

Oxygen Optodes from AADI: 10 years in the market, thousands of applications





Smart sensors



Multiple Output:

- Cond: Cond, Sal, Temp, Sound speed, Raw
- Pres: Pres, Temp, Raw
- Oxygen: O₂, O₂ %, Temp, Raw
- Wave & Tide: Wave, Tide, Temp, Raw
- Vented Wave & Tide: Wave, Tide, Pres, Temp, Raw
- Currents: Currents, Temp, Tilt, Signal, Strength, Raw

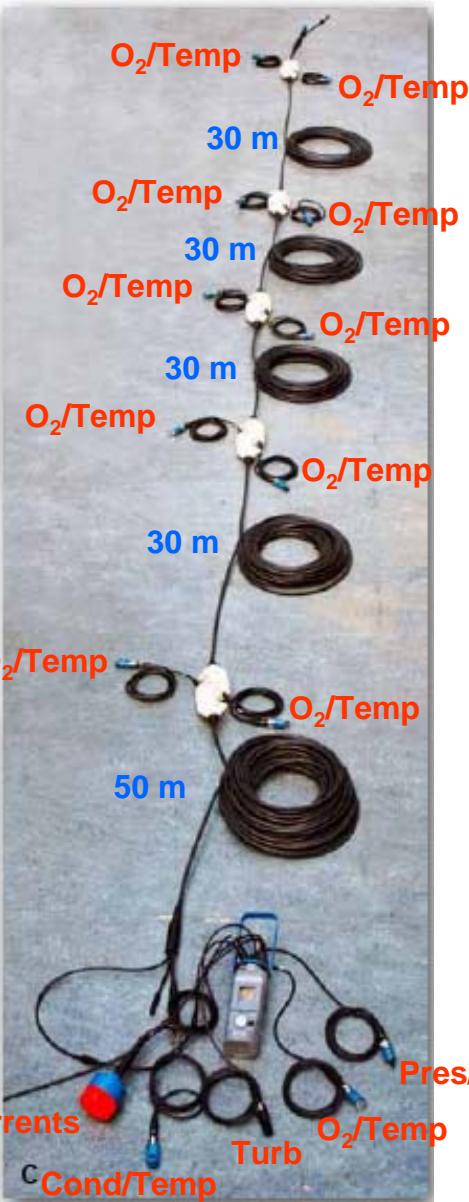
Communication:

- AiCaP
- RS232/RS422
- Aanderaa SR10 (10 bit)
- Analog 0-5 V, 4-20 mA

Aquarius Coral Reef observatory



Figure 2. Aquarius underwater habitat located on Conch Reef along the Florida Keys outer reef tract
(Photo by Chris Martens, UNC-Chapel Hill).



AADI SEAGUARD® Sensor String System

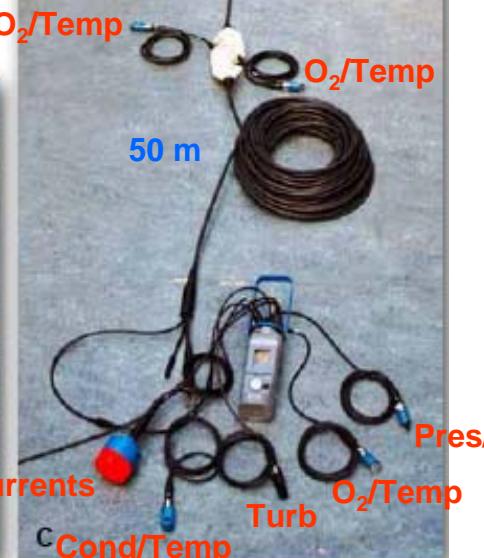
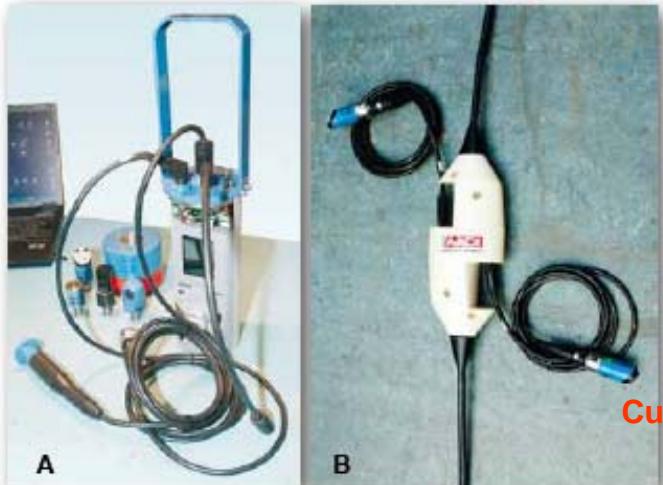
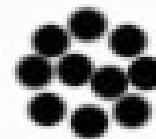


Figure 3. Aanderaa Data Instruments Seaguard sensor system designed for UNC-Chapel Hill's coral reef project.
A, Seaguard base unit with current meter, optode O₂ sensor, CTD and turbidity sensors. B, wet mateable Optode sensors on 3 meter length fly leads. C, 170 meter optode sensor string with Seaguard base unit. .

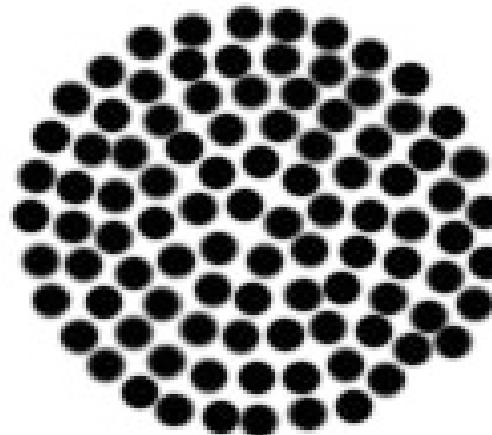
Large system- String Logger



- 10 Oxygen/Temp
- 5 Conductivity/Temp
- 2 Pressure/Temp
- 4 Turbidity
- 1 Doppler Current



AiCaP cable



RS-422/RS-232 cable

Oxygen Optodes

Long term stable

Examples of Scientific Papers

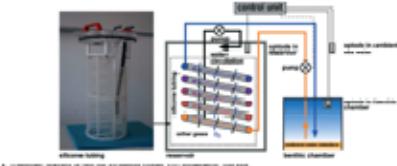
No O₂ consumtion & Robust



Drazen et al (2005)

Not freezing sensitive

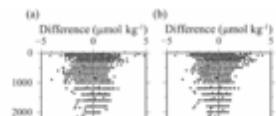
Gas Exchange Chamber



Sommer et al (2008)

Not sensitive to H₂S and most other chemicals

Cabled CTD



High accuracy & low noise

Uchida et al (2008)

Nicho

No pressure hysteresis

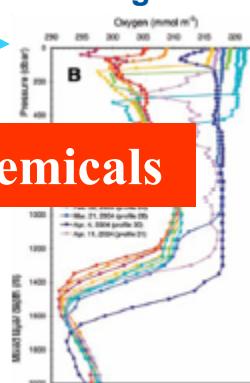
Ferry boxes



Hydes et al (2009)

Good for hot water monitoring

Argo floats

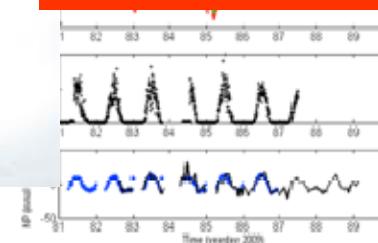


Körtzinger et al (2004, Nature)
Johnson et al (2010, Nature)

ients

Lower fouling sensitivity

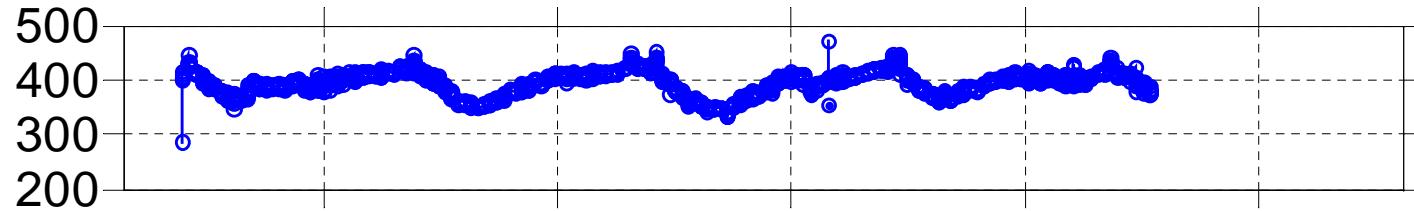
McGillis et al (2011).



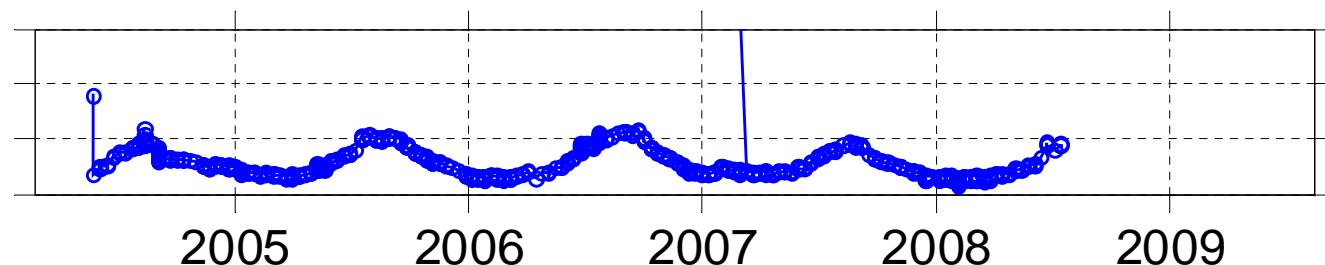
Champenois and Borges (2012)

O₂ concentration (μM)

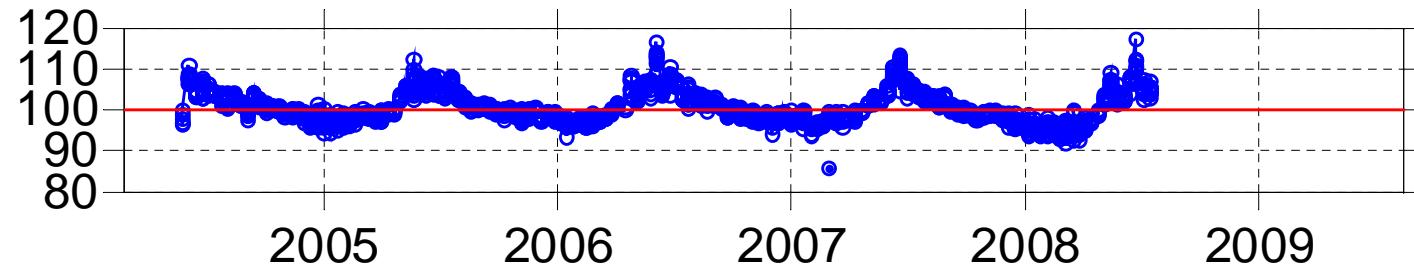
In air surface drift optode data from float 4900494



Air temperature ($^{\circ}\text{C}$)



O₂ saturation (%)



*Denis Gilbert et al., Argo Science Workshop 3,
Hangzhou, China, March 27, 2009*

Improvements in MKII sensors

MKI (2002)

Main models:
3830 & 3835



- Better electronics
- Better optics (faster foils)
- Better temperature compensation
- Better formulas to calculate absolute oxygen
- Multipoint calibrated

MKII (2012)

Main models:
4330, 4831 &
4835



Multipoint Calibration

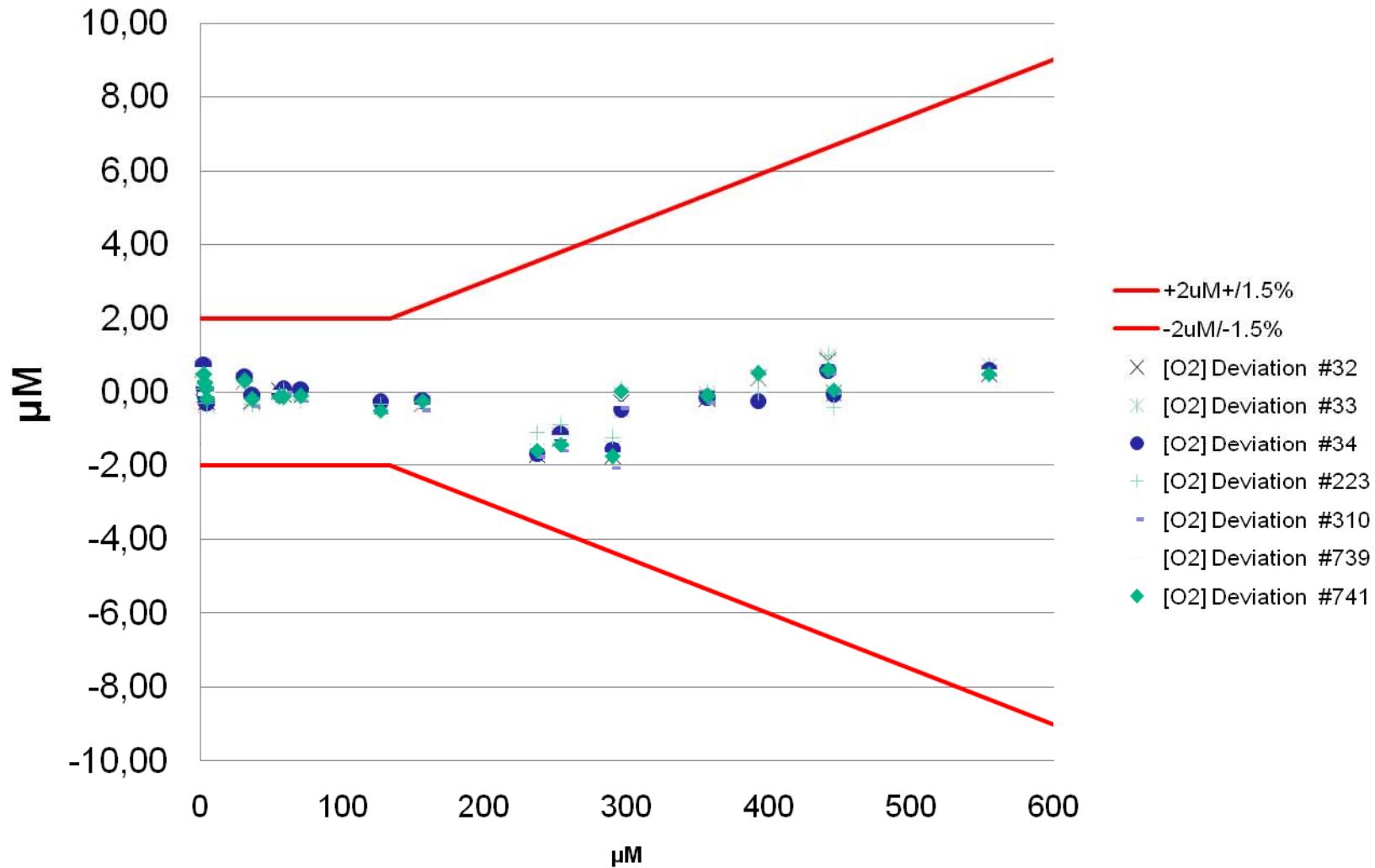
- Gas injection by use of mass flow controllers
- Automatic System 40 point calibration & 20 point subsequent verification
- Reference optodes calibrated at GEOMAR Germany
- Automatic Winkler system from SI Analytics for verification
- International intercomparison of calibration facilities
- Operational October 1 2012, initial delivery time of optodes 7 weeks
- Accuracy: $<\pm 2.5\mu\text{M}/1.5\%$
- Sample based drift: $<0.1\%/\text{100000 samples}$



Multipoint
calibration only for
MkII: 4330, 4831 &
4835

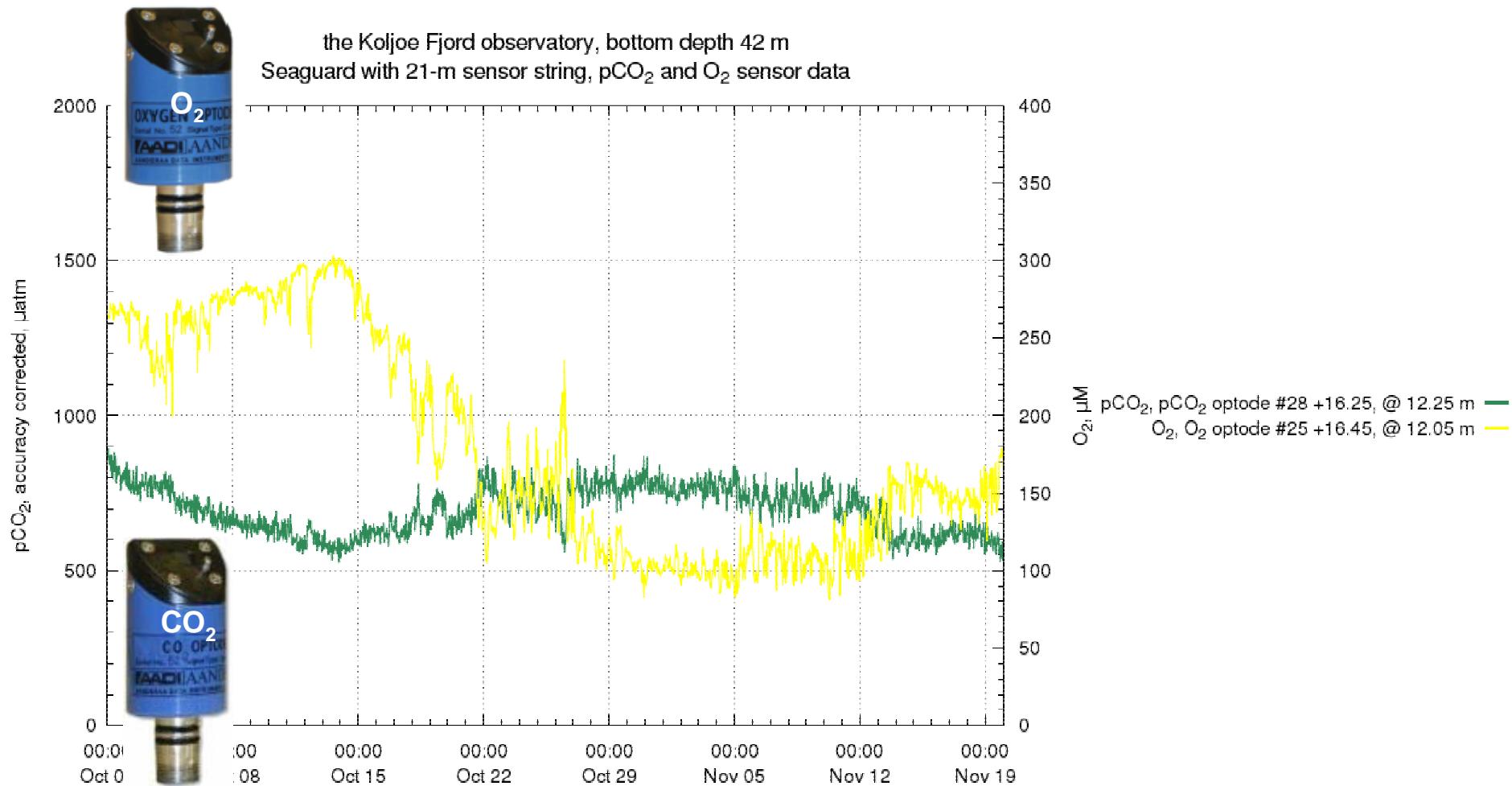


Validation



Absolute Accuracy: $\pm 2.5 \mu\text{M}$ or $\pm 1.5\%$ of reading

Data on-line at: <http://mkononets.dyndns-home.com:8080/>





Merci!
Thank You!

Automatic Weather Station, Svalbard, Arktis