



FIELAX

Marine Service. Science. Sea Technology.

About us



Specialists in Marine Data Acquisition and Processing

FIELAX GmbH was established in 2002. The founders have previously worked as scientists within Germany's polar and marine research and also for a shipping company with strong commitment to research vessels. We have our home downtown the German North Sea port Bremerhaven.

FIELAX offers scientific-technical services and products for research and shipping. Our clients are major national and international research institutes, universities, operators of research vessels, public authorities and offshore-/exploration companies.

Our highly qualified team of scientists and engineers has long-standing experience in surveying operations on land and sea. Our clients benefit from this experience and from our expert knowledge in physics, geophysics, chemistry, mathematics, hydrography, information technology and electronics.

Intention of this brochure is to show the variety of services provided by FIELAX. For more detailed information visit our homepage www.fielax.de.

Marine Heat Flow

Worldwide experience with thermal measurements in different marine environments puts FIELAX at the forefront for providing heat flow measurements and sets the standards for data processing and interpretation.

Scientific Data Processing

FIELAX participates in survey expeditions to acquire multibeam echosounding data, operates oceanographic and hydroacoustic instruments and processes and visualizes scientific datasets.

Software Development

With our IT-team of experienced analysts and programmers FIELAX offers customized software solutions designed specifically for scientific datasets and devices.

Technical Services & Consulting

Expertise in technical and information technology allows FIELAX to provide solutions in terms of sensors, interfaces, networking, computers and data logging to suit your situation.

Marine Heat Flow

Heat Flow Measurements & Service

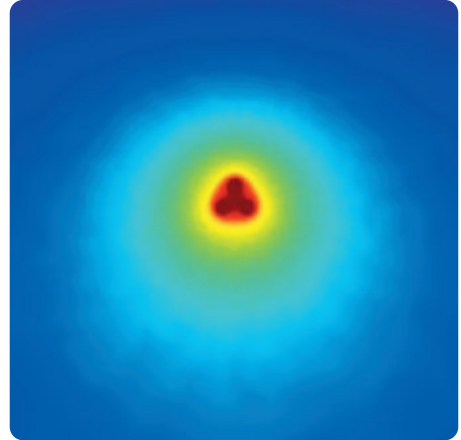
FIELAX offers worldwide heat flow measurements for marine research and offshore industries as well as data interpretation. Over the last decade FIELAX has gained an enormous amount of experience with thermal measurements in different marine environments. Starting with classical heat flow probe measurements in soft deep-sea sediments, FIELAX has not only further developed its measuring devices to allow measurements in shallow water regions but also the knowledge base and understanding of thermal transportation processes in marine sediments from both, natural and artificial sources. For more detailed information regarding operation and products available we refer to our special brochures *Marine Heat Flow Measurements* and *Prediction of Sediment Temperatures*, both available online.

- Rental or sale of equipment and optional delivery/freight
- Experienced and safety trained offshore surveyors
- Operation of the heat flow instruments on board during station work
- Preliminary data quality check on board
- Data interpretation and analysis on land



2D Temperature Evolution Calculations in Marine Sediments

FIELAX developed 2D and 3D temperature evolution calculations in marine sediments. The models incorporate the geothermal heat flow, measured thermal properties of the sediments as well as temperature variations through seasonal variations of the bottom water temperature. As a result the models determine temperature distributions resulting from superimposition of seasonal, natural temperatures and those induced by internal sources such as power cables, the latter also time-dependent.

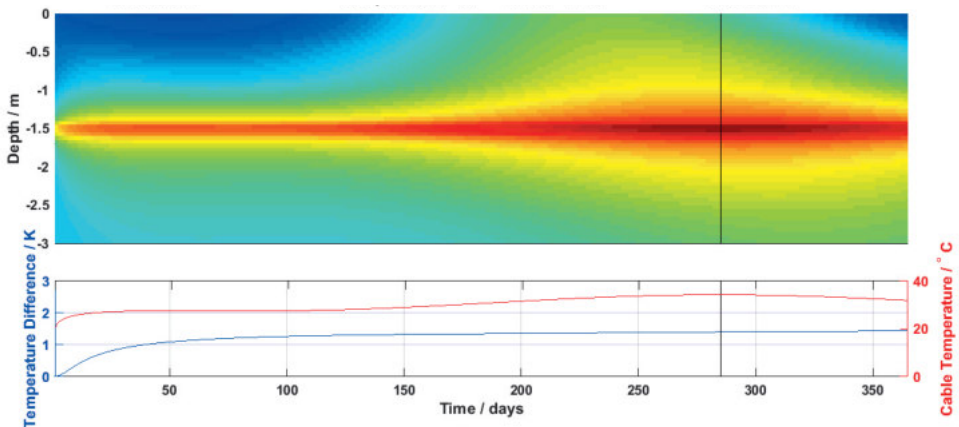


Model Data Input:

- Measured sediment thermal properties
- Seasonal forcing from varying bottom water temperatures
- Power cable properties

Model Data Output:

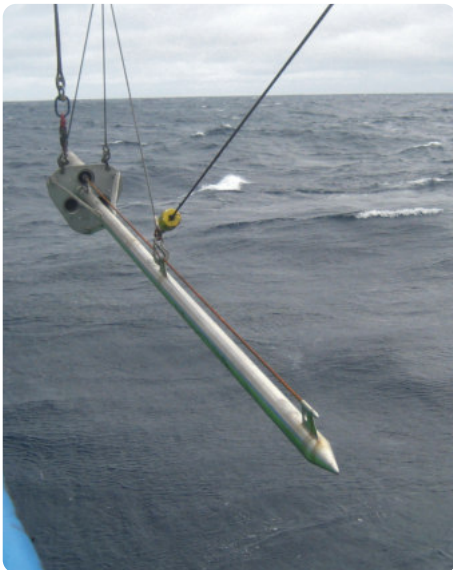
- Temperature distribution in and around a power cable
- Temporal evolution of sediment temperatures
- Temporal evolution for monitoring the cable temperature and 2 K criterion compliance



Marine Heat Flow

Classical Heat Flow

Thermal measurements taken with the classical HeatFlowProbe have been conducted in a wide range of deep-sea environments, with the device using its own weight and gravity to penetrate the seafloor. The instrument is capable to measure in-situ values with 22 sensors down (with a resolution of 1 mK) to a depth of six meters below the seafloor. A heating wire inside the probe provides a calibrated heat pulse for the measurement of thermal conductivity. The probe can be operated in water depths up to 10000 m.



VibroHeat

The VibroHeat measuring device has been developed specifically for in-situ thermal measurements in shear resistant marine sediments, typical for shallow seas, coastal and continental shelf regions. Therefore, the measuring components are combined with a VKG6 type Vibrocorer. With the ability to penetrate even through harsh layers such as gas hydrates, permafrost soils or 'sands', the technical application is not restricted to soft sediment conditions anymore. The FIE-LAX VibroHeat device can be operated from small vessels in water depths up to 1000 meters.



PushHeat

In order to overcome possible liquefaction, which may occur in very sandy sediments due to the vibrocoring, FIELAX has further developed its heat flow measurement system to work with a CPT unit used for in-situ geotechnical measurements. In cooperation with Marine Sampling Holland, FIELAX has adapted the sensorstring to fit into a standard coiled CPT-tube of variable length. Also available is a combined version i.e. a sensorstring with a cpt-cone mounted.



OnshoreHeat

The latest development allows heat flow measurements onshore using borehole drilling technology of Wiertsema & Partners B.V. (The Netherlands). The system can be brought down the desired depth and measure the thermal parameters up to 5 meters downwards from the bottom of the borehole.

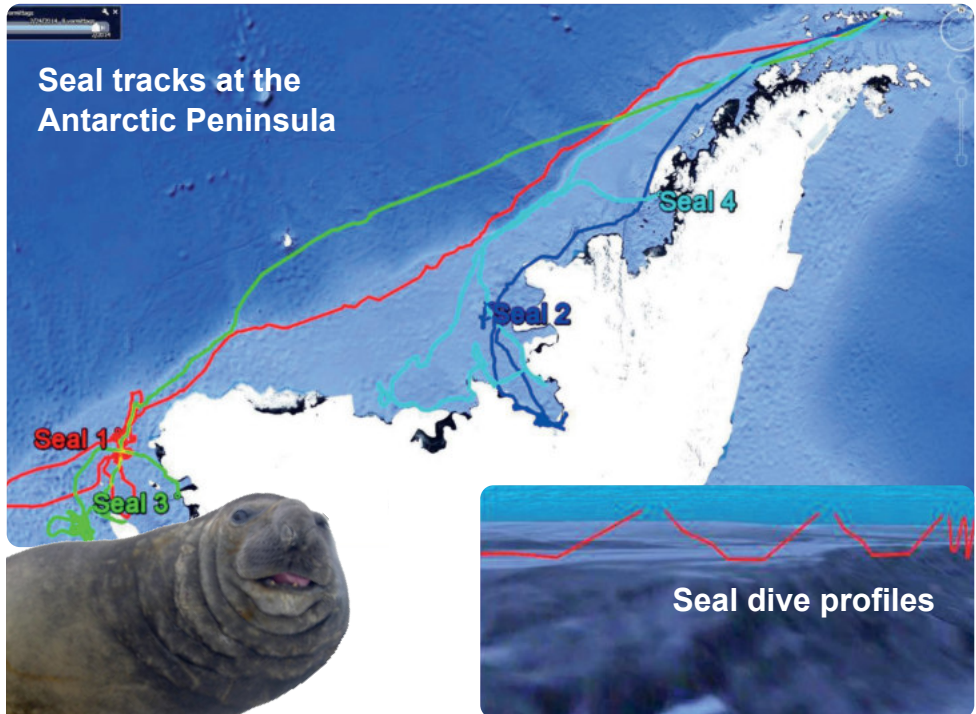


Scientific Data Processing

Marine Mammal Tracking

Elephant and weddell seals in Antarctica have been equipped with satellite transponders to investigate their travel and eating behavior. FIELAX continuously receives data from those transponders, post-processes data and provides the information to the client in the field about the recent state quo. After the campaign, track charts are provided and all data is compiled and delivered to long-term data publication systems such as www.pangaea.de.

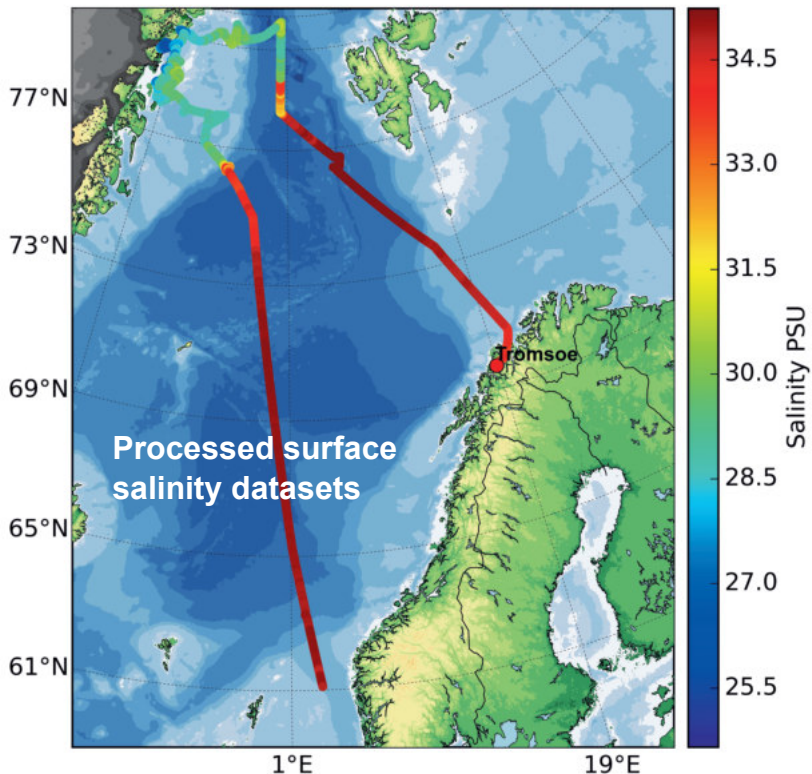
- GIS solutions and charting
- Argos satellite tracked data processing and analysis
- Data management and automation



Hydrography and Oceanography

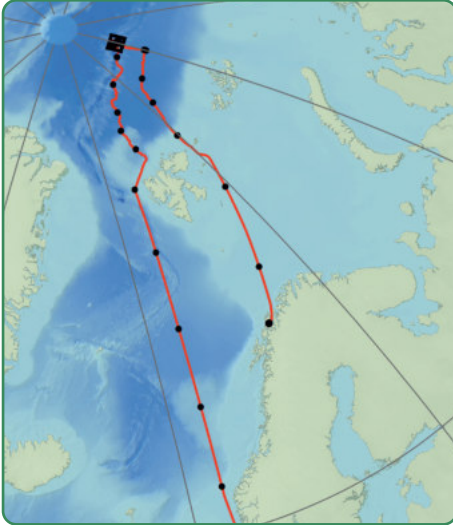
Experienced FIELAX personnel regularly attends international multibeam survey campaigns as operators or data processors. Furthermore, we process, validate and document oceanographic long-term datasets. Our wide variety helps us to bring in new views on workflows, optimization and automation while meeting all survey/scientific requirements.

- Experienced offshore personnel for multibeam operation, surveys and data processing
- Processing of oceanographic datasets e.g. from a CTD or thermosalinometer
- Aerial imagery processing e.g. from hyperspectral laser scanner



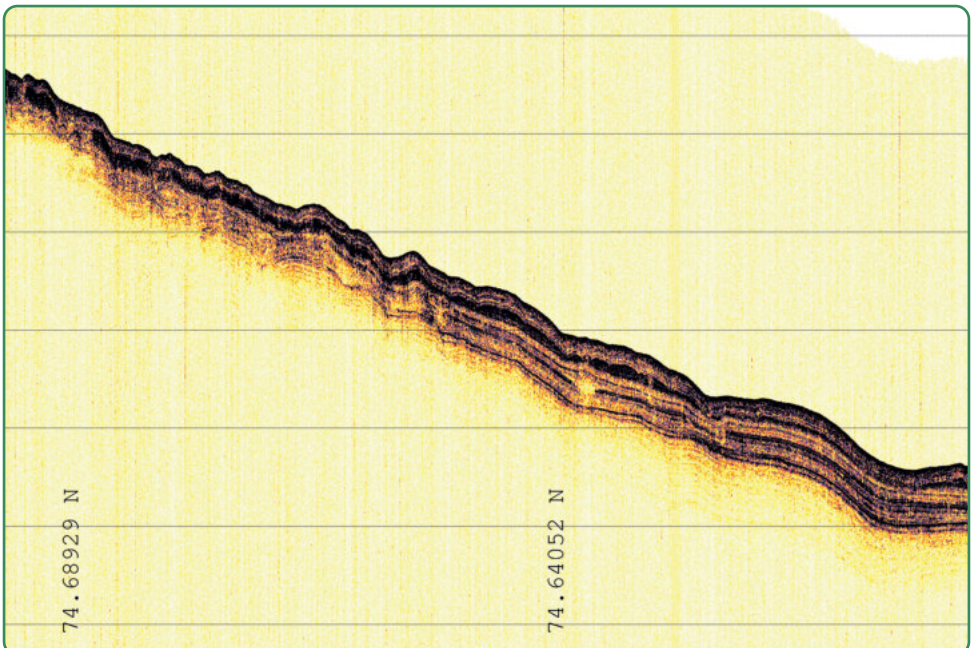
Scientific Data Processing

Scientific Research Campaign 'PS101'



In 2016, FIELAX personnel supported a science team around Prof. Dr. Antje Boetius on RV 'Polarstern' campaign PS101 to the Karasik Seamount in the Arctic. They were responsible for the ship's IT infrastructure, the operation of the multibeam and parametric subbottom echosounders as well as analysis, processing and documentation of acquired datasets from various sensors and instruments.

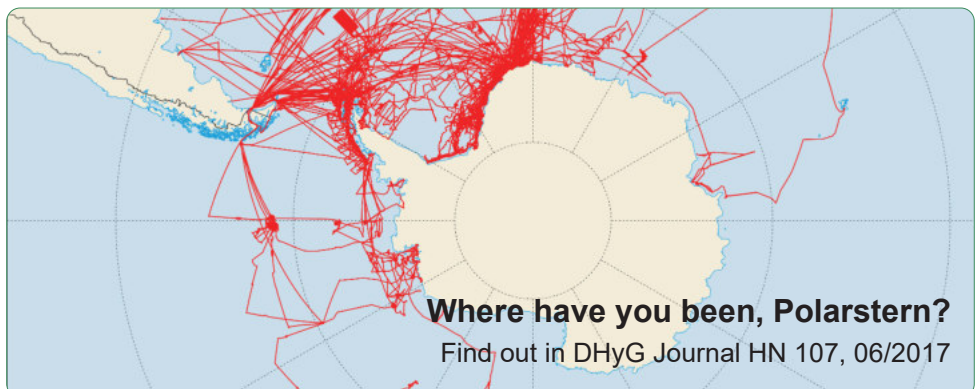
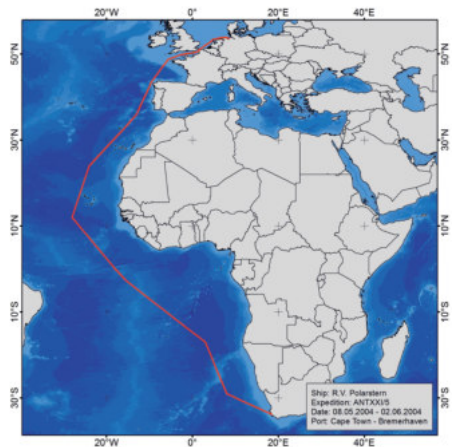
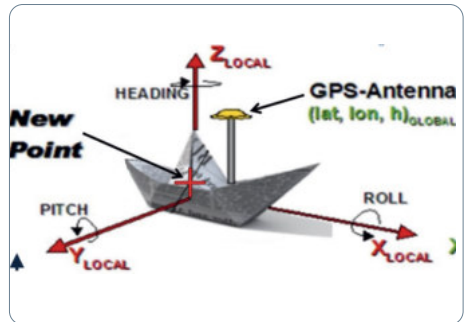
- Echosounding survey planning, operation and data processing
- Charting and visualization
- Data management and reporting



Navigation Data Processing 'Master Track'

FIELAX regularly post-processes navigation data e.g. of the German research ice breaker RV 'Polarstern'. The job includes validation, filtering, interpolation, generalization and documentation of all applied processes. The objective is to achieve a valid 'master track' for each expedition which can be used to georeference scientific data and visualization in data portals. For RV 'Polarstern' all navigation tracks were processed that have been recorded since 1982 (when GPS was not born yet). The track history, processing workflows and results of 35 years of navigation data history have been published by FIELAX/AWI in the german magazine Hydrographische Nachrichten (Hydrographic News).

- Navigation data post-processing
- Charting and visualization
- Data management and automation

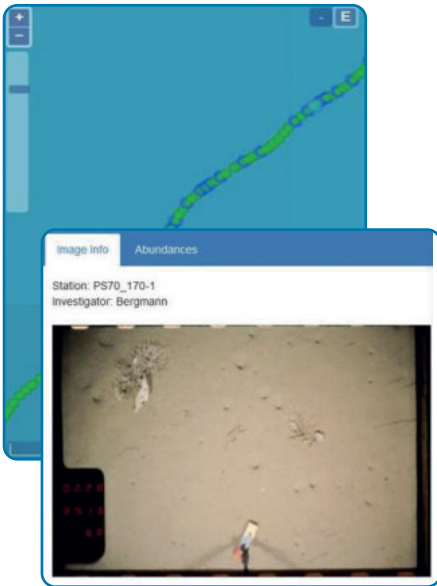


Where have you been, Polarstern?

Find out in DHyG Journal HN 107, 06/2017

Software Development

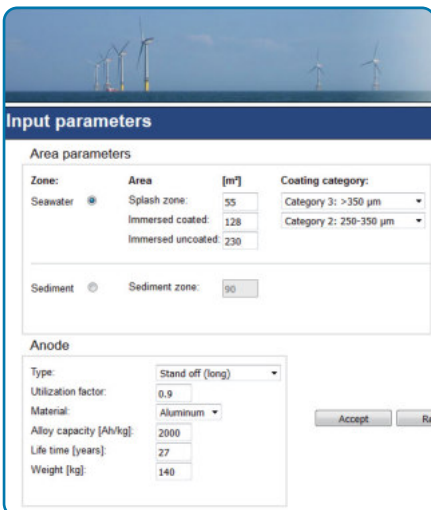
Map Viewer for Sea Floor Images



The 'OFOS-Viewer' (Ocean Floor Observation System) aggregates a web mapping tool, seabed imagery and scientific datasets e.g. species' abundances in a user-friendly web application. It helps scientists to overview stations, acquired images and scientific analysis' results in one go. All mapping features are implemented as interoperable OGC web services in geo databases.

- Web mapping application and OGC web services (WMS, WFS)
- SQL database interfaces
- GIS tools, add-ins and tool boxes for ESRI ArcGIS

Calculative Implementation of Construction Standards

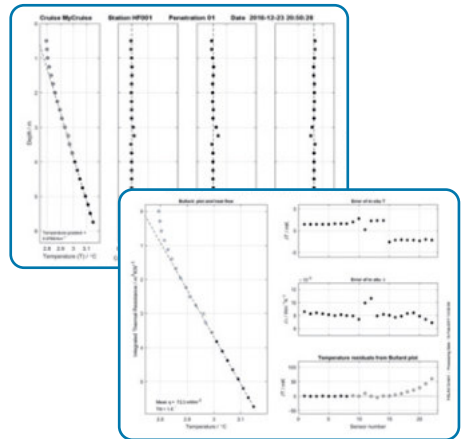


FIELAX developed a web-based application to determine corrosion protection requirements for offshore constructions. Multiple rules and standards were implemented and user-friendly presented. As an alternative to an intranet installation a 'to go' version was setup to be runnable from USB stick.

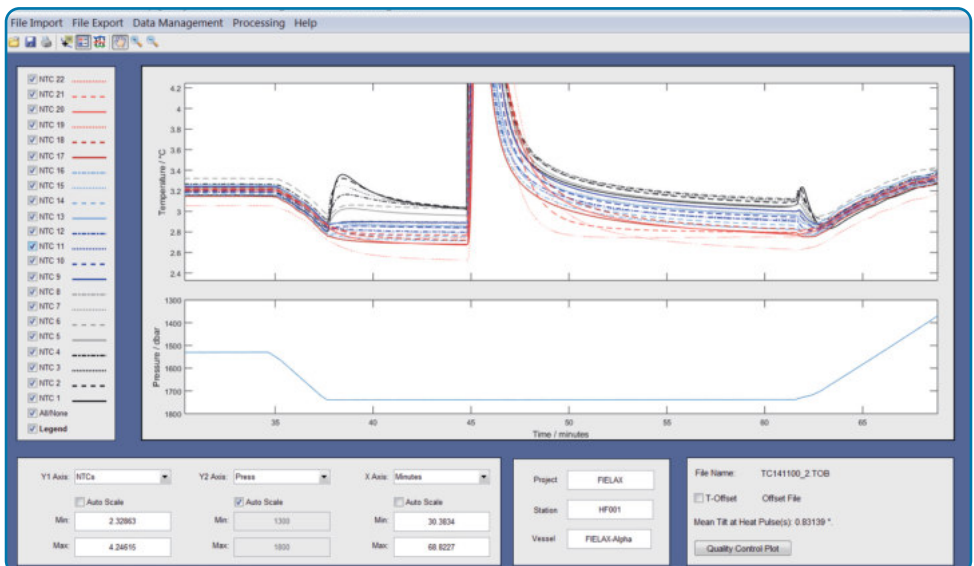
- Web application, also 'to go' usage
- Algorithmic implementation of various constructional standards
- Validation of algorithmic results

FIELAX HF FELLOW

'FIELAX HF Fellow' is a data processing suite for managing and processing acquired temperature data by FIELAX HeatFlowProbe equipment. FELLOW allows validating the recorded temperature data quickly. All temperature and status sensors (i.e. tilt, acceleration, pressure) recorded can be visualized to retrieve a general overview of the recorded data so that the decision about the successful performance of the measurement can be made quickly. Heat flow determination is used for the calculation of the depth dependent thermal parameters (in situ temperatures, thermal conductivities and diffusivities) and finally the heat flow estimation.



- Desktop application
- Data visualization techniques
- 3D temperature evolution models



Software Development

Data Collection Framework for Research and Science

Research institutes and their platforms such as vessels and stations nowadays use multiple data sources to support field research, track moving research platforms (vessels, buoys) or find optimal transit routes regarding weather and sea ice conditions. FIELAX has developed a data collection framework to automatically collect data from various data sources worldwide such as drift buoys in the Arctic, satellite base stations or moving vessels. The framework continuously collects files, email attachment or whole folders via protocols such as FTP or IMAP. Regular expressions and filters help to specify a subset of data files / emails to be downloaded. Post-processing scripts can be automatically started to process or manage the incoming files.

- Web based and command-line interface applications
- Automated continuous data collection e.g. from satellites, vessel telegrams, drift buoys data
- Various protocols such as FTP, SMB, IMAP, Argos
- Automated processing of incoming files (e.g. import to databases, processing algorithms)
- SQL database storage



NRTAdmin					
Overview About / Contact					
Last page update: 2017-07-05 11:20:50 Re-init All XMLs Rescan XML Folder Disable All Jobs Open Log File					
✓ Show Enabled Jobs ✓ Show Disabled Jobs					
Enable	Type	Last Download	Next Run	Last Message	
<input checked="" type="checkbox"/>	AWI Mail Account	Mail	-	2017-07-05 11:25:00	No matches found. Nothing to download.
<input type="checkbox"/>	Drift and Noise FTP	FTP	-	-	
<input checked="" type="checkbox"/>	FIELAX FTP	FTP	27 seconds ago	2017-07-05 11:25:00	⚠ Job finished: 5 of 5 item(s) downloaded. At least one script call finish with errors. Open LogFile
<input checked="" type="checkbox"/>	FIELAX Mail	Mail	2 minutes ago	2018-12-01 09:00:00	✓ Job finished: 7 of 7 item(s) downloaded. 17 scriptcall(s) executed.
<input checked="" type="checkbox"/>	FIELAX Rsync	Rsync	29 seconds ago	2017-07-05 11:25:00	✓ Job finished: 10 of 10 item(s) downloaded.
<input checked="" type="checkbox"/>	FIELAX SMB	SMB	24 seconds ago	2017-07-05 11:30:00	✓ Job finished: 5 of 5 item(s) downloaded. 15 scriptcall(s) executed.
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Microcontroller Firmware for Realtime Data Conversion

FIELAX develops customized microcontroller firmware e.g. to convert serial data in realtime applications. Common usage is the conversion of ASCII or binary data to specialised data formats (or reversed) using FIELAX hardware converter boxes (see next page). Serial incoming data can be resampled, reformatted or even recalculated (e.g. leveraging a heave to a remote location on a vessel).

- Microcontroller firmware
- Digital/analog IO interfaces control
- Realtime calculations / conversions

Example:

```
Incoming Port 1, GPS position NMEA
string $GPGGA:
$GPGGA,123519,4807.038,N,
01131.000,E,1,08,0.9,545.4,M,
46.9,M,,*47
```

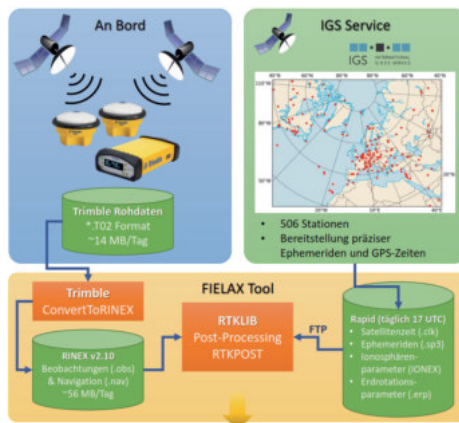
```
Incoming Port 2, Heading NMEA
string $HEHDT:
$HEHDT,064.3,T,*2E
```

Conversion and output Port 3, proprietary binary telegram containing GPS latitude/longitude and heading (shown in HEX format):
c7h4 8423

GPtider - Embedded GPS-Tide System Based on RTK

Tidal data series are a required parameter for many offshore related data-sets such as bathymetric or wave-height data. FIELAX developed an embedded system installed on a vessel to autonomously calculate GPS RTK solutions and tide series based on GPS antenna heights. Therefore, GPS-receivers are connected to the system. RTK data is automatically downloaded via internet.

- Embedded system
- GPS RTK post-process automation
- Linux based command line tools



Technical Services & Consulting

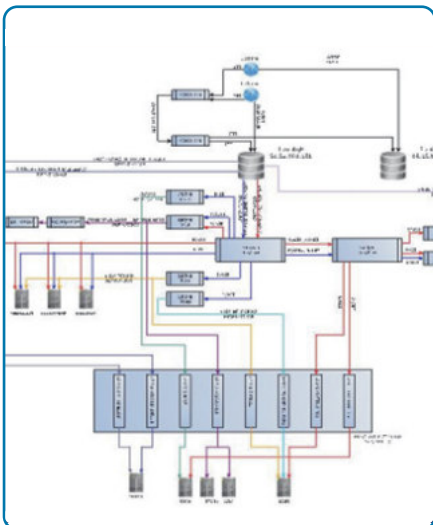
FIELAX Y-Converter - Hardware Development



Serial data communication between sensors and instruments is often impossible due to incompatible data protocols. FIELAX developed a programmable converter box solving that problem. It has two input and one output serial RS232/RS422 port (Y-converter). The microcontroller's firmware can be customized e.g. to convert telegrams, merge two input telegrams, resample data or calculate an output from two input ports.

- Hardware development
- Microcontroller programming
- Realtime conversions

Integration of Sensors and Instruments



Integration of sensors and instruments especially in remote/ internet-free) sites is a demanding task that requires professional expertise, experience and knowledge. Wired connections, hardware interfaces and data protocols need to be planned and (re-)organized. FIELAX is your partner and e.g. integrated motion reference units (MRU) in existing vessel facilities and reorganized all data sources and transmitters.

- Planning of hardware integration
- Installation and integration
- Tests and sensor data validation

Service and Support on Research Vessels

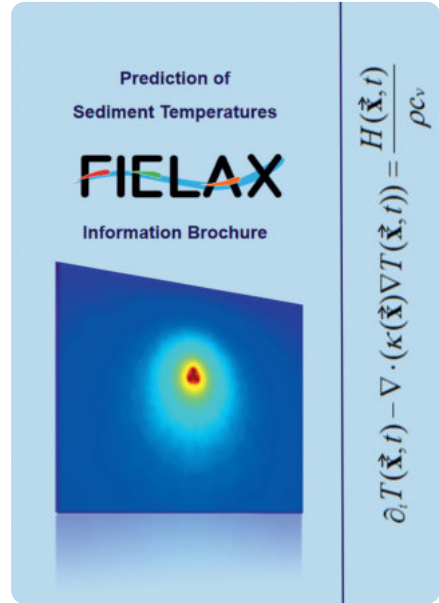
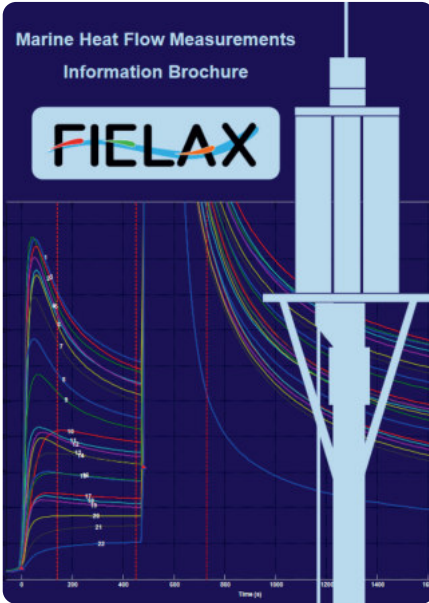
RV Heincke and RV Mya II are research vessels operated by the Alfred-Wegener Institute in Bremerhaven. They are equipped with modern scientific echosounding systems: Multibeam echosounders for bathymetric surveys, acoustic doppler current profilers (ADCP) and single beam echosounders. FIELAX is responsible to keep these systems ready-to-use and to train unexperienced users in the operation including first-level support (by phone/mail) at sea.

- Supervision and maintenance of various sensors and instruments
- Training of operators and users
- First-level support
- Installation and integration of sensors and instruments
- Data processing and quality checks
- Expedition planning and data management



Find out more

Available online



Publications

- Usbeck, R., Rössler, S. & Gerchow, P. (2017), Where have you been, Polars-tern?, Hydrographische Nachrichten
- Müller, C., Usbeck, R. & Miesner, F. (2016), Temperatures in shallow marine sediments: Influence of thermal properties, seasonal forcing, and man-made heat sources, Applied Thermal Engineering
- Miesner, F., Lechleiter, A. & Müller, C. (2015), Reconstructing bottom water temperatures from measurements of temperature and thermal diffusivity in marine sediments, Ocean Science
- Müller, C., Miesner, F., Usbeck, R. & Schmitz, T. (2013), 2K-criterion: measuring and modelling temperatures and thermal conductivities/diffusivities in shallow marine sediments, Proc. Conference on Maritime Energy 2013, TUHH, Hamburg, pp. 475 – 490
- Dillon, M., Müller, C. & Usbeck, R. (2012), Acquiring thermal conductivity data from shear-resistant sediments, Sea Technology

Some services are documented in scientific publications resp. technical reports. For HF, separate brochures are available. See our website for any updates.

Clients & Partners



LIGHTHOUSE



JX Nippon Oil & Gas Exploration



F. LAEISZ





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