

OPTImare

YOUR PARTNER FOR
INTEGRATED SENSOR SOLUTIONS

Company Overview



- **1991: Foundation of Optimare GmbH**
- **2002: Foundation of Optimare Sensorsysteme AG**
 - Marine Observing Systems and
 - Polar Service
- **ISO 9001 certified & approved as aircraft supplier for the German Armed Forces**

Polar
Service

Remote
Sensing

Marine
Observing
Systems

Analytics

Autonomous
Observing
Systems



Our premises in Bremerhaven





Selected References and Partners

AWI
DLR
BSH
RUAG
Dutch Coast Guard

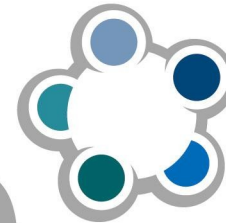
Royal Thailand Navy
Rijkswaterstaat

BFG
German Ministry of Transport
German Ministry of Defence
German Ministry of Research
UFZ Halle/Leipzig

EADS CASA
SASEMAR
BAS
Ifm-Geomar
IOPAS

NIPR Japan
ITM
University of Coburg
University of Potsdam
Stockholm University
NERSC

OPTImare



Marine Observing Systems

Marine Observing Systems: Overview

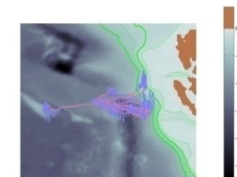
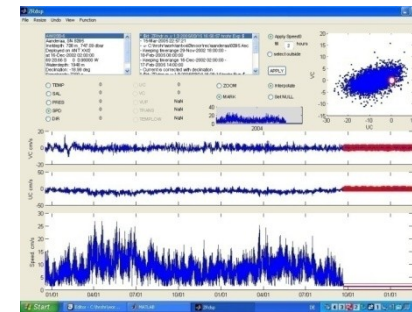
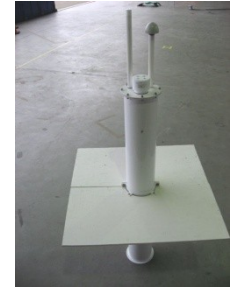
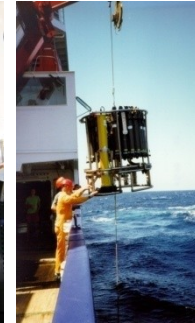


Oceanographic services:

- Participation in more than 25 expeditions on “RV Polarstern”, “RV Meteor”, ... (> 5 years “at sea”)
- Supporting CTD-, ADCP-, drifter-, moorings-, ... work
- Data retrieval, post-processing and analysis
- Special ARGOS/Iridium data service (24h/7d)
- **Glider Operation Center** under construction

Marine observing systems:

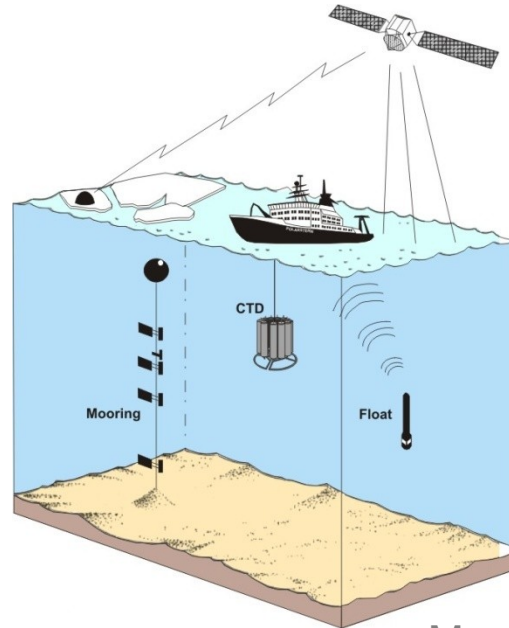
- Field and lab systems for special applications
- **NEMO** floats for ocean observation
- **PopUp** buoys for intermediate data retrieval
- **ITAC** for “online” ocean observation
- **Iceberg buoys** for iceberg tracking
- **PACT**-system for Tsunami detection and warning
- **MOVING** for navigation of under water vehicle
- **Precision Salinometer** for reference measurements



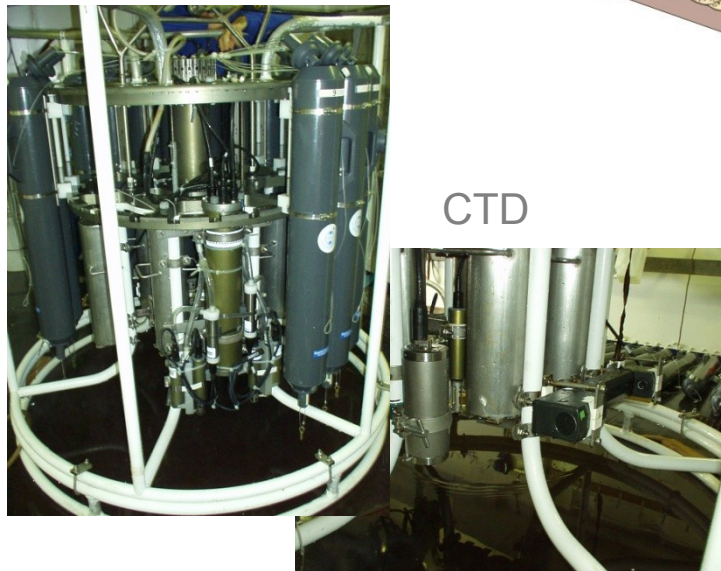
Marine Observing Systems: Oceanographic Services – data retrieval



- CTD & CT Recorder
- ADCP
- Fluorometer
- Transmissometer
- Current meter
- Radiance Sensors
- Irradiance Sensors
- PAR Sensors ...



ICEberg tracking



CTD

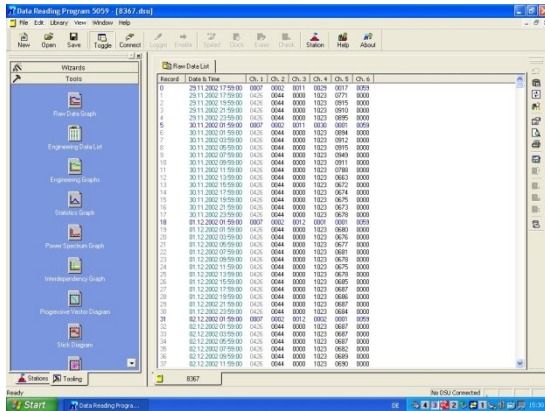
Moorings



Marine Observing Systems: Oceanographic Services – post processing

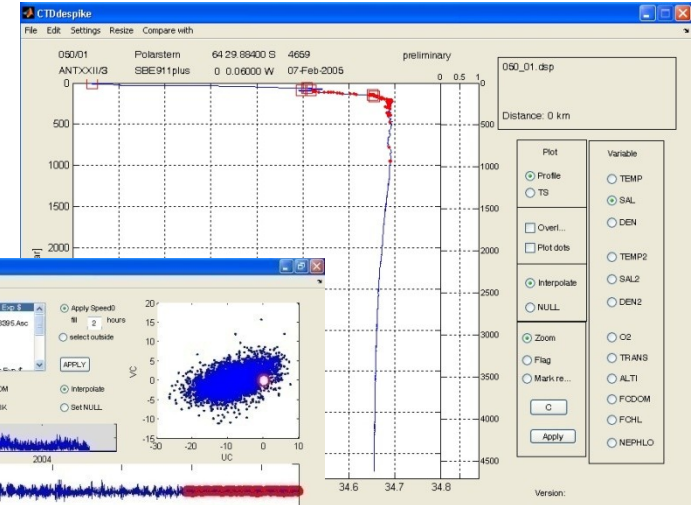


Data retrieval with
manufacturer software

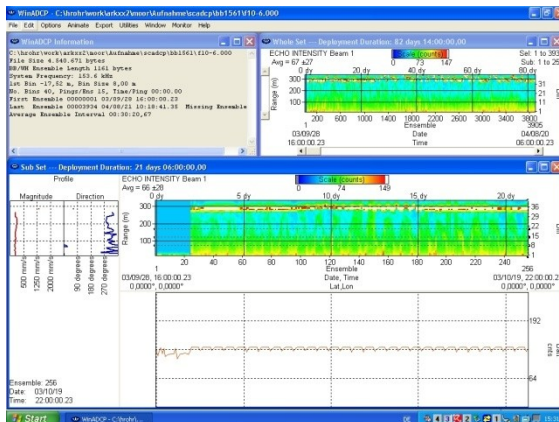


Data visualisation post-processing and quality
control with own software tools

Time series



Quick-look of ADCP data



CTD

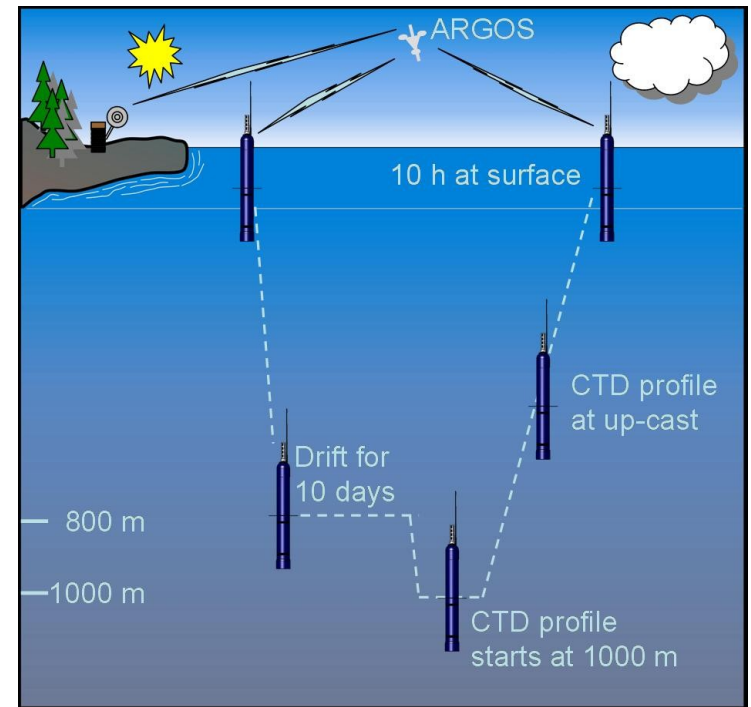
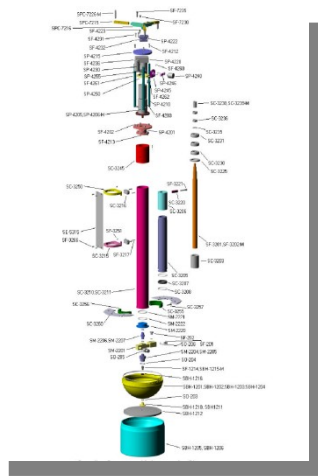
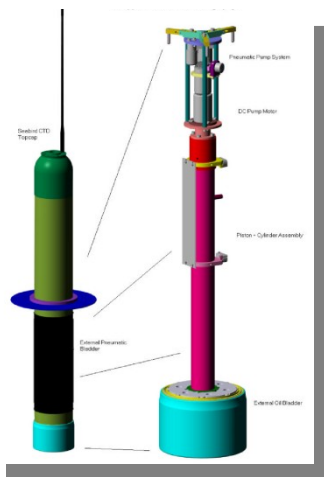
The tools are based on many years of experience
and field work.

NEMO



OPTIMARE has developed the NEMO float based on the successful design of the SOLO floats from Scripps Institute of Oceanography, La Jolla, California.

The goal was to improve the performance and functionality using the proven SOLO float design.



NEMO – The Beginning



Main **goals** of the development were to

- increase the maximum operation depth to 2000 dbar.
- deploy floats in ice covered regions with operation under ice and delayed mode data transfer
- increase the payload for larger sensor packages
- have the possibility to integrate more sensors
- create a highly modular system concerning the mission software and sensor integration

NEMO received the industrial award "Industriepreis 2008" in the category "Research" from the German medium-sized businesses initiative.

NEMO was placed under the first seven out of 600 products.



NEMO Status



	Status	WMO ID	Telecom ID	Model	Program	Date	Data	Age
1		7900069	26724	NEMO	Argo AWI	24/07/2008		1270
2		7900093	29056	NEMO	Argo AWI	20/07/2008		1230
3		1900382	26872	NEMO	Argo eq. AWI	18/07/2008		1540
4		7900086	29036	NEMO	Argo AWI	21/02/2008		1088
5		6900271	24737	NEMO	Argo BSH	21/07/2008		1190
6		6900270	24736	NEMO	Argo BSH	22/07/2008		1191
7		7900082	29019	NEMO	Argo AWI	11/03/2008		1111
8		7900073	29220	NEMO	Argo AWI	04/03/2008		1120
9		7900218	27993	NEMO	Argo AWI	27/04/2008		49
10		7900219	27985	NEMO	Argo AWI	23/03/2008		9
11		7900123	28021	NEMO	Argo AWI	07/02/2008		585
12		7900227	8067	NEMO	Argo AWI	18/04/2008		40
13		6900326	30710	NEMO	Argo BSH	26/07/2008		686
14		7900160	28044	NEMO	MERSEA	02/01/2008		320
15		7900156	28040	NEMO	MERSEA	30/01/2008		349
16		7900162	28043	NEMO	MERSEA	13/01/2008		330
17		7900222	28037	NEMO	Argo AWI	10/04/2008		30
18		7900161	28042	NEMO	MERSEA	10/04/2008		418
19		6900542	30372	NEMO	Argo BSH	25/07/2008		284
20		7900223	8060	NEMO	Argo AWI	30/03/2008		20
21		7900231	9728	NEMO	Argo AWI	09/04/2008		30
22		6900543	30712	NEMO	Argo BSH	26/07/2008		284
23		7900126	27998	NEMO	MERSEA	03/04/2007		264
24		7900080	29038	NEMO	Argo AWI	15/08/2006		540
25		7900083	29140	NEMO	MERSEA	23/02/2006		363
26		6900327	30712	NEMO	Argo BSH	16/08/2007		341
27		1900518	54128	NEMO	Argo IFM-GEOMAR	25/04/2008		1060
28		6900325	30372	NEMO	Argo BSH	10/09/2006		0
29		7900070	10814	NEMO	Argo AWI	17/01/2006		360
30		1900517	54127	NEMO	Argo IFM-GEOMAR	17/02/2008		990

Six batches of NEMO floats have been built since 2002. This amounts to a total of about 112 floats and ~60 floats to be delivered this year.

We have integrated on standard ARGO floats:

- CTD
- O₂
- RAFOS

We use for telemetry

- ARGOS
- Iridium – GPS.

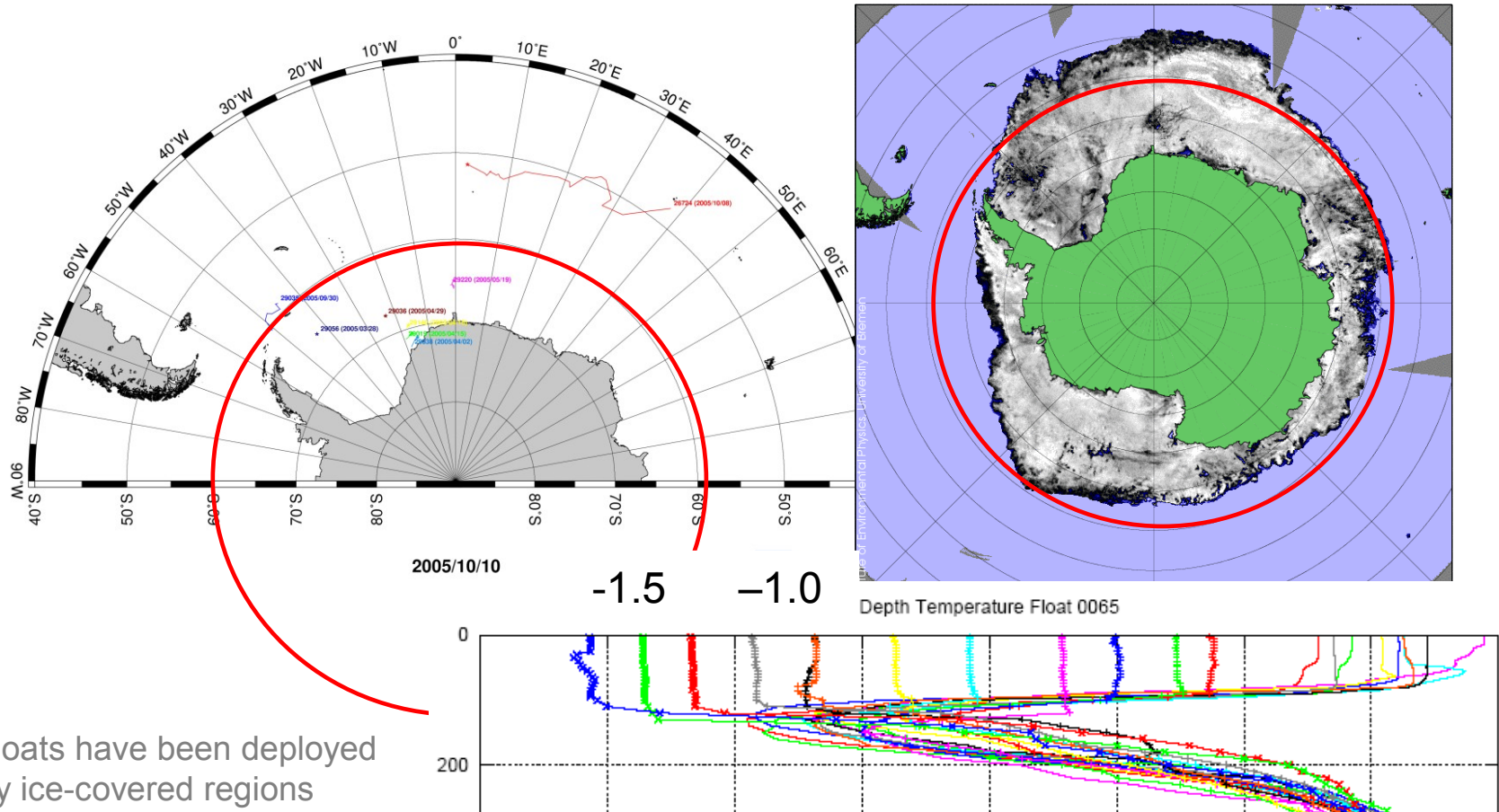
We have built special floats for special projects:

- Biofloat (radiance – irradiance)
- CO₂-Float (PSI-CO₂ sensor)

Customers: AWI, BSH, Ifm-Geomar, Bergen University, IOPAS



One Example: NEMO under Ice



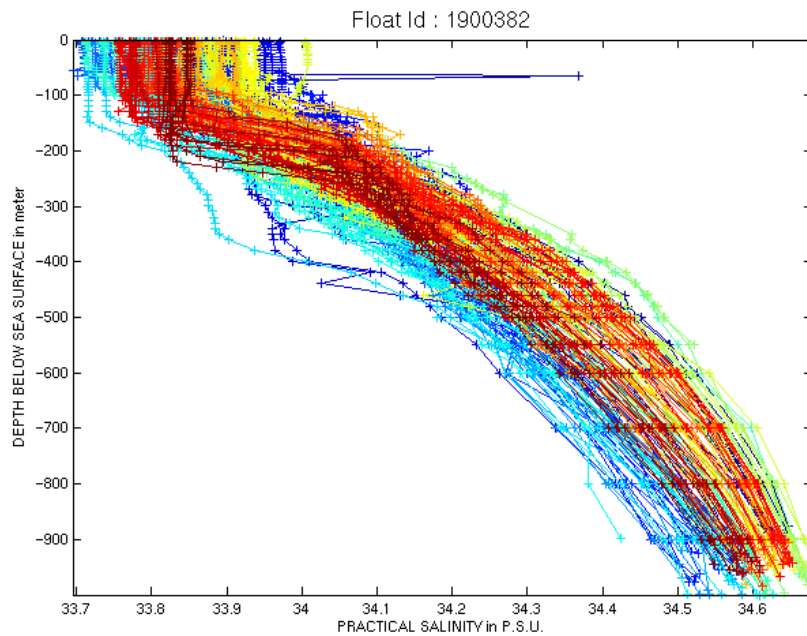
Many floats have been deployed in partly ice-covered regions since 2004. They do not resurface for longer periods of the year.

Our record: One float has been drifting for 14 months under the ice of the Weddell Sea.

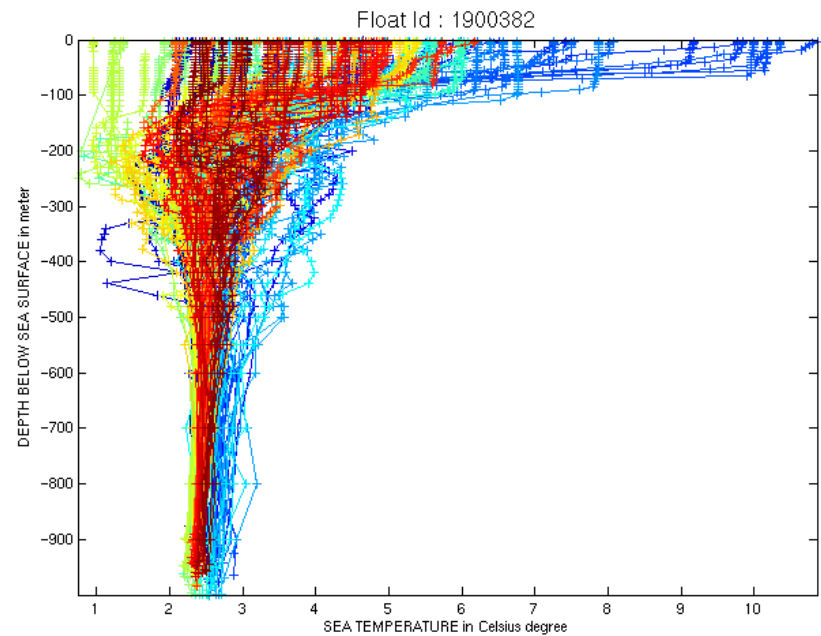
NEMO – Our Oldest Float



Overlay plots from our oldest float.
Deployed in April 2004 – 164 cycles



(C) Coriolis Data Centre - 29/03/2009

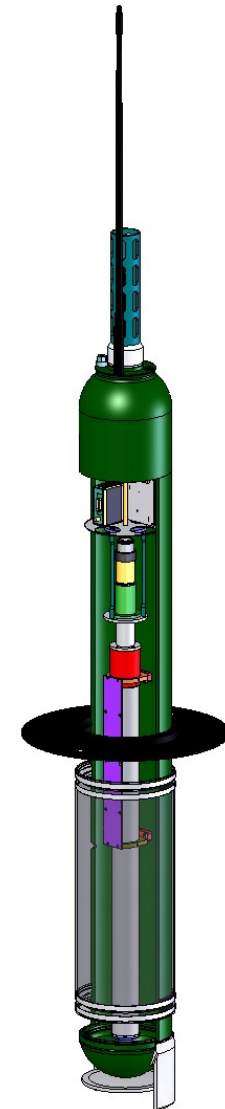


(C) Coriolis Data Centre - 29/03/2009



The **Bio-NEMO** is equipped with a generic docking unit for the bottom cap of the float, which will allow integration of downward-looking sensors. The top cap was modified to permit integration of upward-looking sensors.

As an autonomous profiler, this instrument may prove to have a useful application as part of GOOS, through integration of new sensors to determine the underwater light field and distribution and composition of dissolved and particulate matter in the upper water column.

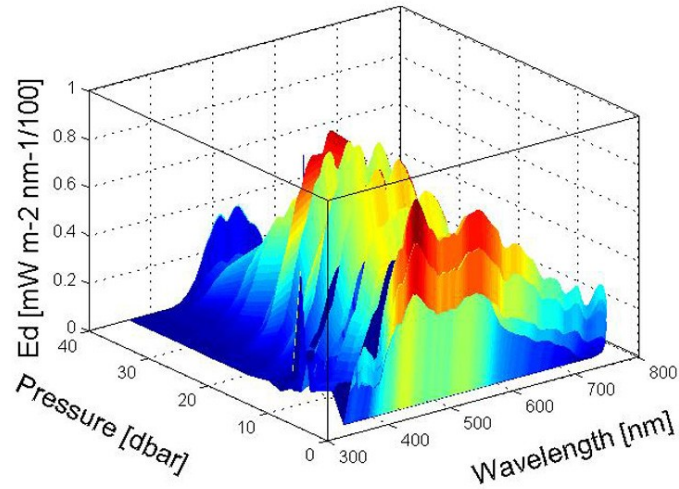


Marine Observing Systems

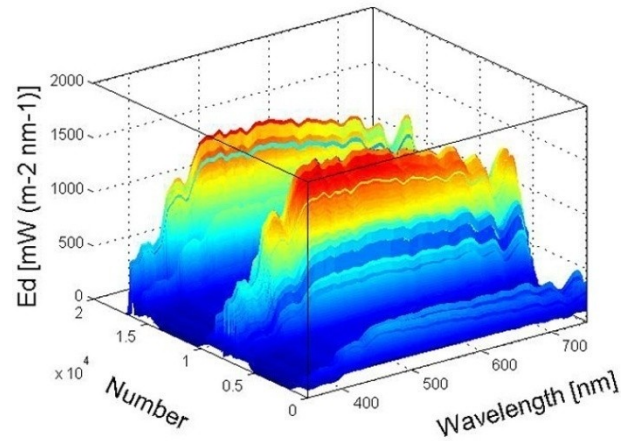
Bio-NEMO - Some results



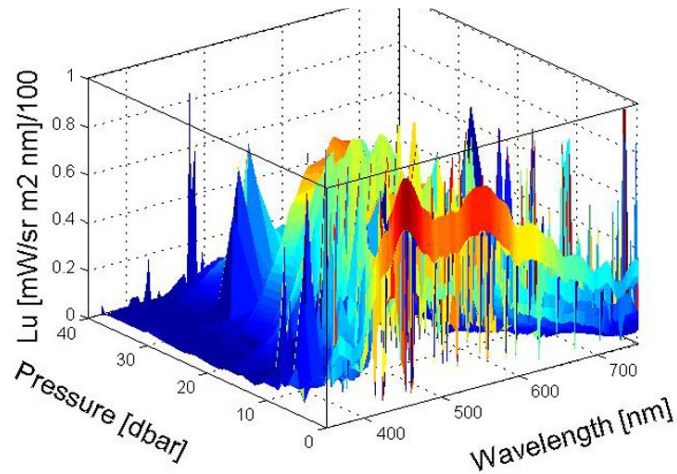
Profile of downwelling irradiance E_d



Reference downwelling irradiance (E_d) above water surface.



Profile of upwelling radiance L_u



Bio-NEMO

Results from the first field measurements using a pair of TriOS hyperspectral irradiance and radiance (RAMSES ACC and ARC) sensors in the Hemmoor lake in Germany from August 2004



Navigating European Marine Observer (NEMO) floats NERSC/UiB - Mozilla Firefox

http://www.nersc.no/~gislen/NEMO/index.htm

NERSC

UNIVERSITÄT BERGENSIS

Navigating European Marine Observing (NEMO) floats NERSC/UiB.

NB!! UPDATE IN PROGRESS 24.06.08!!

[Project Information](#) | Available floats: [47](#) [60](#) [Deployment](#)

Fertig

Our norwegian customer NERSC

Their floats are equipped with **Iridium/GPS** and Aanderaa Optode for O₂ data acquisition.

Deployed in January 2008.





Photos: Ifm-Geomar



NEMO-PSI

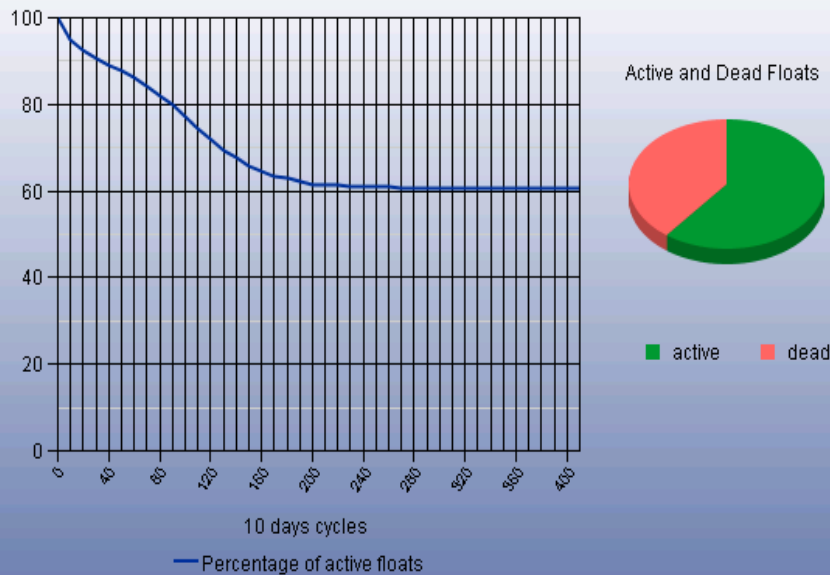
A special float with a PSI-CO₂ sensor, bi-directional Iridium- and ARGOS-telemetry, GPS and recovery function for applications in the upper 400 meters; deployed in October 2008

Comparing Float Decay



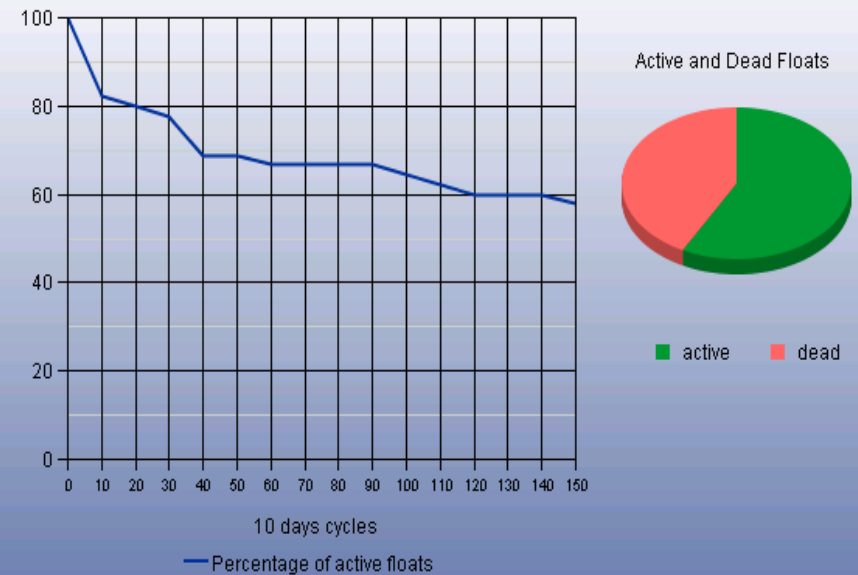
APEX

Float Decay



NEMO

Float Decay



Comparison of the decay of NEMO and APEX floats.

NEMO – Features

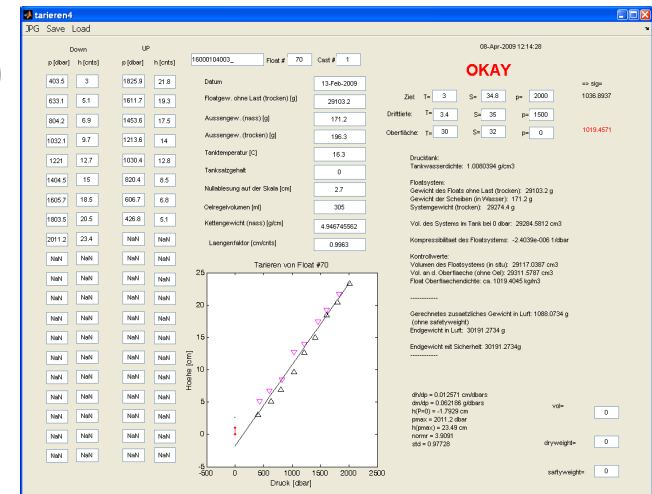


Outstanding Features

- on-board firmware updates via serial interface
- Compact Flash mass storage (practically unlimited profile storage)
- more than 240 profiles with full lithium battery pack
- bi-directional communication via Iridium
- data management service for ARGOS and Iridium (SBD/RUDICS) for the whole lifetime
- modular software architecture allows easy to customize the mission cycle modes e.g.

- Park and profile (with user defined park depth) mode
- ISA (Ice Sensing Algorithm) mode
- Profile first mode (for O2 comparison)
- Auto deploy mode
- ...
- **your specific requirements**

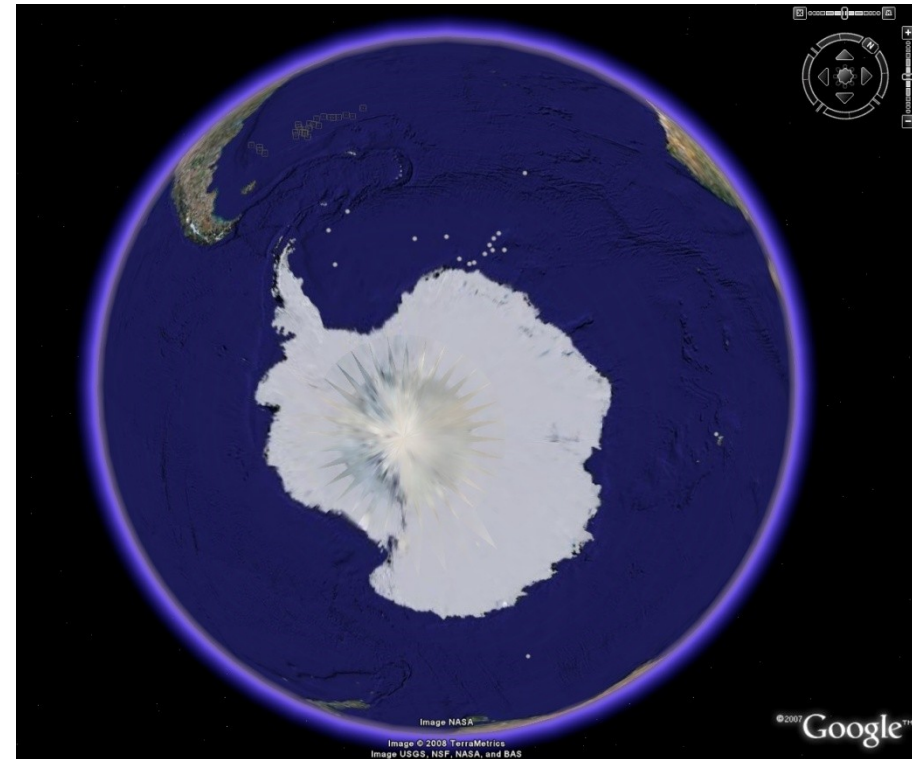
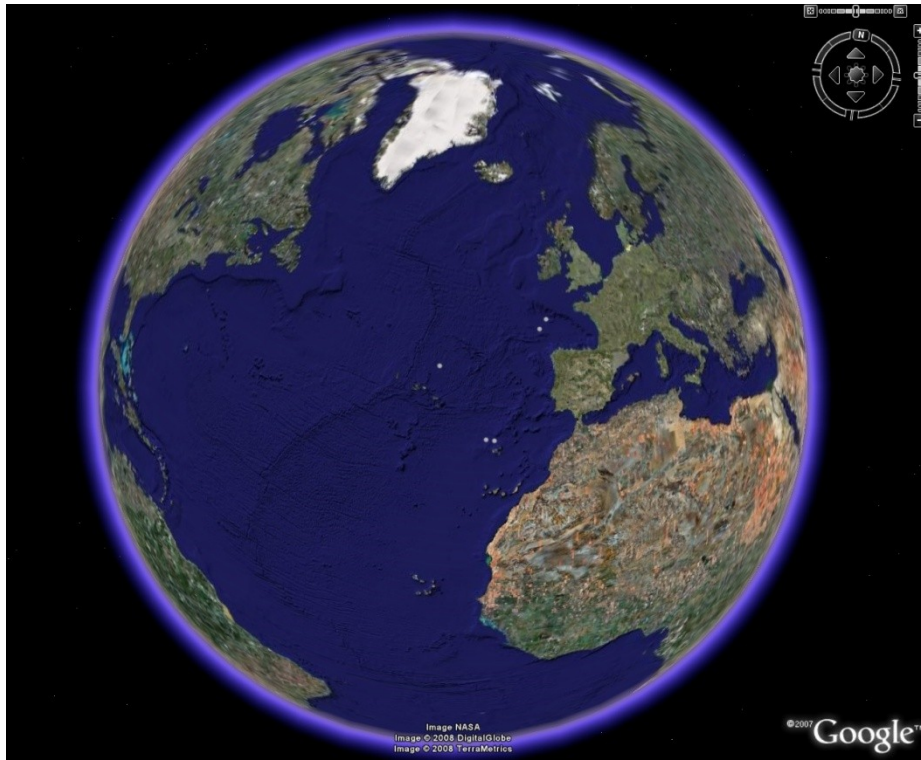
- individual ballasting of each float
- operation in regions with a density difference of up to 17 Sigma



Marine Observing Systems



A dot for each NEMO - from the tropics to the poles



Marine Observing Systems



Upcoming features

- multi mission cycle mode
- high resolution measurements
- mission cycle and parameter modification after deployment
- improved ice detection
- embedding new sensors
- improved recovery features (e.g. beaching detection)
- grounding detection



NEMO – Potential and Philosophy



Benefits from partnering with OPTIMARE

- Integration of standard sensors almost at no additional costs
- minor changes in the mission cycle are part of the standard delivery
- data management for the whole lifetime

