

Hosting an Underway pCO₂ System

+ Data Handling and Quality Control

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Production Systems

- General Oceanics 8050
 - LDEO (Taro Takahashi/Tim Newberger)
 - OSU BoL (Burke Hales)
 - Sunburst SuperCO2
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- LI-COR infrared gas analyzer Li-7000

Component Requirements

- Uncontaminated seawater intake
- Clean atmospheric air intake
- Gas standards & zero (nitrogen, scrubbed air, soda lime)
- Equilibrator
- Gravity drain (complicates below water line installations)
- CO2 Analyzer (LI-COR)
- Stable power
- Maintenance

Other Sensor Data

- Navigation – GPS & time
- Meteorological – Barometric pressure & wind
- Seawater – Intake temperature & salinity

- Considerations:
 - Pipe/tube insulation
 - Time lags & drifts

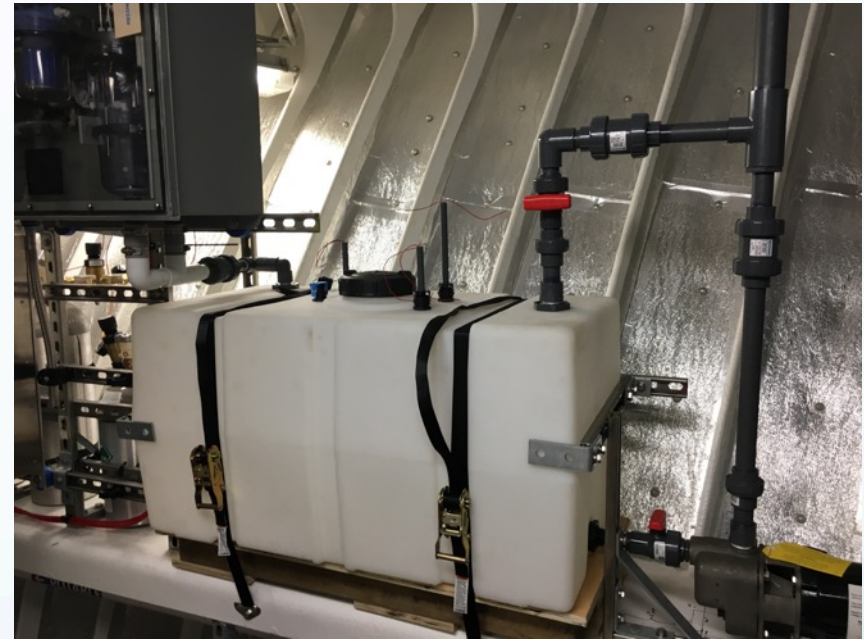
Installation Examples

- R/V *Neil Armstrong* – GO 8050
- R/V *Sally Ride* – GO 8050
- R/V *Sikuliaq* – LDEO
- R/V *Kilo Moana* – GO 8050
- USCGC *Healy* – LDEO
- R/V *Roger Revelle* – GO 8050 (After midlife)
- Temporary shipboard installs (OSU BoL & PMEL)
- Shellfish hatcheries (OSU BoL & PMEL)

R/V *Neil Armstrong*



R/V Sally Ride



R/V Sikuliaq



R/V Kilo Moana



Other Installations



Courtesy NOAA PMEL, M/V Cap Vilano



Courtesy OSU R/V Elakha



Courtesy OSU

Data Handling & QC

- Instruments are logging the concentration of CO₂ samples as measured by an interim calibration curve
- It is recalculated later using a new response curve and temperature correction
- R2R is considering process to QC data coming from different ships & systems.

Operational Challenges Affecting Data Quality

- Quality sea surface temperature value
- Seawater flow rates
- Flow rates of gases
- Seawater Filters (coastal vs open ocean)
- Gas leaks
- Calibration using WMO certified reference gas mixtures

Maintenance and Support Considerations

- Is data being reviewed by shore based research staff?
- Frequency of site visits by knowledgeable technicians
- GO system offers internal Q/C checks, flag, flowmeters
- Network monitoring of Q/C values could increase stability
- Coastal geo-fencing is possible with some systems