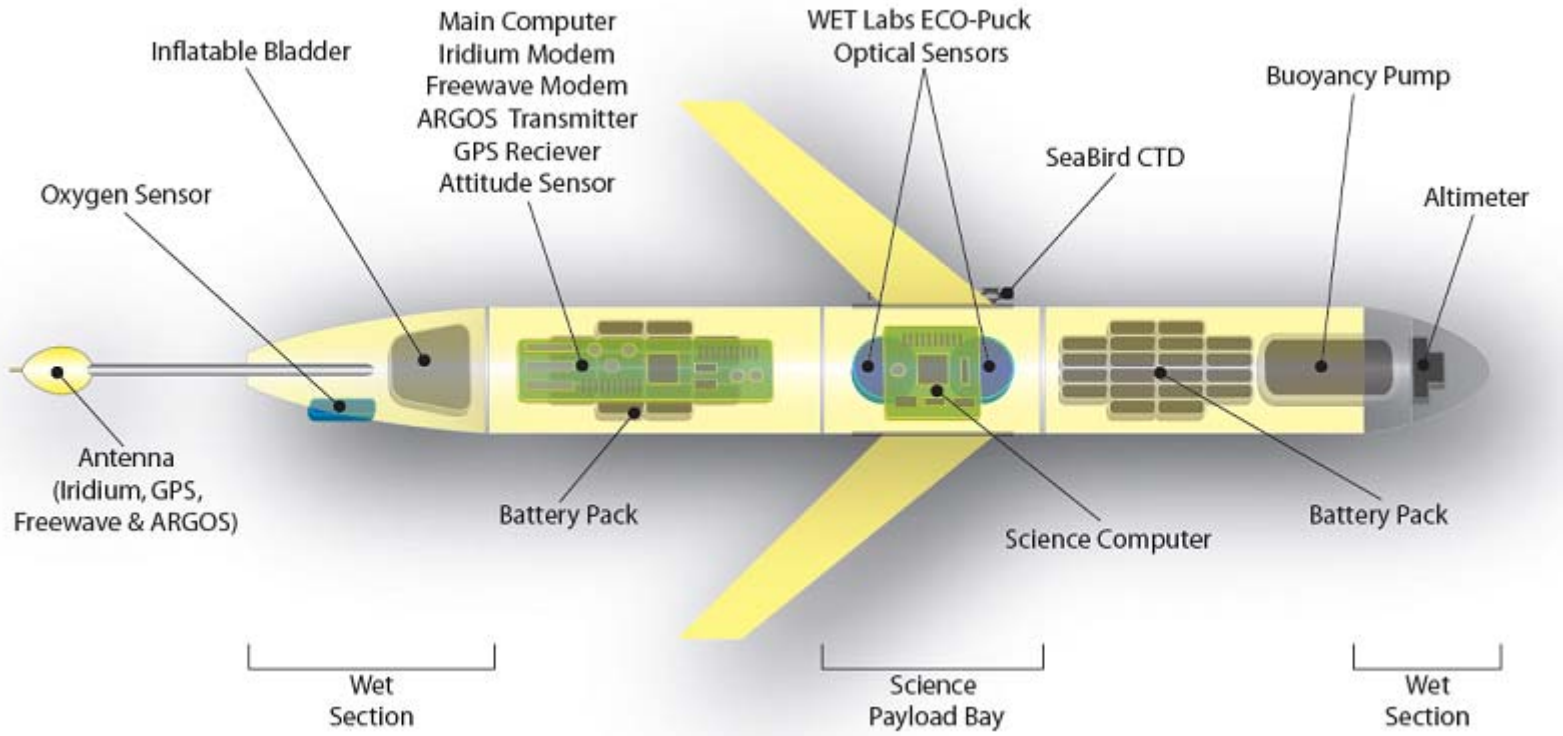
SEAGLIDER TECHNOLOGY

Glider schematic

source: Webb Research



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SEAGLIDER TECHNOLOGY

Operations summary

- Operation depths: 30, 100, 200, 1000 m
- Mission duration: 15 – 180 days
- Speed: 0.2 - 0.5 knots
- Weight in air : 50 - 75 kg
- Monitored and controlled from desktop
- R/T surface communications: via radio link, Iridium, cell, Argos
- Deploy/recover from small boat by 2 persons
- All weather operations

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RECENT GHD APPLICATIONS

internal waves

wastewater outfall

continental shelf dynamics

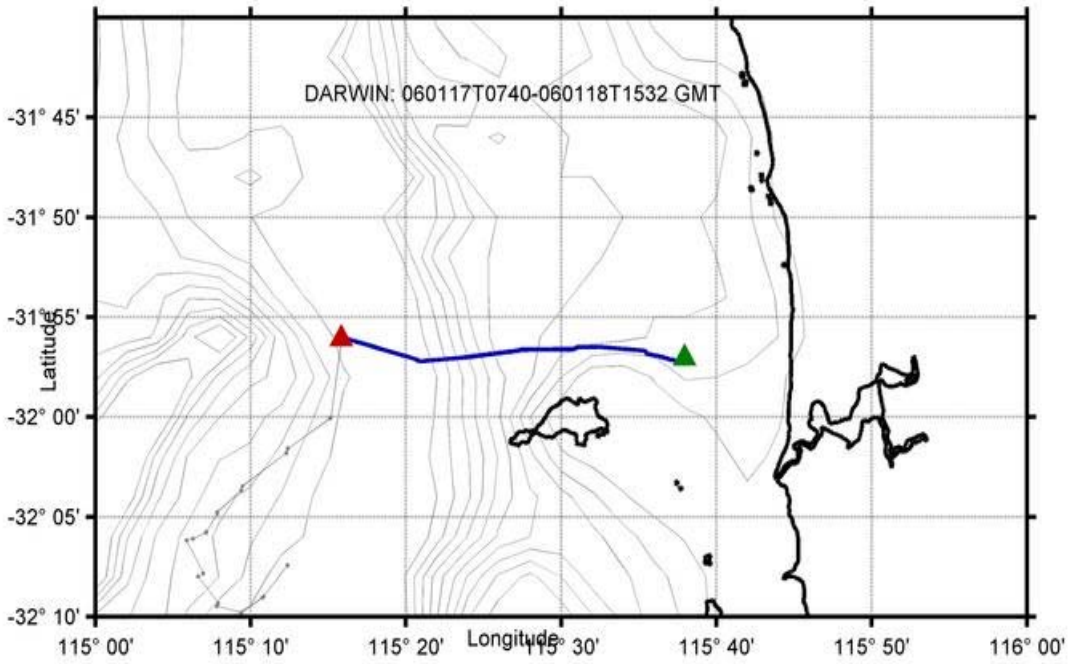
desalination plant

desalination plant

CHARACTERISE CONTINENTAL SHELF OCEANOGRAPHY

Example #2: Rottnest glider track 18 January 2006

source: AUV Pty Ltd



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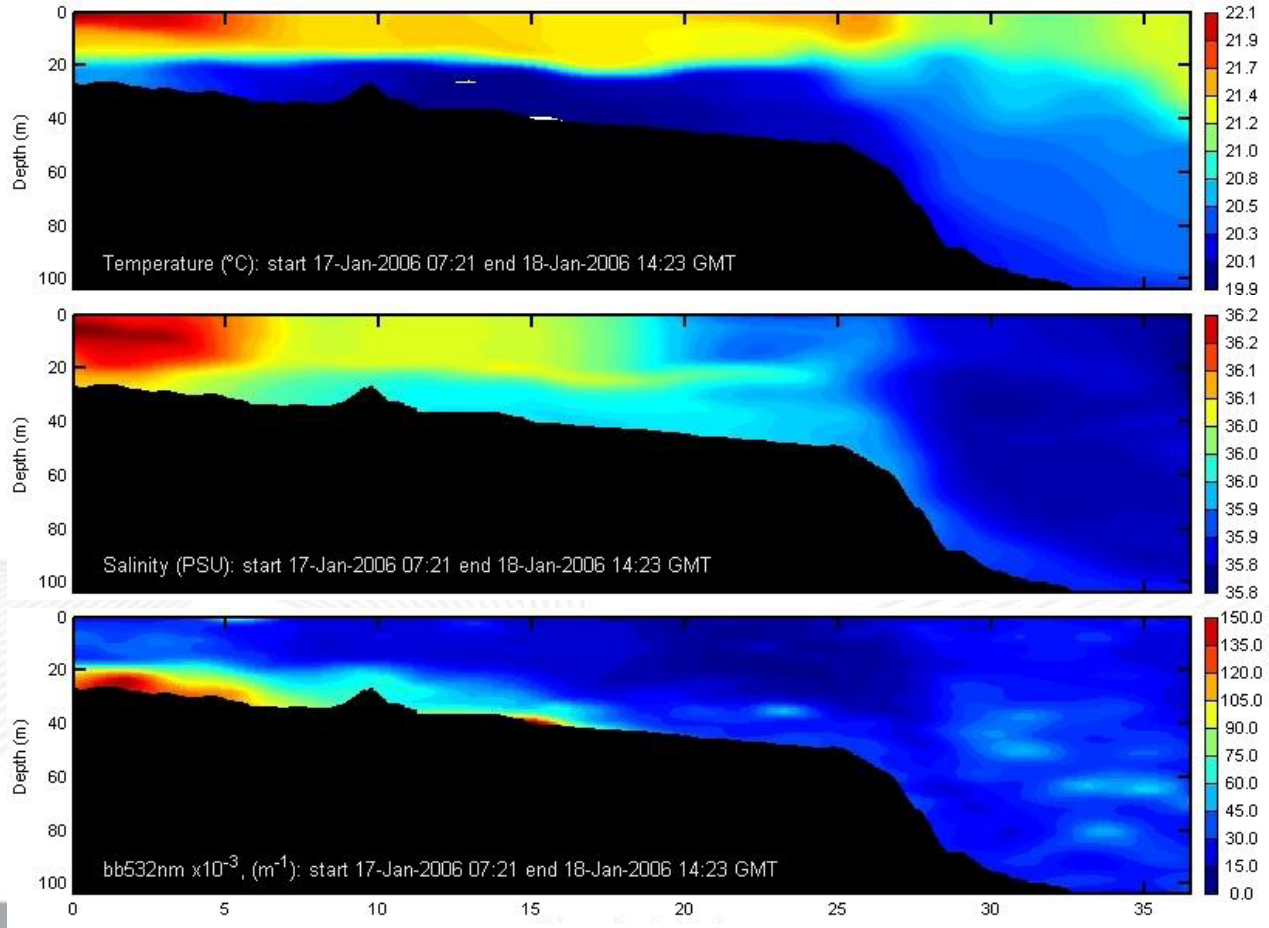
CHARACTERISE CONTINENTAL SHELF OCEANOGRAPHY

Example #2: Rottnest temperature salinity and density profiles on 18 January 2006 *source: AUV Pty Ltd*



temperature (^{o}C)

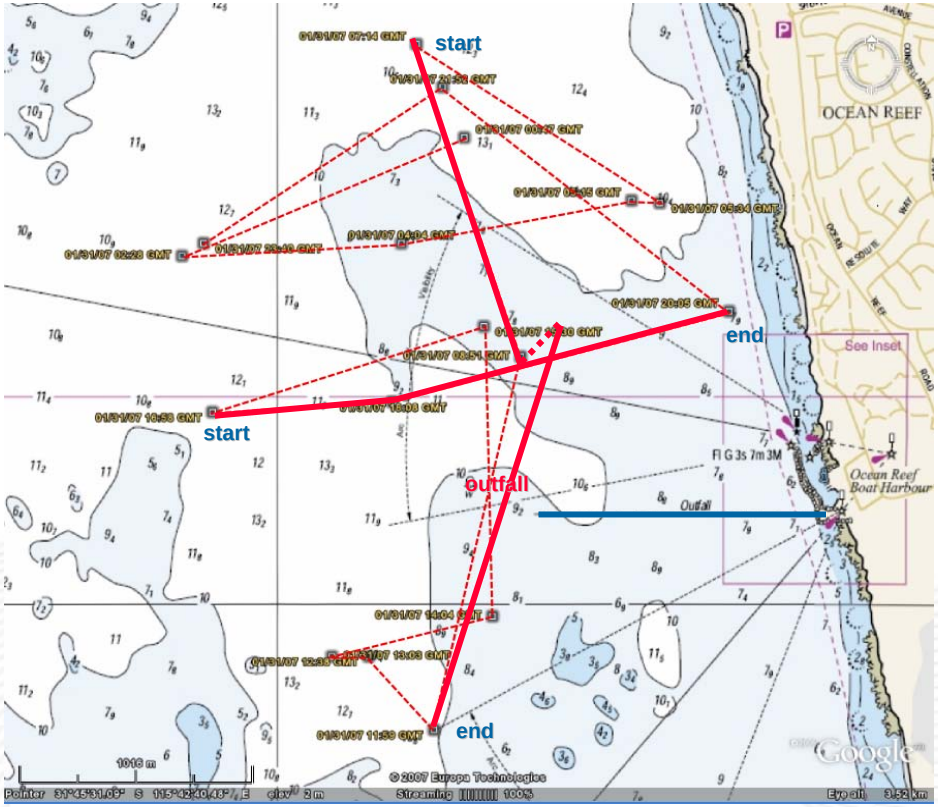
salinity (PSU)

backscatter (m^{-1})

distance (km)

MONITOR COASTAL WASTEWATER OUTFALL

Example #3: glider tracks



glider tracks

- —— detailed
- - - - 24 hours

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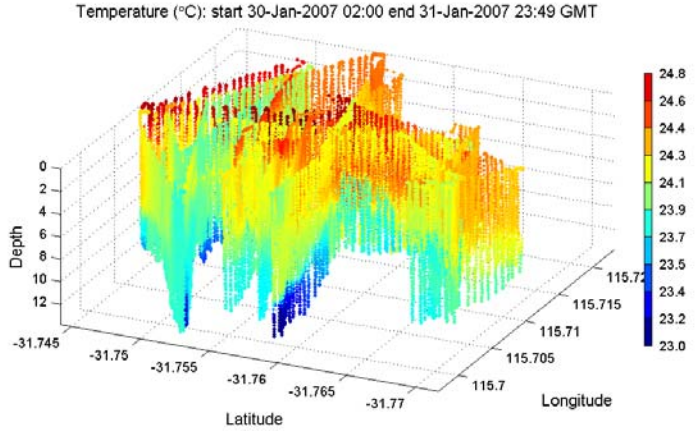
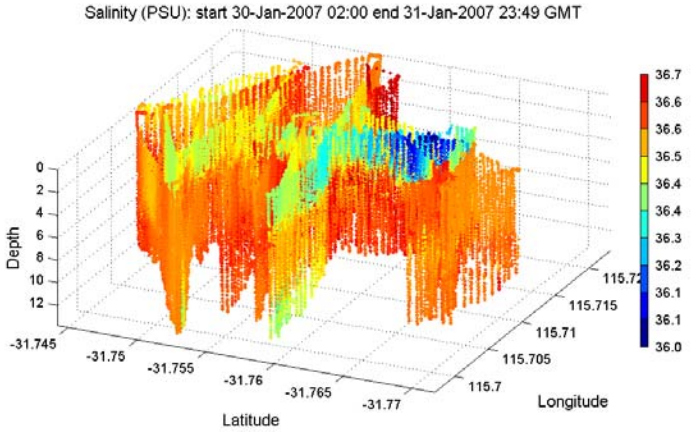
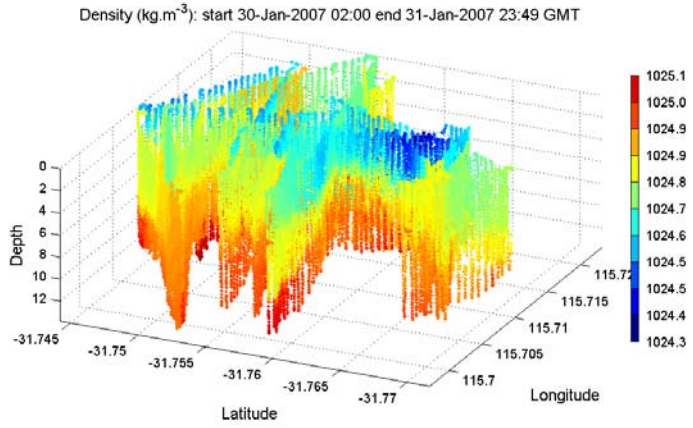
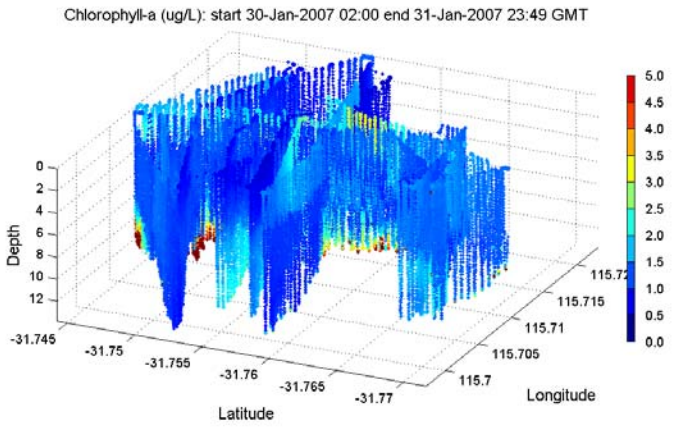
MONITOR COASTAL WASTEWATER OUTFALL

Example #3: outfall monitoring via 24 hours glider tracks of physical and biological water quality parameters



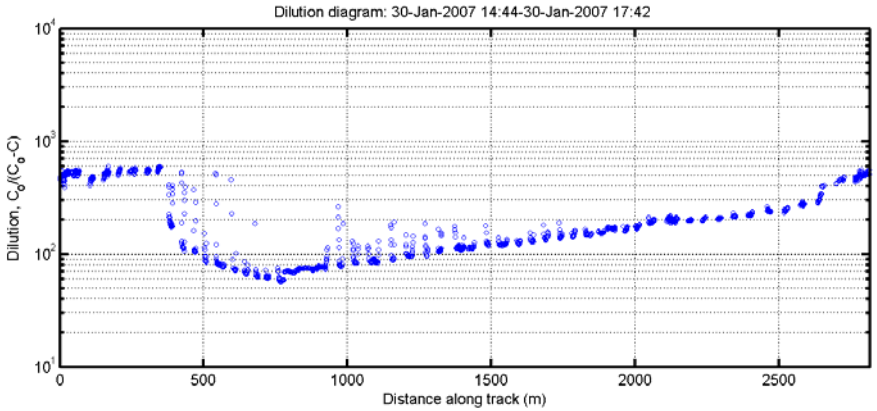






MONITOR COASTAL WASTEWATER OUTFALL

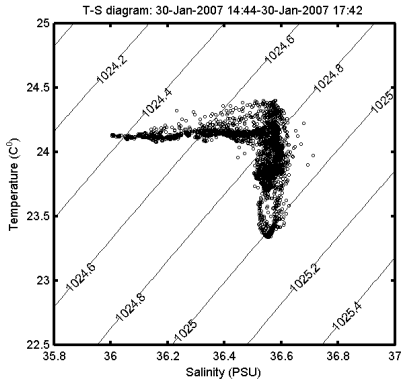
Example #3: treated wastewater dilution



dilution $c_0/(c_0-c)$

dilution downstream distance

distance (m)



temperature

temperature salinity diagram

salinity

SEAGLIDER OPPORTUNITIES

Services

- Services
  - Coastal/Marine Monitoring Compliance
  - Inform Offshore Resource Industry of Oceanographic Conditions
  - Monitor Effects during Coastal/Marine Projects: Construction, Dredging, Formation Water Discharge
- GHD Value Add
  - Numerical modelling: physical, chemical and biological
  - Real-time 3D visualisation
  - Real-time 3D triggers and alerts

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SUMMARY

- Cost effective collection of high quality coastal and oceanographic data
- Continuous safe data collection during all conditions
- Real-time remote control and data recovery
- Real-time data acquisition and visualisation


GHD