Verdien av tverrfaglig, langsiktig FoUI-samarbeid

INGER M. GRAVES
OCEAN AND COASTAL BUSINESS DEVELOPMENT LEADER, XYLEM ANALYTICS
We devote our technology, time and talent to advise the smarter use of water.

We look to a future where global water issues do not exist.
This is Xylem

- A leading global water technology provider
- Nearly $4.5 billion in revenues
- Nearly 16,000 global employees
- Global footprint serving 150+ countries
- We devote our technology, time and talent to advance the smarter use of water
- We promote HSEQ for businesses operating in the ocean
Våre varemerker

[Image of various brand logos]

[Logo for AANDERAA, a Xylem brand]
Aanderaa

History

• Aanderaa Instruments started in 1966 by Ivar Aanderaa
• Located in Bergen, Norway
• Manufacturing, R&D, Sales, Marketing, Administration and Customer Care located here
• Worldwide offices
• Several sister companies around the world
• 88 employees
Coastal Buoys

From +6000 m to -11 000 m, from high Arctic to Tropical

Accurate, Reliable & Low Energy

Top of Elbrus

Ports & Harbors

Arctic

Sensors for Deepest Trenches

Aquaculture

Coral Reef Observatories

Deep Sea Moorings

Coastal Moorings

Deep Water Platforms with Acoustic Communication

Accurate, Reliable & Low Energy

AANDERAA

a xylem brand
Different customers – different needs

Aquaculture consultants

Autonomous vehicles

Ports and Harbours

WHOI

AWI

Helsingborg Harbour

WSA

UIB
Ideal solutions for non-ideal environments

We extend our monitoring solutions ensuring that you measure **what** you need, **where** you need it.

www.aanderaa.com
Aanderaa samarbeid med FOU (utdrag)

- pCO₂ sensor
- Acoustic material for current meters
- pH sensor
- MOTUS wave buoy
- NANO2021
- MAROFF
- Sailbuoy Ice Edge
- Sailbuoy Ocean Currents
- AUV DCPS
- DEMO2000

Logos of various organizations:
- The Michelsen Centre
- UNI Research Polytec
- CMR
- Akvaplan
- NIVa
- Metereologisk institutt
- NERSC
- Høgskolen i Bergen
Example: MAROFF project

Collaboration with:
- Christian Michelsen Research (CMR); Validation of technology through simulation and downscaled tank tests. Uncertainty analysis.
- Norwegian Meteorological Institute (MET): Data Validation, comparison towards SWAN modelling.
- Uni Research Polytec: Data validation and field testing.

CMR - Tank test facility used for IMU – wave processing validation and downscaled buoy modelling (Proteus)
Field Validation

Two buoys and one Datawell Waverider were deployed in the North sea approximately 4 nm off the coast of Karmøy.

• One **Tideland SB138P** buoy was fitted with Motus wave sensor #4, Buoy orientation sensor, In line DCS single point current sensor, Gill wind sensor and GPS.

• One **EMM2.0** buoy was fitted with two Motus wave sensors, Buoy orientation sensor, In line DCS single point current sensor, DCPS Current profiler, Gill wind sensor and GPS.

• One of the EMM 2.0 wave sensors (#2) were located close to the buoy COG, and the other wave sensor were located close to the outer top edge of the floating cylinder in order to evaluate the effect of the installation position and the build in offset compensation algorithm.
Comparison with CDIP Wave Evaluation Tool
Opportunity in the market

Challenges identified

Innovation and problem solving

Testing and validation

Benefits

Manufacurable solution

Commercialization

Tools
Facilities
Competition

Modelling and simulation tools
Test tank
Industry
Research

Manufacturable solution

Commercialization
Innovation

Have a problem

Need a solution

Have a solution

Need a problem
Erfaringer fra FOU samarbeid

**Hvorfor** samarbeid FOU og industri

- Selskaper blir samtenkte, “nye øyne” på definerte problemstillinger skaper bedre løsninger
- FOU miljø har verdifulle kontakter og nettverk som kan sette bedrifter i forbindelse med viktige bidragsytere
- FOU miljø har oversikt over fagfelt og publikasjoner
Erfaringer fra FOU samarbeid

**Hvordan** samarbeide

- Markedsdrevne behov fra industrien kan lede til gode produkter med en riktige løsningen
- Potensiell teknologi identifisert av FOU miljø kan lede til innovasjon i uventede sammenhenger
- Strukturerte prosjekter med gode planer leder til best resultat
Suksessfaktorer

• Selvdrevne deltakere som har evne til å tenke utenfor “boksen”

• Variert bakgrunn i gruppen, løsningen kommer kanskje fra uventet hold

• Innovasjonserfaring i teamet eller som tilgjengelig ressurs

• Gode prosjektplaner og oppfølging

• Lav overhead på det administrative
Oxygen Optodes
Examples of Scientific Papers (+150 published)


Gas Exchange Chamber
Sommer et al (2008)

Cabled CTD

Gliders

Incubators

Hydes et al (2009)

Ferry boxes

Argo floats

Tengberg et al (2006) technology description

Lake Metabolism


Rivers/Hydrology/Hyporheic

Chryosphere

Bagshaw et al (2016)

Mornings


Buoys

Jannash et al (2008), Bushinsky & Emerson (2013)


Gradients

Laboratory Simulation and Measurement of Instrument Drift in Quartz-Resonant Pressure Gauges

Glenn S. Sasagawa and Mark A. Zumberge
University of California San Diego, Scripps Institution of Oceanography, La Jolla, California

Poster presented at AGU meeting, San Francisco, December 2017

Results - Instrumental Drift Estimates From DWT and Zero Calibration Methods