

# Quality assurance of dissolved oxygen measurements



JOINT EUROPEAN RESEARCH INFRASTRUCTURE NETWORK FOR COASTAL OBSERVATORIES

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## Quality assurance procedure

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- *Continous measurements of dissolved oxygen on ships of opportunity (TorDania until 04/2012, LysBris, FunnyGirl) at Cuxhaven port measurement site*
- *Oxygen samples during maintenance in harbour  
Analysis in lab by Winkler-titration*
- *Calibration tests in lab*



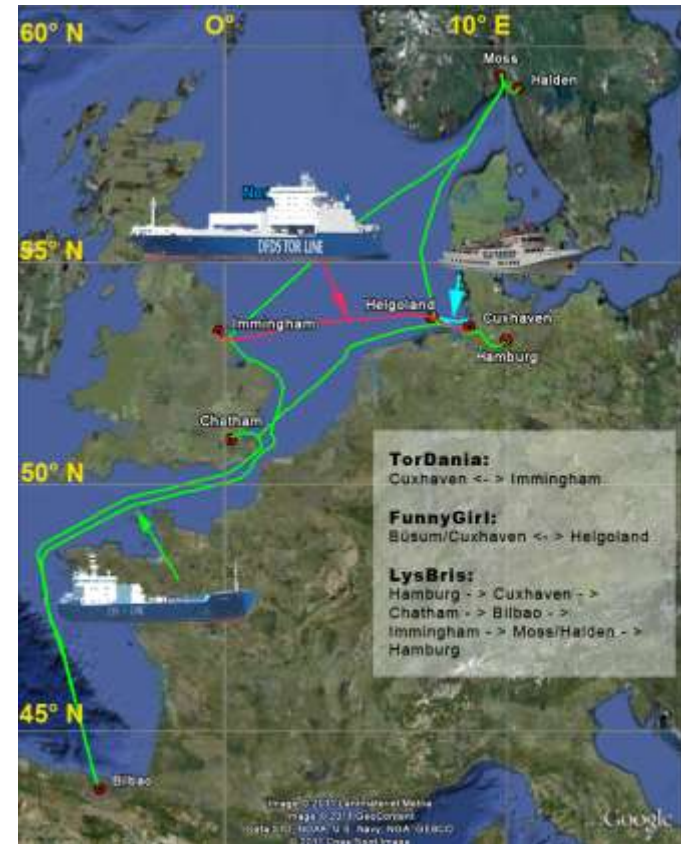
# HZG Optode Quality assurance platforms



- TorDania: Route between Germany and England
  - Ferrybox maintenance in Cuxhaven
- LysBris: Route between Germany, England, Spain, Norway
  - Ferrybox maintenance in Hamburg
- Campaign data of R/V Heincke
  - Optode measurements + Winkler-titration on board

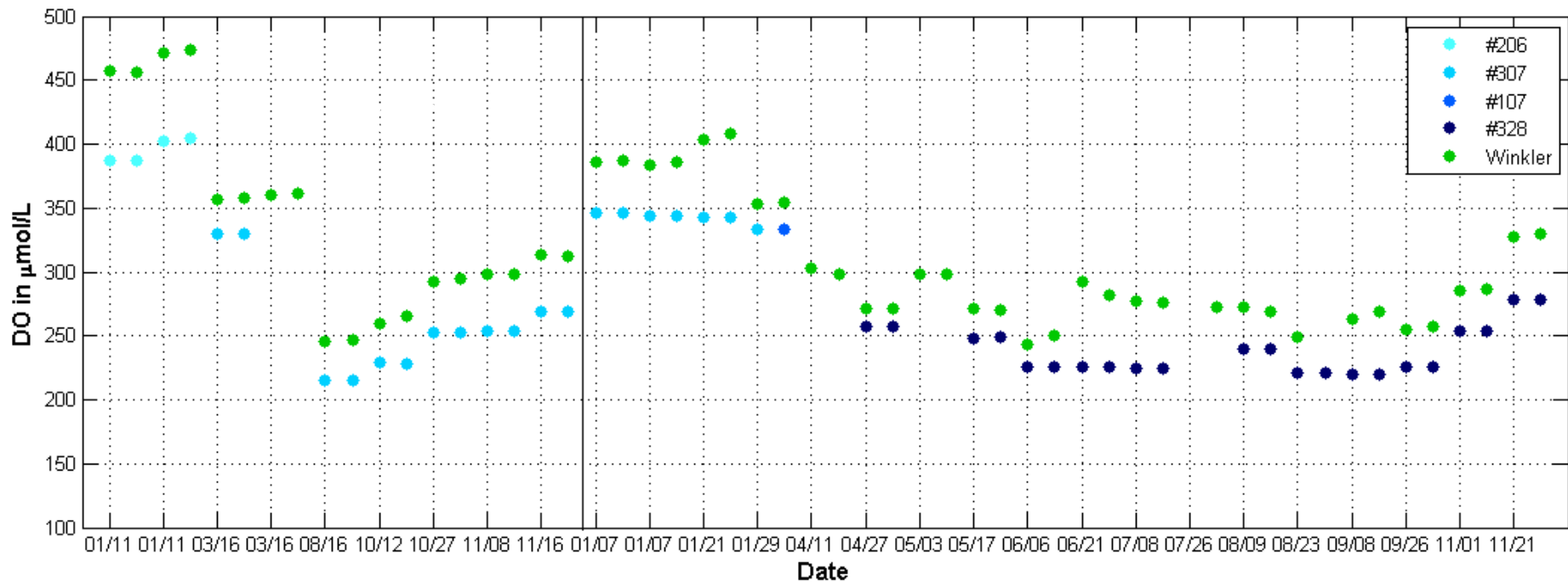


R/V Heincke





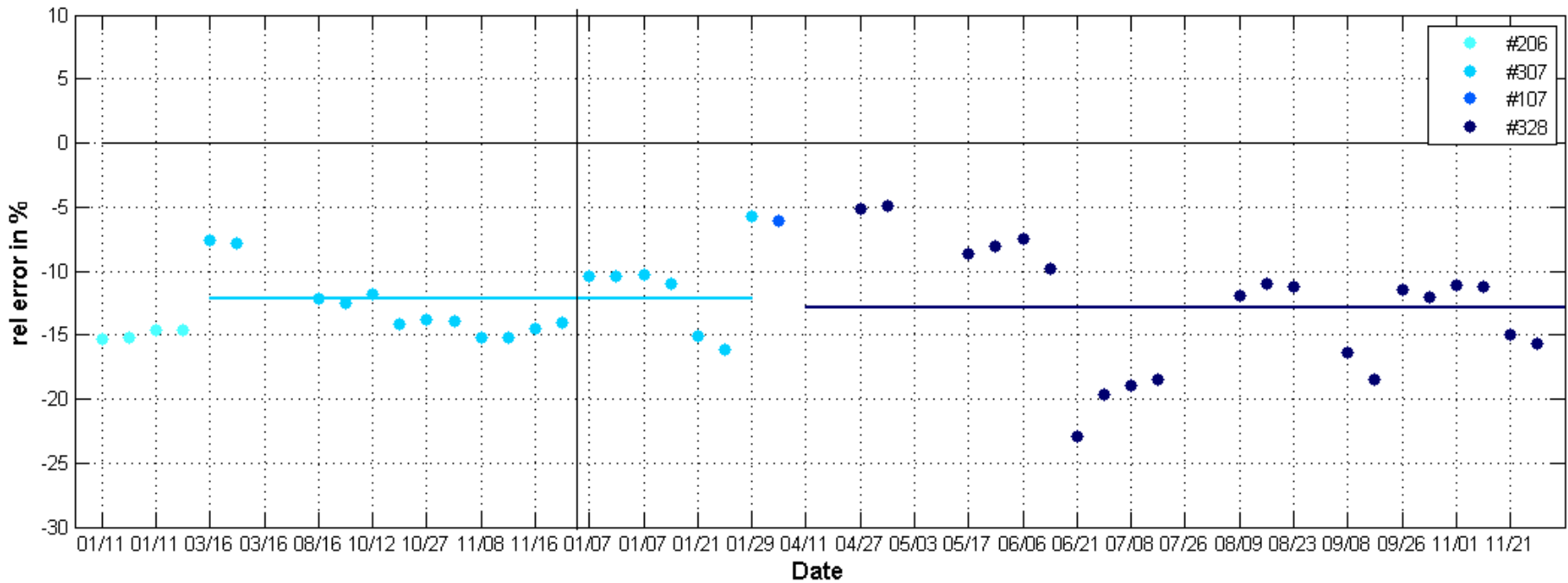
## Tor Dania 2010-2011 time series



TorDania: Dissolved Oxygen time series 2010-2011  
In two years four different optodes



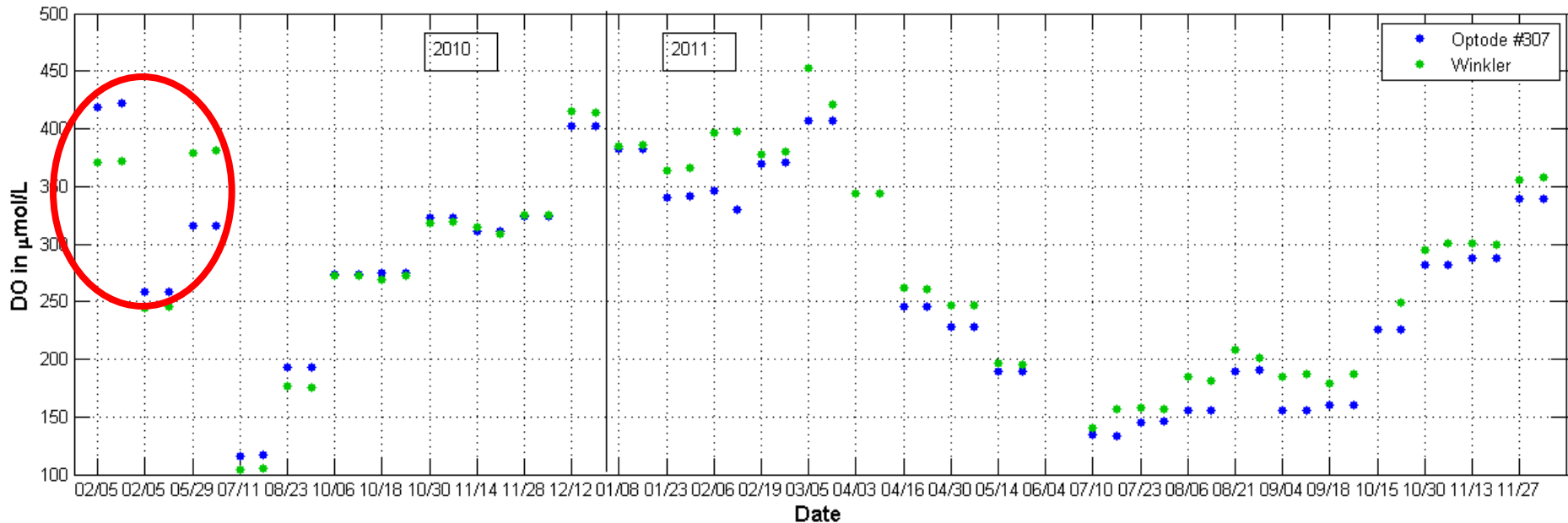
# Tor Dania 2010-2011 relative error



Relative error and mean values for each optode



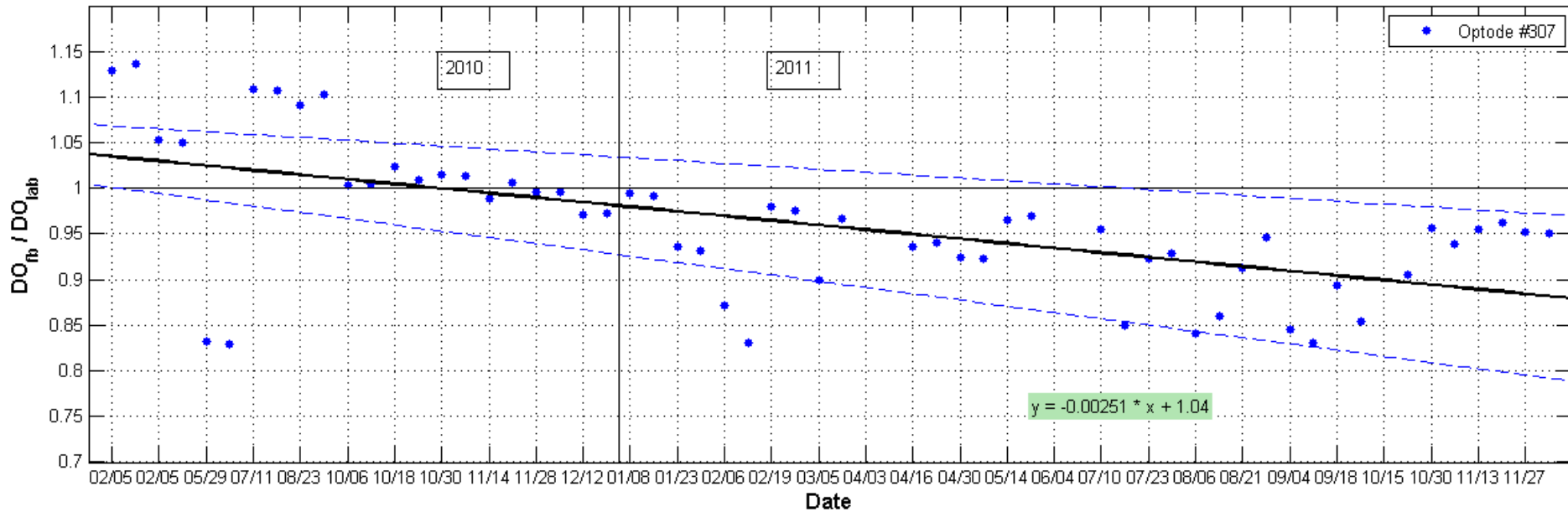
# LysBris DO time series



Two year time series of comparison between Optode and Winkler for one Optode  
Measurements taken in Hamburg harbour → low DO values in summer!



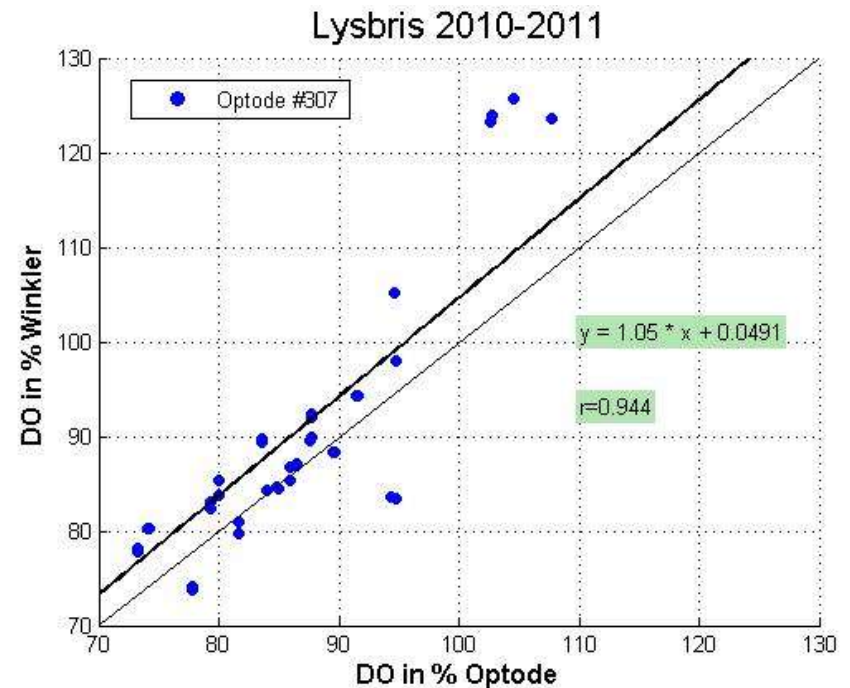
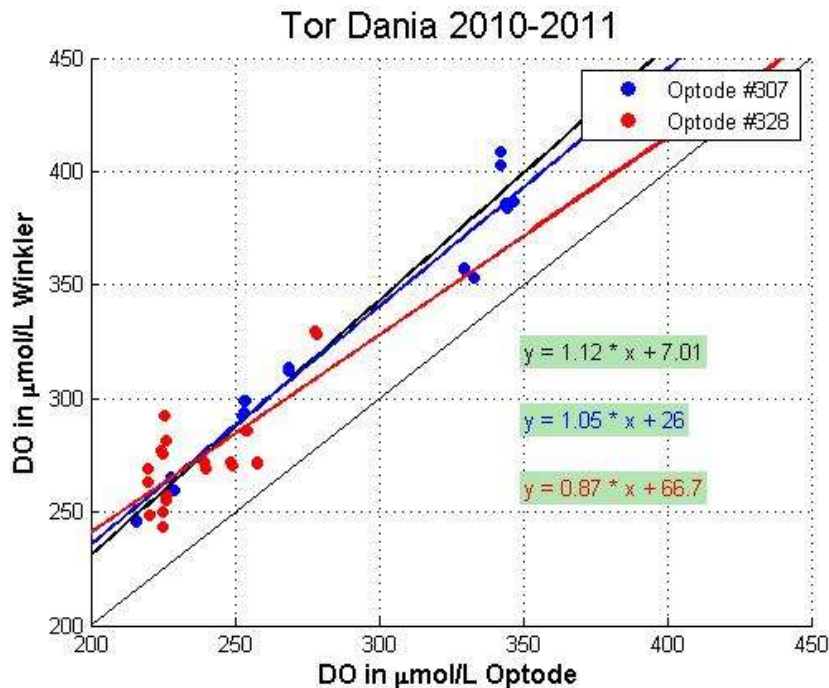
# LysBris 2010-2011 DO ratio Ferrybox / Lab



Ratio DO FB/Lab: Drifting optode, starting with overestimation



## Tor Dania and LysBris DO Scatterplots

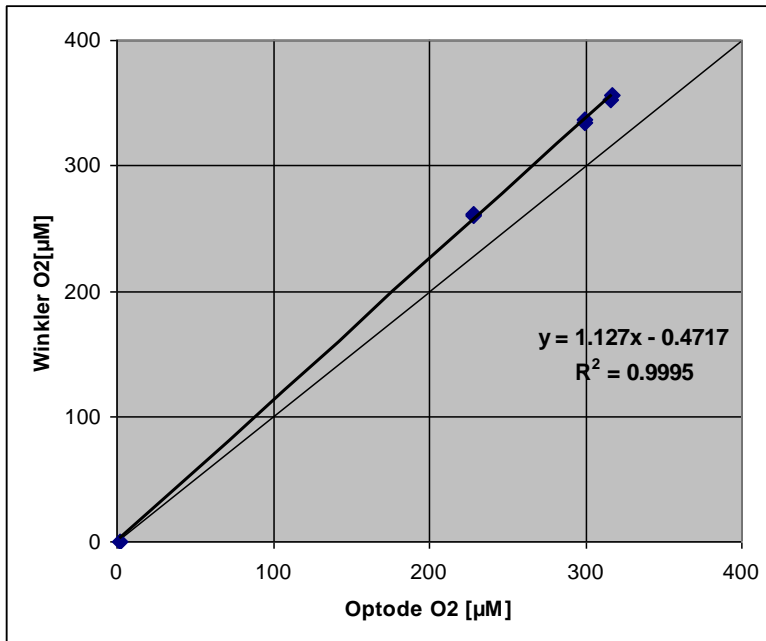


Systematic underestimation of optode measurements  
Oxygen data over wide range helpful

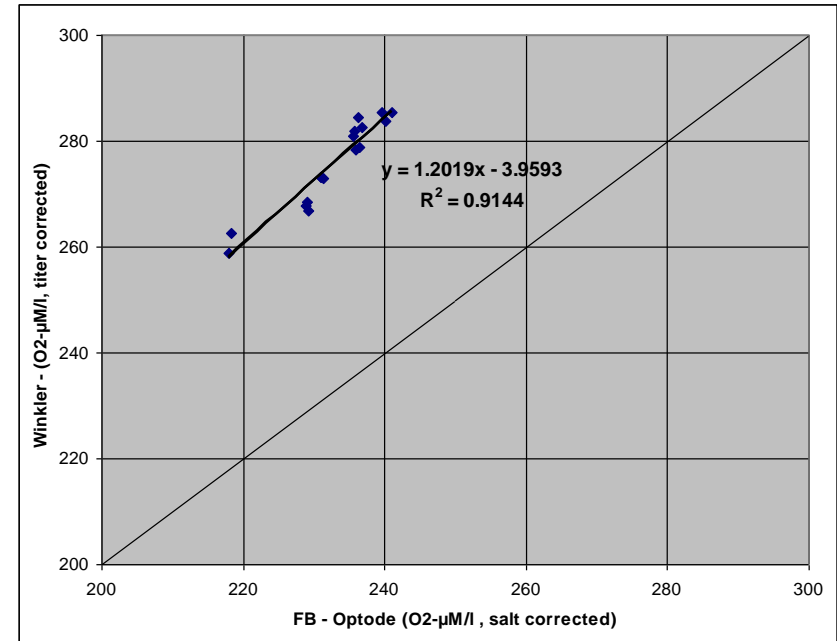




## Pre-campaign lab calibration comparison



Lab calibration Optode #205 and Winkler  
9-11/06/2011  
Temperature  $\approx 23^\circ\text{C}$ , Salinity: 0 psu  
Mean ratio = **0.89**



Comparison on ship cruise R/V Heinke  
Optode #205 and Winkler  
17-21/06/2011  
Temperature  $\approx 12\text{-}15^\circ\text{C}$ , Salinity: 32.3-34.8 psu  
Mean ratio = **0.84**



## Conclusions

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- *2-year period of quality assurance*
- *Underestimation of Optode measurements ( $\approx 10-15\%$ )*
- *Drifting Optode measurements on LysBris*
- *Calibration over wide range helpful*
- *Individual Optode calibration is beneficial*  
*Calibrating before and after optode change in Ferrybox is needed on regular basis*



## To-Do List



- *Continue quality assurance for 2012*
- *Determine correction functions*
- *Installation of Ferrybox on Ro-Ro Ship „HafniaSeaways“ as a replacement for TorDania*

HafniaSeaways

