



HGF-Alliance ROBEX

Robotic Exploration of Extreme Environments

Image Analysis Design Team

7th ROBEX community workshop – 27th – 28th October 2015

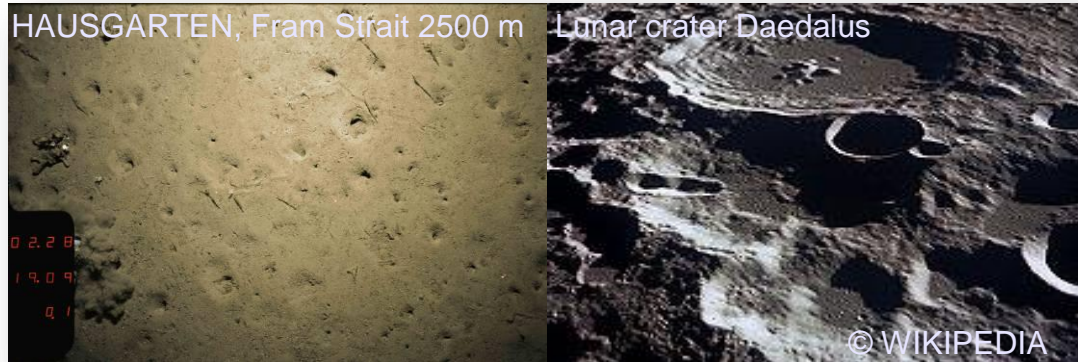
Autun Purser (AWI/JUB)

On behalf of

**Melanie Bergmann (AWI) and Yann Marcon
(AWI/MARUM)**



Overview



Current challenges:

Functioning analysis tools developed or advanced within ROBEX:

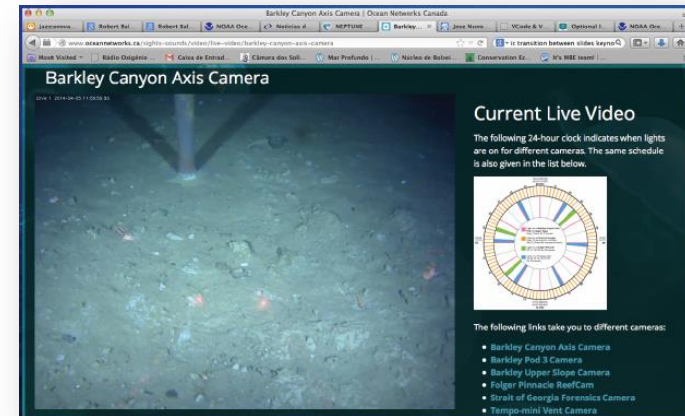
1. Still image analysis: **BIIGLE/ABBIE/ImageAnnotator** (AWI/Bielefeld Uni)
2. Video image analysis work: **VidLib** Deep Seas Video Platform (AWI/MARUM)
3. Future work of Design Team ‘ **Image Analysis** ’



BIG DATA: rovers, observatories, telescopes, ROVs, TowCams, crawlers, AUVs, DropCams, offshore industry, etc. etc.

produce large quantities of image data

- Data storage and management
- Data access
- Data mining tools
- Lack of analysis tools capable of coping with large volumes of images



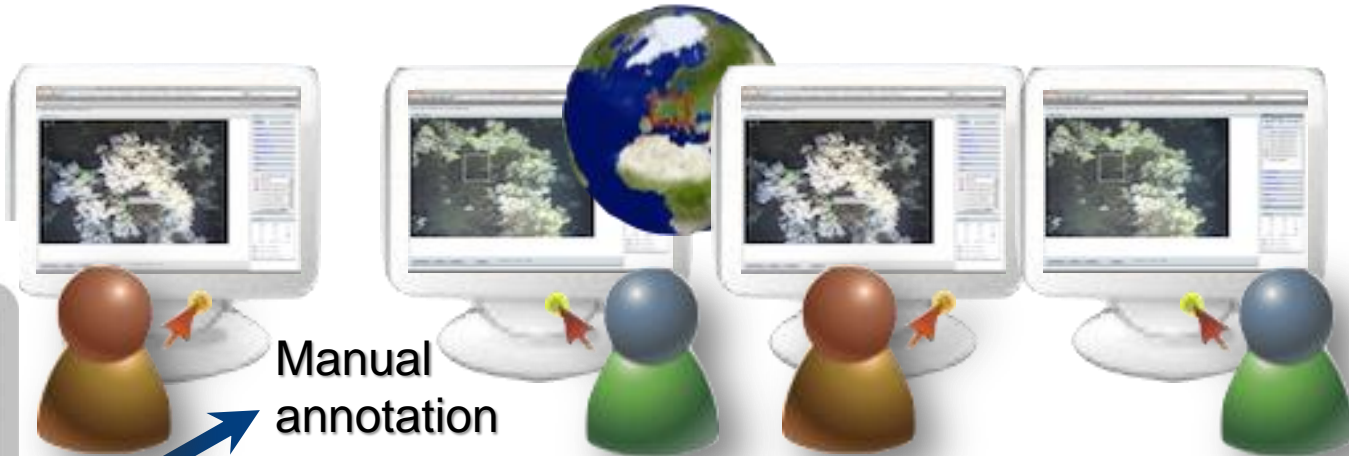
1. BIIGLE: manual annotation



BIIGLE

| T | y | |
|------|------|---|
| HG-I | 2002 | |
| HG-I | 2004 | |
| HG-I | 2007 | |
| ⋮ | | ⋮ |

Upload



Manual
annotation

All features of interest manually labelled... (fauna, geology, litter etc.) WEB BASED DESIGN

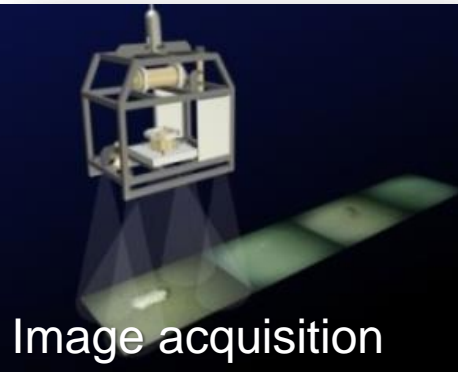


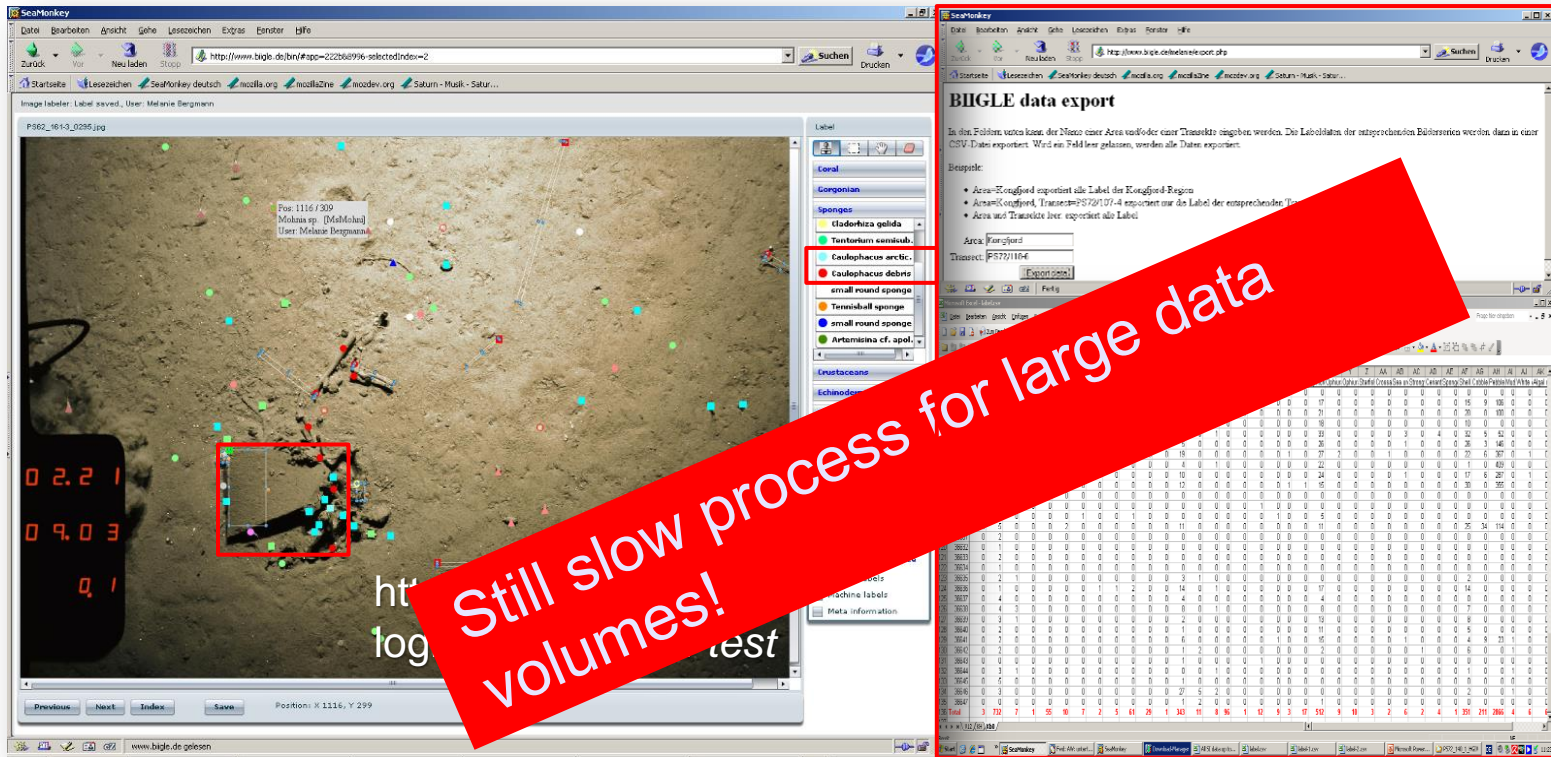
Image acquisition



(Schöning *et al.* 2012, Plos1)



1. BIIGLE: manual annotation



Still slow process for large data volumes!

- Annotation by mouse click on objects
- Export of labels to table
- Automated laser detection -> conversion to density

1. AWI ImageAnnotator

AWI ImageAnnotator

Simple system for
labelling limited
numbers of items -
for **specific** tasks.

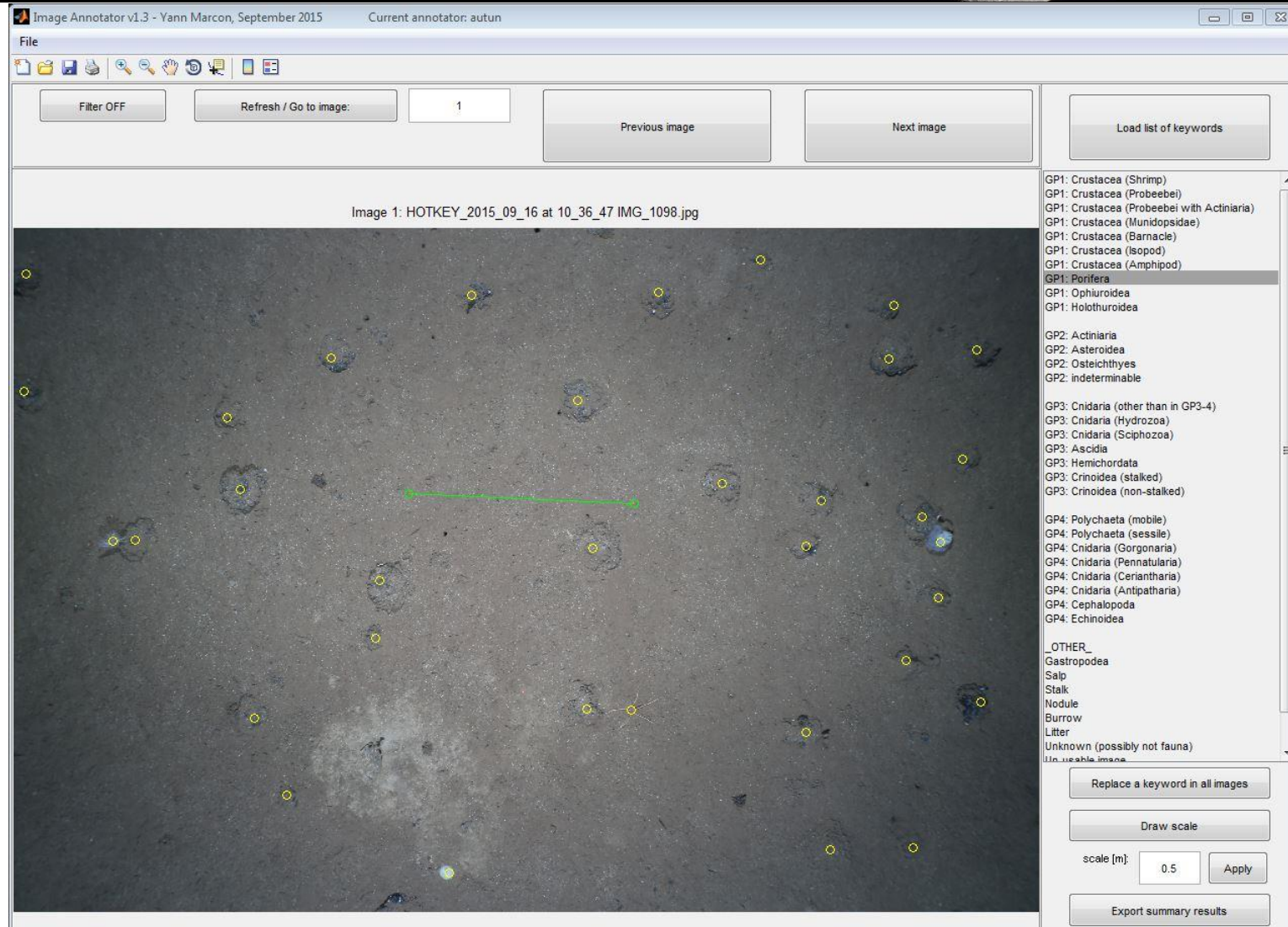
Universal application
- lists designed as .txt
files.

Easy to use.

Images easily scaled.

Export as .csv for
further analysis.

..linked to GIS.

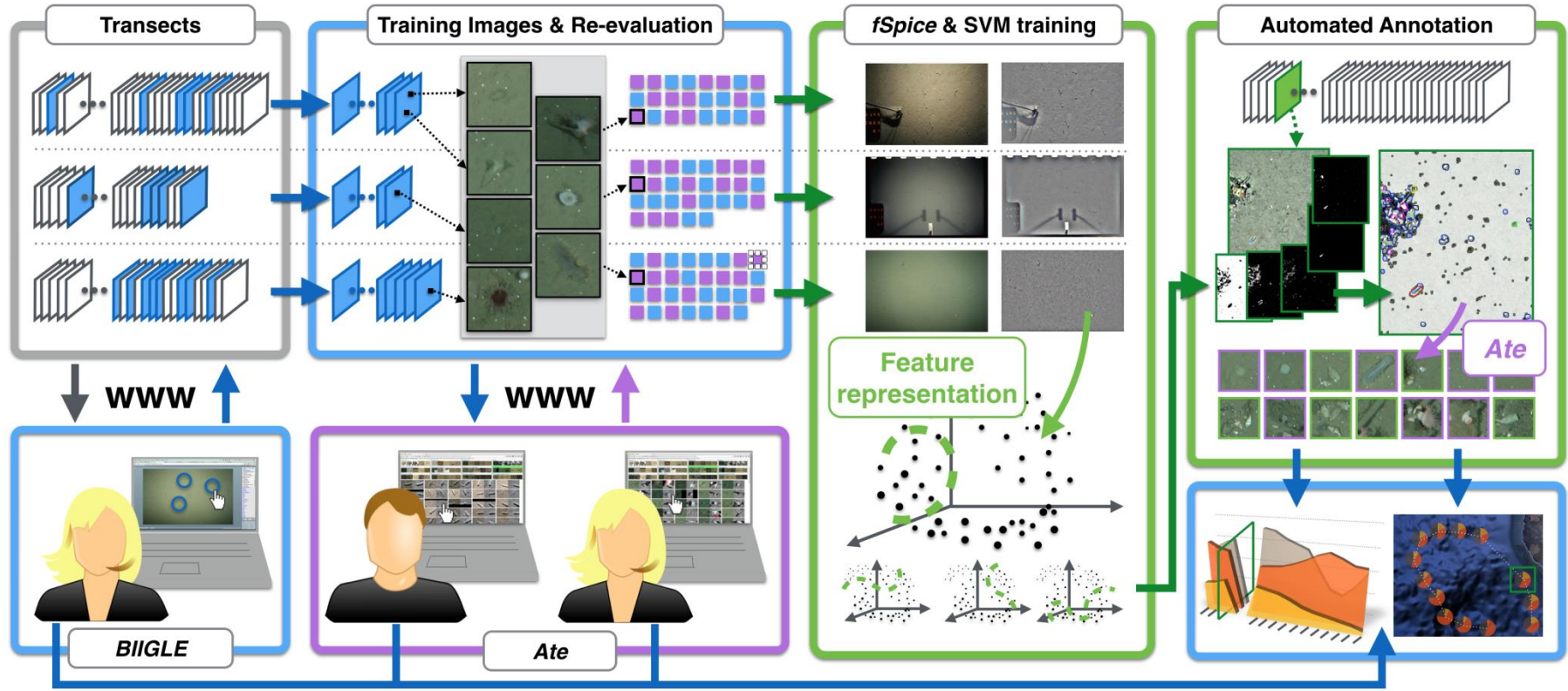


1. ABBIE – automated annotation



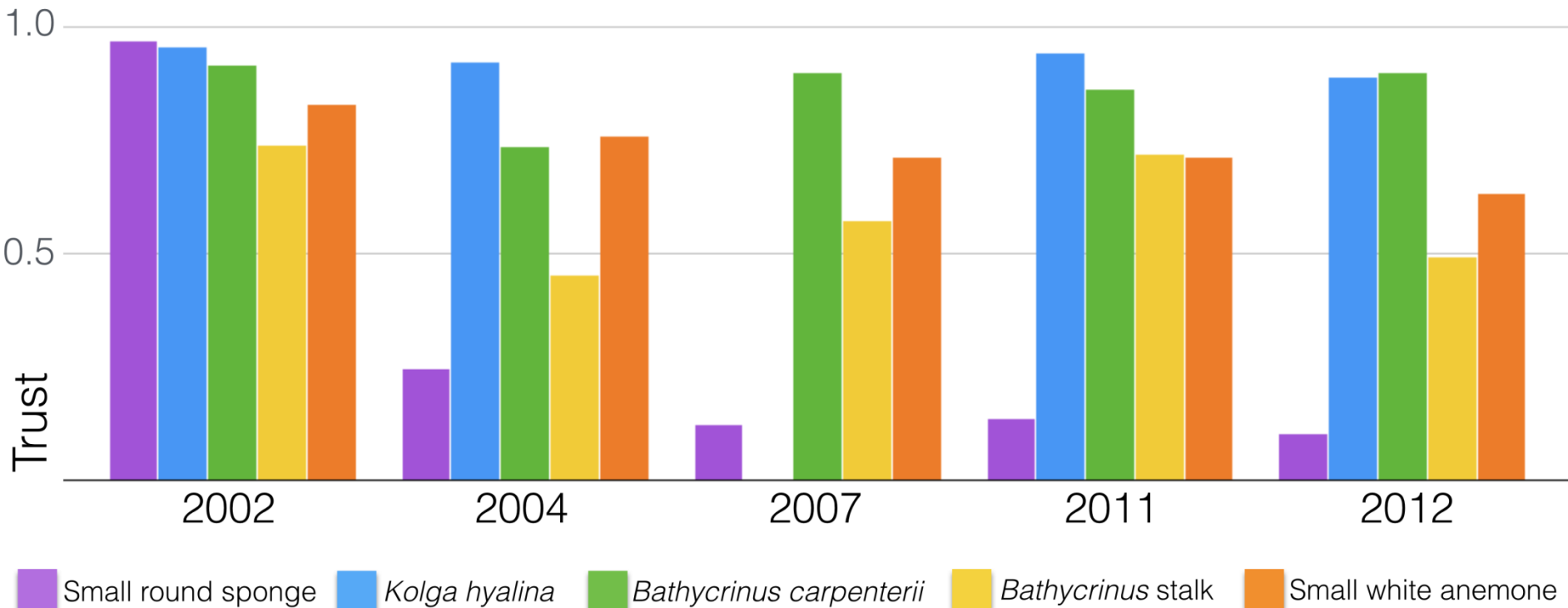
ABBIE – ‘Automated, annotation-Based Benthic Image Exploration’

Data sets are often now very large, and any automation in analysis is desired.
 ..Computers can be trained to identify some features. New BIIGLE add-on allows further user verification of results.



(Schoening, Bergmann, et al. In review)

1. Results of ABBIE



- Images from different years/transects are quite different -> new training for each transect
- ABBIE works quite well for certain features
- Others have to be fine-tuned

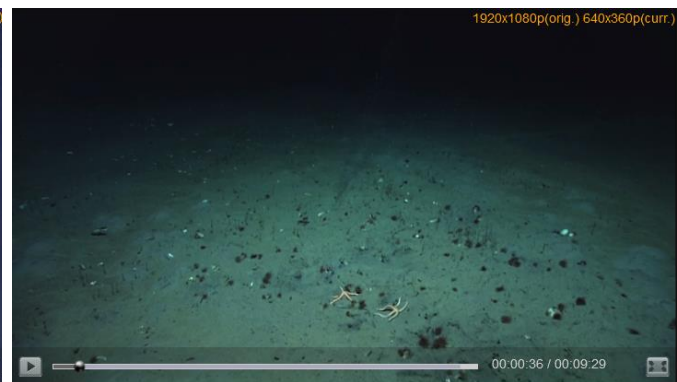
(Schoening, Bergmann, *et al.* In review)

2. Deep-Sea Video Platform



VIDLIB Deep Sea Video Platform Motivation:

- Storage of marine video data from multiple sources
- Easy access to data (web interface, video streaming)
- Direct analysis of video data (annotation, geo-referencing, etc.)
- Sharing of expert knowledge (e.g. species identification, etc.)
- Quick retrieval of relevant video material
- Facilitate public outreach
- Crowd-sourcing





Video directory
<http://vidlib.marum.de>

- List of all videos with attributes:
 - Expedition and dive number
 - Date and time
 - Duration
 - Latitude and longitude
 - Video resolution
 - Amount of annotations
 - Etc

Recently annotated videos My Recently annotated videos Recently Uploaded videos My Favorite videos Search

Showing videos 1 - 10 of total 335

| | | |
|--|---|--|
| | <p>PS86_0065_START_20140724_162301</p> <p>Filmed by: OFOS Description: OFOS Dive Duration: 04:25:54.95 Country: Greenland Expedition: PS86 Longitude: -6.216446732 Latitude: 82.90855583</p> | <p>Date Of Filming: 24 Jul 2014 Uploaded Date: 07 Apr 2015 Dive: PS86/0065 Research area: Gakkel Ridge Original Resolution: 1920x1080p Total annotations: 19 Top 10 annotations: [sponge (17) , [?]</p> |
| | <p>dive179_HD1_01</p> <p>Filmed by: ROV MARUM-QUEST Description: dive: 179 HD: 1 video: 1/2 Duration: 00:33:57.30 Country: Pakistan Expedition: M74-3 Longitude: 62.7384704 Latitude: 24.1956822</p> | <p>Date Of Filming: 02 Nov 2007 Uploaded Date: 17 Feb 2015 Dive: dive179 Research area: Makran Accretionary ... Original Resolution: 1920x1080p Total annotations: 3 Top 10 annotations: [cold seep (1) , b...</p> |
| | <p>PS81_0650_START_20131201_215106</p> <p>Filmed by: OFOS Description: OFOS Dive Duration: 04:57:33.11 Country: South Africa Expedition: PS81 Longitude: 14.16906102 Latitude: -52.15973912</p> | <p>Date Of Filming: 01 Dec 2013 Uploaded Date: 16 Feb 2015 Dive: PS81/0650 Research area: Southwest Indian Ridg... Original Resolution: 1920x1080p Total annotations: 466 Top 10 annotations: [sea cucumber (2...</p> |
| | <p>PS81_0647_START_20131201_030113</p> <p>Filmed by: OFOS Description: OFOS Dive Duration: 03:41:50.39 Country: South Africa Expedition: PS81 Longitude: 14.16765597 Latitude: -52.15051931</p> | <p>Date Of Filming: 01 Dec 2013 Uploaded Date: 23 Feb 2015 Dive: PS81/0647 Research area: Southwest Indian Ridg... Original Resolution: 1920x1080p Total annotations: 726 Top 10 annotations: [sea urchin (207)...</p> |
| | <p>dive198_HD1_05</p> <p>Filmed by: x Description: SO196 Duration: 00:10:41.34 Country: Germany Expedition: Default Longitude: 42.5590705871582 Latitude: 56.776336669921875</p> | <p>Date Of Filming: 18 Nov 1111 Uploaded Date: 10 Apr 2013 Dive: Default Video Set Research area: x Original Resolution: N/A Total annotations: 12 Top 10 annotations: [crab (3) , gas hy...</p> |
| | <p>dive317_HD1_01</p> <p>Filmed by: x Description: SO216 Duration: 00:01:10.87 Country: Germany Expedition: Default Longitude: 43.086415516931 Latitude: 46.103109897244</p> | <p>Date Of Filming: 18 Nov 1111 Uploaded Date: 07 Jun 2013 Dive: Default Video Set Research area: x Original Resolution: N/A Total annotations: 4 Top 10 annotations: [Hydrolycus sp. (...]</p> |



Video sharing & visualisation

<http://vidlib.marum.de>

- List of all videos with attributes:
 - Expedition and dive number
 - Date and time
 - Duration
 - Latitude and longitude
 - Video resolution
 - Amount of annotations
 - Etc
- **Online video streaming**
 - 3 resolutions (240p, 360p, 480p)

Home | Search Videos | Manage Users | Manage Profile | Expedition | Utilities | Upload Video | Logout | About

mpressum / Disclaimer

Welcome, Yann Marcon | Role: admin

PS86_0024_START_20140713_222105

1920x1080p(orig.) 640x360p(curr.)

Categories

- Marine Biology
- Marine Geology
- Scientific Instruments
- Marine Chemistry
- Marine Physics
- Trash
- Beauty of Deep Sea
- Data Quality
- PS86 Aurora

Annotations

Annotations Timeline

Video Info

| | |
|---------------------------------|---------------------------------------|
| Country: Greenland | Name: PS86_0024_START_20140713_222105 |
| Expedition: PS86 | Description: OFOS Dive |
| Dive: PS86/0024 | Duration: 03:18:52.60 |
| Latitude: 82.90908663 | Date Uploaded: 07/04/2015 02:49:33 |
| Longitude: -6.257765722 | Date Of Filming: 13/07/2014 |
| Original Resolution: 1920x1080p | Filmed By: OFOS |
| | Research Area: Gakkel Ridge |

Copyright

Filter

Video Time

No sequences

Screenshot of the video streaming screen

Video analysis <http://vidlib.marum.de>

- List of all videos with attributes:
 - Expedition and dive number
 - Date and time
 - Duration
 - Latitude and longitude
 - Video resolution
 - Amount of annotations
 - Etc
- Online video streaming
 - 3 resolutions (240p, 360p, 480p)
- **Analysis: annotations on the video**
 - Full screen option

Annotations are made directly on the video, and can be displayed during video visualisation.

The screenshot displays the user interface of the Deep-Sea Video Platform. At the top, there is a navigation bar with links for Home, Search Videos, Manage Users, Manage Profile, Expedition, Utilities, Upload Video, Logout, and About. Below this, the user is logged in as Yann Marcon (Role: admin). The main content area is divided into several sections:

- Categories:** A list of categories including Marine Biology (selected), Marine Geology, Scientific Instruments, Marine Chemistry, Marine Physics, Trash, Beauty of Deep Sea, and Data Quality.
- Annotations:** A list of annotations for the video, including "sea cucumber (>=50 cm)" at various time points (e.g., 2291s, 2316s, 2329s, 2402s, 2409s, 2460s, 2494s, 2535s) with an "Edit" link for each.
- Video Time:** A section for video time management.
- Video Info:** Metadata for the video, including Country (South Africa), Expedition (PS81), Dive (PS81/0647), Latitude (-52.15051931), Longitude (14.16765597), Original Resolution (1920x1080p), Name (PS81_0647_START_20131201_030113), Description (OFOS Dive), Duration (03:41:50.39), Date Uploaded (23/02/2015 06:34:45), Date Of Filming (01/12/2013), Filmed By (OFOS), and Research Area (Southwest Indian Ridge (SWIR)).

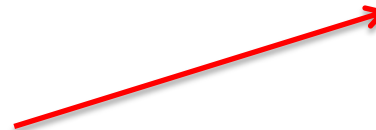
The video player shows a sea cucumber (>=50 cm) annotation overlaid on the video frame. The video title is PS81_0647_START_20131201_030113, and the resolution is 1920x1080p (orig.) 853x480p (curr.).



Video Search

<http://vidlib.marum.de>

- Videos are searchable by:
 - **Filename**



Home | Search Videos | Manage Users | Manage Profile | Expedition | Utilities | Upload Video | Logout | About

Impressum / Disclaimer Welcome, Yann Marcon | Role: admin

Home Activities

Recently annotated videos | My Recently annotated videos | Recently Uploaded videos | My Favorite videos |

- PS81_0666_START_20131207_103900
- PS86_0050_START_20140720_171902
- PS81_0633_START_20131126_135522
- PS81_0670_START_20131208_141357
- PS81_0671_START_20131208_184242
- PS81_0647_START_20131201_030113
- PS86_0024_START_20140713_222105
- PS86_0084_START_20140729_115335
- PS86_0039_START_20140717_183811
- PS81_0630_START_20131125_190250
- PS86_0056_START_20140722_140859
- PS86_0019_START_20140712_163312
- PS86_0068_START_20140725_121320
- PS86_0065_START_20140724_162301
- PS81_0650_START_20131201_215106
- PS86_0082_START_20140728_222611
- PS81_0615_START_20131120_063346
- PS86_0030_START_20140715_084629
- PS86_0054_START_20140721_202953
- PS81_0680_START_20131211_103418

PS86_0084_START_20140729_115335

Date Of Filming: 29 Jul 2014
 Uploaded Date: 07 Apr 2015
 Dive: PS86/0084
 Research area: Gakkel Ridge
 Original Resolution: 1920x1080p
 Total annotations: 0
 Top 10 annotations: []

PS86_0085_START_20140729_181912

Filmed by: OFOS Date Of Filming: 29 Jul 2014
 Description: OFOS Dive Uploaded Date: 08 Apr 2015
 Duration: 01:55:48.64 Dive: PS86/0085
 Country: Greenland Research area: Gakkel Ridge
 Expedition: PS86 Original Resolution: 1920x1080p
 Longitude: -6.23722419 Total annotations: 0
 Latitude: 82.90090666 Top 10 annotations: []

PS86_0082_START_20140728_222611

Filmed by: OFOS Date Of Filming: 28 Jul 2014
 Description: OFOS Dive Uploaded Date: 07 Apr 2015
 Duration: 02:38:14.95 Dive: PS86/0082
 Country: Greenland Research area: Gakkel Ridge
 Expedition: PS86 Original Resolution: 1920x1080p
 Longitude: -6.206803418 Total annotations: 0
 Latitude: 82.90360473 Top 10 annotations: []

VIDLIB search by name

Video Search

<http://vidlib.marum.de>

- Videos are searchable by:
 - Filename
 - **Location (by map selection)**

VIDLIB map search

Home | Search Videos | Manage Users | Manage Profile | Expedition | Utilities | Upload Video | Logout | About

Impressum / Disclaimer Welcome, Yann Marcon | Role: admin

Search Videos

GEO Search
Click on the map to get the values!
Longitude: Latitude:
Radius(KM):

Time Range Filter
Time Range Filter:
Start:
End:

Keyword
Keyword:

Add attribute

Showing videos 1 - 5 of total 11

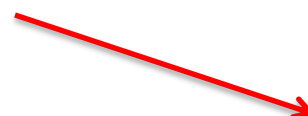
PS81_0627_START_20131123_122409_missing_video_T063
Filmed by: OFOS Date Of Filming: 23 Nov 2013
Description: OFOS Dive Uploaded Date: 07 Apr 2015
Duration: 03:58:21.23 Dive: PS81/0627
Country: South Africa Research area: Southwest Indian Ridg...
Expedition: PS81 Original Resolution: 1920x1080p
Longitude: 13.07121876 Total annotations: 0
Latitude: -52.49212673 Top 10 annotations: []

PS81_0627_START_20131127_210401



Video Search <http://vidlib.marum.de>

- Videos are searchable by:
 - Filename
 - Location (by map selection)
 - **Date**



Home | Search Videos | Manage Users | Manage Profile | Expedition | Utilities | Upload Video | Logout | About

Impressum / Disclaimer Welcome, Yann Marcon | Role: admin

Search Videos

GEO Search
Click on the map to get the values!
Longitude: Latitude:
Radius(KM):

Time Range Filter
Time Range Filter: 2014
Start:
End:

Keyword
Keyword:

Add attribute
Expeditions

Showing videos 1 - 5 of total 14

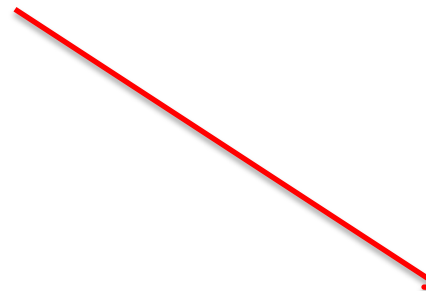
PS86_0046_START_20140719_131431
Filmed by: OFOS
Description: OFOS Dive
Duration: 02:43:21.04
Country: Greenland
Expedition: PS86
Longitude: -6.286560621
Latitude: 82.91207407
Date Of Filming: 19 Jul 2014
Uploaded Date: 26 May 2015
Dive: PS86/0046
Research area: Gakkel Ridge
Original Resolution: 1920x1080p
Total annotations: 0
Top 10 annotations: []

VIDLIB date search



Video Search <http://vidlib.marum.de>

- Videos are searchable by:
 - Filename
 - Location (by map selection)
 - Date
 - **Attribute** (expedition, dive, etc.)



VIDLIB attribute search

The screenshot shows the VIDLIB search interface. At the top, there is a navigation bar with links: Home, Search Videos, Manage Users, Manage Profile, Expedition, Utilities, Upload Video, Logout, and About. Below this is a sub-header: Impressum / Disclaimer and a user greeting: Welcome, Yann Marcon | Role: admin.

The main section is titled "Search Videos" and contains several filter panels:

- GEO Search:** Includes a map of the world with a red location pin. Below the map are input fields for Longitude and Latitude, and a Radius(KM) slider.
- Time Range Filter:** Includes a "Time Range" dropdown menu (currently set to "-Select Year-"), a "Filter:" dropdown, and "Start:" and "End:" date input fields (format: dd/mm/yyyy).
- Keyword:** Includes a "Keyword:" input field and a "Search videos by keywords" button.
- Add attribute:** A dropdown menu currently showing "Dives" with a "+" button next to it.
- Attributes:** A section for "Expeditions:" with a search input field containing "PS86" and a close button (x).

At the bottom right, there are "Clear search" and "Search" buttons. Below the filters, it says "Showing videos 1 - 5 of total 14".

The first search result is visible, showing a video thumbnail and the following details:

- PS86_0046_START_20140719_131431**
- Filed by: OFOS
- Description: OFOS Dive
- Duration: 02:43:21.04
- Country: Greenland
- Expedition: PS86
- Date Of Filming: 19 Jul 2014
- Uploaded Date: 26 May 2015
- Dive: PS86/0046
- Research area: Gakkel Ridge
- Original Resolution: 1920x1080p



Video Search

<http://vidlib.marum.de>

- Videos are searchable by:
 - Filename
 - Location (by map selection)
 - Date
 - Attribute (expedition, dive, etc.)
 - **Keyword (Annotation)**

VIDLIB annotation query



Annotation Query

Search example: JAMSTEC marker



Annotation Query

Search example: JAMSTEC marker

Result: 3 ROV videos

Home | Search Videos | Manage Users | Manage Profile | Expedition | Utilities | Upload Video | Logout | About

Impressum / Disclaimer Welcome, Yann Marcon | Role: admin

Search Videos

GEO Search

Click on the map to get the values!

Longitude: Latitude:
Radius(KM):

Time Range Filter

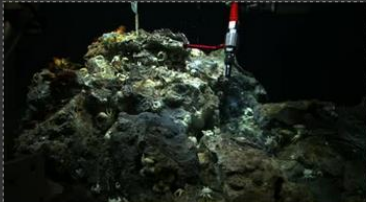
Time Range: Filter:
Start:
End:

Keyword


Keyword:

Add attribute

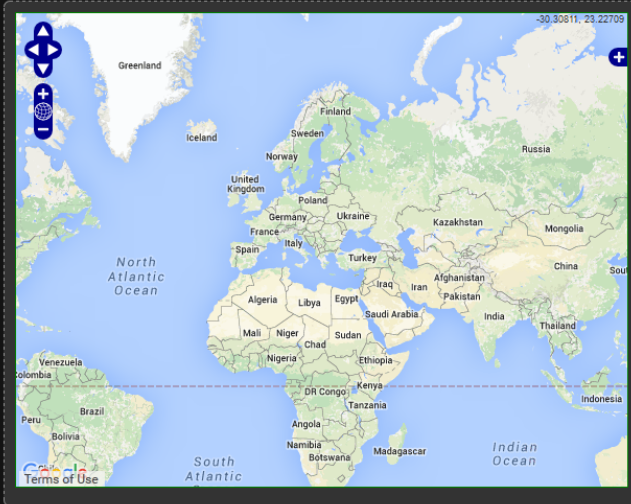
Showing videos 1 - 3 of total 3



dive202_HD4_01
Filmed by: x
Description: SO196
Duration: 00:12:08.79
Country: Germany
Expedition: Default
Longitude: 44.141103016931
Latitude: 57.349771502744
Date Of Filming: 18 Nov 1111
Uploaded Date: 10 May 2013
Dive: Default Video Set
Research area: x
Original Resolution: N/A
Total annotations: 5
Top 10 annotations: [bubbling site (1...



dive202_HD3_02
Filmed by: x
Description: SO196
Date Of Filming: 18 Nov 1111
Uploaded Date: 12 Apr 2013





Annotation Query

Search example: JAMSTEC marker

Result: 3 ROV videos

Go directly to searched keyword

The screenshot displays the user interface of the Deep-Sea Video Platform. At the top, there is a navigation bar with links: Home, Search Videos, Manage Users, Manage Profile, Expedition, Utilities, Upload Video, Logout, and About. The user is logged in as 'Yann Marcon' with the role of 'admin'. The main content area is divided into several sections:

- Categories:** A list of categories with icons, including Marine Biology, Marine Geology, Scientific Instruments, Marine Chemistry, Marine Physics, Trash, Beauty of Deep Sea, Data Quality, and PS86 Aurora.
- Annotations:** A list of annotations with their timestamps and edit links, such as 'marker (at 4s)', 'marker 364, JAMSTEC (at 7s)', 'mussel (at 15s)', 'Bathymodiolus sp. (at 16s)', 'crab (at 21s)', 'fish (at 136s)', 'bubbling site (at 214s)', 'laser (at 1028s)', and 'shrimp (at 1476s)'. There is also a search filter box.
- Video Player:** A video player showing a deep-sea scene with a red marker labeled 'marker 364, JAMSTEC'. The video title is 'dive202_HD1_03' and the resolution is 'N/A(orig.) 640x360p(curr.)'. The progress bar shows 00:00:09 / 00:32:03.
- Annotations Timeline:** A timeline view showing the duration of various annotations as colored bars along the video's duration.
- Video Info:** Metadata for the video, including Country (Germany), Expedition (Default), Dive (Default Video Set), ROV Cable Length (1.0), Latitude (56.776336669921875), Longitude (43.0864143371582), Original Resolution (N/A), Name (dive202_HD1_03), Description (SO196), Duration (00:32:03.28), Date Uploaded (12/04/2013 01:07:02), Date Of Filming (11/11/1111), Filmed By (x), and Research Area (x).
- Video Time:** A section at the bottom left with the text 'No sequences'.



Annotation Query

Search example: JAMSTEC marker

Result: 3 ROV videos

Go directly to searched keyword



Quick retrieval of annotations and features of interest

The screenshot displays the user interface of the Deep-Sea Video Platform. At the top, there is a navigation bar with links: Home, Search Videos, Manage Users, Manage Profile, Expedition, Utilities, Upload Video, Logout, and About. The user is logged in as 'Yann Marcon' with the role of 'admin'. The main content area is divided into several sections:

- Categories:** A list of categories with icons, including Marine Biology, Marine Geology, Scientific Instruments, Marine Chemistry, Marine Physics, Trash, Beauty of Deep Sea, Data Quality, and PS86 Aurora.
- Annotations:** A list of annotations with their start times and edit options: marker (at 4s), marker 364, JAMSTEC (at 7s), mussel (at 15s), Bathymodiolus sp. (at 16s), crab (at 21s), and fish (at 136s).
- Video Player:** A video player showing a deep-sea scene with a red marker. The video title is 'dive202_HD1_03' and the resolution is 'N/A(orig.) 640x360p(curr.)'. The video progress bar shows 00:00:09 / 00:32:03.
- Annotations Timeline:** A timeline view showing the duration of various annotations on the video.
- Video Info:** Metadata for the video, including Country (Germany), Expedition (Default), Dive (Default Video Set), ROV Cable Length (1.0), Latitude (56.776336669921875), Longitude (43.0864143371582), Original Resolution (N/A), Name (dive202_HD1_03), Description (SO196), Duration (00:32:03.28), Date Uploaded (12/04/2013 01:07:02), Date Of Filming (11/11/1111), Filmed By (x), and Research Area (x).
- Video Time:** A section for video time, currently showing 'No sequences'.



Annotation Query

Search example: JAMSTEC marker

Result: 3 ROV videos

Go directly to searched keyword

The screenshot displays the user interface of the Deep-Sea Video Platform. At the top, there is a navigation bar with links for Home, Search Videos, Manage Users, Manage Profile, Expedition, Utilities, Upload Video, Logout, and About. The user is logged in as Yann Marcon (Role: admin). The main content area is divided into several sections:

- Categories:** A list of categories including Marine Biology, Marine Geology, Scientific Instruments, Marine Chemistry, Marine Physics, Trash, Beauty of Deep Sea, Data Quality, and PS86 Aurora.
- Annotations:** A list of annotations with their timestamps and edit options: marker (at 4s), marker 364, JAMSTEC (at 7s), mussel (at 15s), Bathymodiolus sp. (at 16s), crab (at 21s), and fish (at 136s).
- Video Player:** A video player showing a deep-sea scene with a red marker labeled 'marker 364, JAMSTEC'. The video title is 'dive202_HD1_03' and the resolution is 'N/A(orig.) 640x360p(curr.)'. The progress bar shows 00:00:09 / 00:32:03.
- Annotations Timeline:** A timeline view showing the duration of various annotations as colored bars along the video's duration.
- Video Time:** A section at the bottom left showing 'No sequences'.
- Original Resolution:** A section at the bottom right showing 'Original Resolution: N/A'.
- Research Area:** A section at the bottom right showing 'Research Area: x'.



Quick retrieval of annotations and features of interest

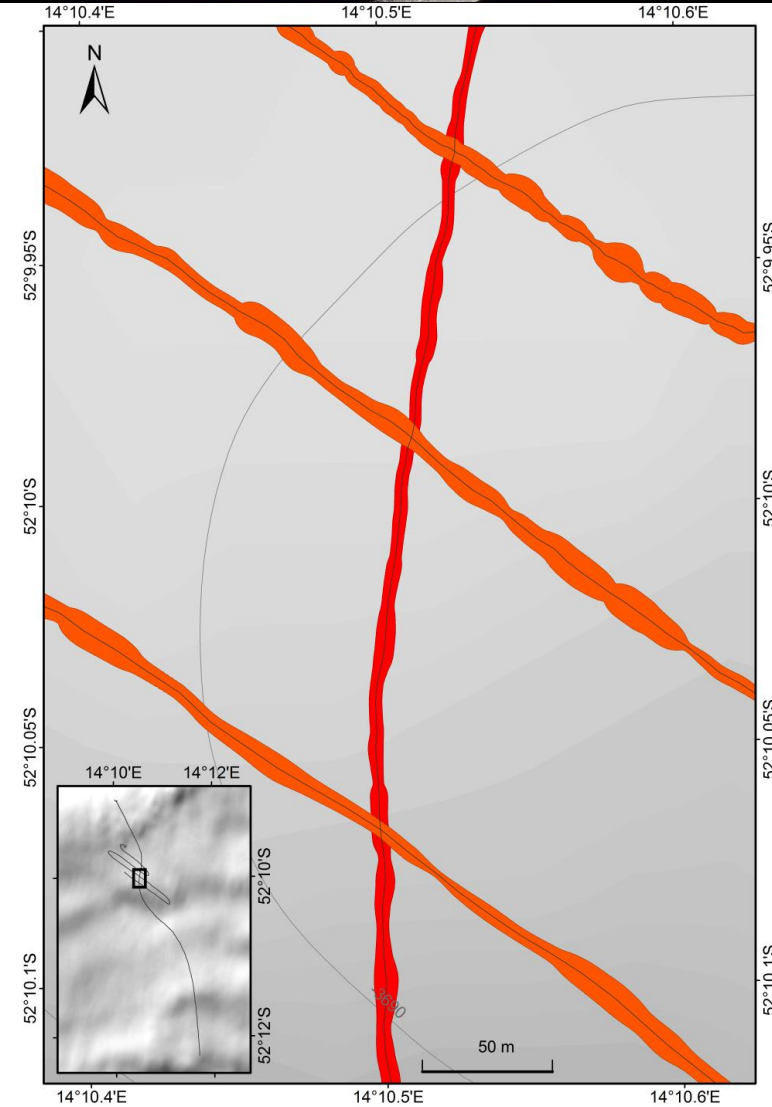
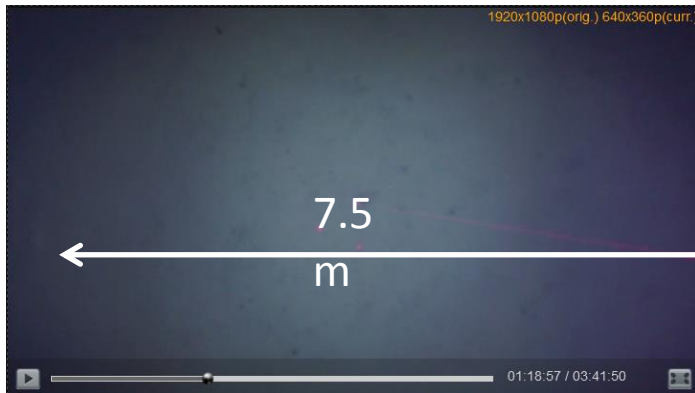
Applications for:

- **Video data mining**
- **Science media (television), communication and outreach**

2. Deep-Sea Video Platform

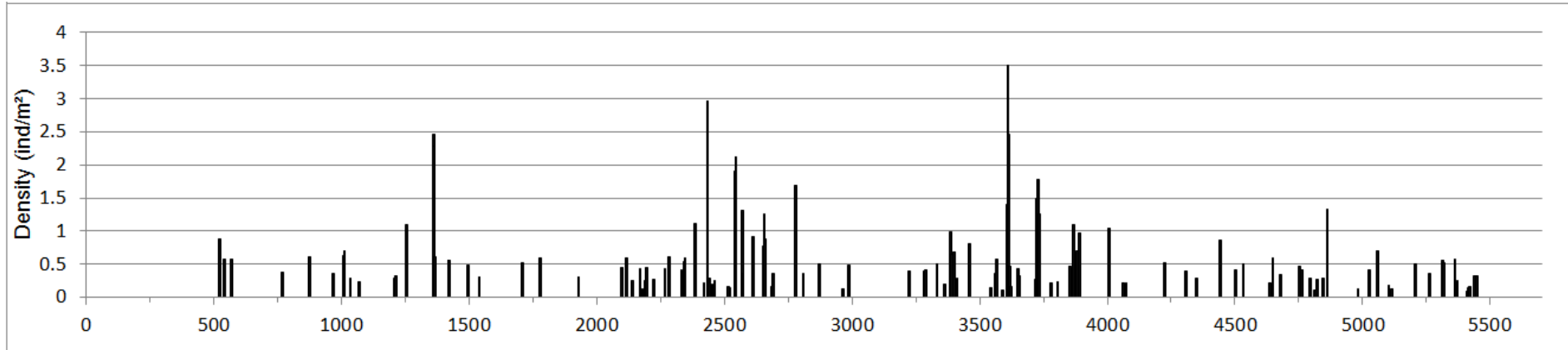


Field of view can be taken into account prior to import of data into GIS.

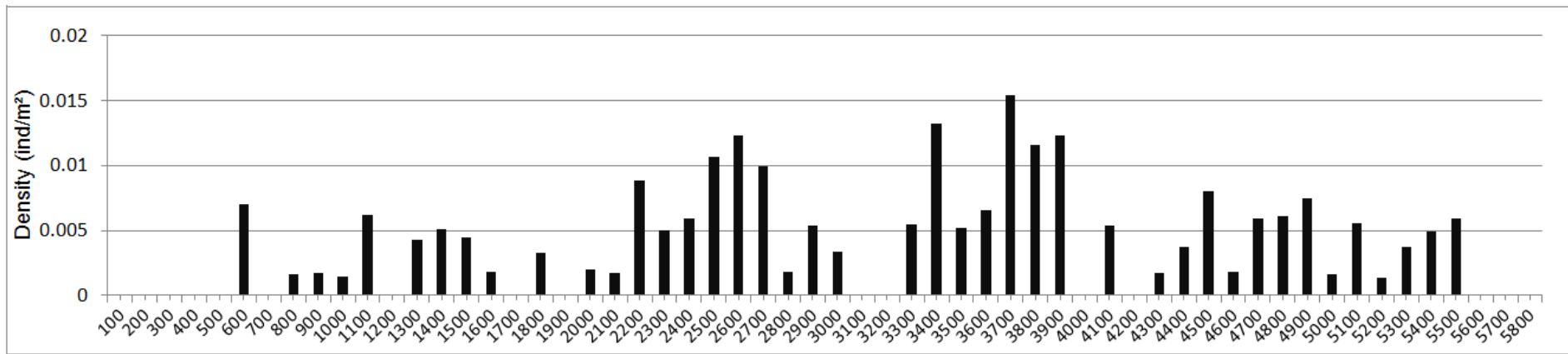




Holothurian density per meter of track



Holothurian density per 100 meters of track



3. Future work : Image Analysis

ROBEX partners, together with other collaborators (such as Bielefeld University) have developed several tools for the storage and analysis of **Still** and **Video Image** data.

These tools are now producing ROBEX citing publications.

These tools can be used to upload :

- Training workshop data
- Demo mission data
- New ROBEX developed methodology testing (e.g. 360 cameras vs traditional cameras for monitoring)

..And allow the uploaded data to be accessible for **outreach, education, or collaborative research** uses.

3. Ongoing work : Image Analysis



| | | |
|--------------------------|---|--|
| ADELIE | Underwater vehicle data post-processing software | Ifremer (FR) |
| BIIGLE | Bio-Image Indexing, Graphical Labelling and Exploration | Bielefeld University/ Alfred Wegener Institute (GE) |
| CATAMI | Collaborative and Annotation Tools for Analysis of Marine Imagery and Video | National eResearch Collaboration Tools and Resources/Australian National Data Service (AU) |
| ClassAct Mapper | ClassAct Mapper | Fisheries and Oceans Canada (CA) |
| COVER | Customizable Observation Video image Record | Ifremer (FR) |
| CPCe | Coral Point Count with Excel extensions | Nova Southeastern University (US) |
| EventMeasure | Event logging & 3D measurement | NOAA (US) |
| FISH_ROCK | A Tool for Identifying and Counting Benthic Organisms in Bottom Photographs | Woods Hole Oceanographic Institution, NOAA (US) |
| Frame-Grabber | The Alvin Frame-Grabber System | Woods Hole Oceanographic Institution, NOAA (US) |
| ImageJ | Image Processing and Analysis in Java | National Institutes of Health, Bethesda (US) |
| IRLS | Integrated Real-time Logging System | NOAA Scientific Submersible Facility (US) |
| NICAMS | NIWA Image Capture and Management System | NIWA (NZ) |
| OFOP | Ocean Floor Observation Protocol | Scientific Abyss Mapping Services, Texel (NE) |
| photoQuad | Photo quadrat analysis software | University of the Aegean (GR) |
| Seascape | Segmentation and Classification of Seafloor Images | Large Consortia * (ES, FR) |
| SeaScribe/Seatube | NEPTUNE Seafloor Observing System Library of deep-sea video | Ocean Networks Canada , University of Victoria (CA) |
| Squidle | Software for management, analysis and visualization of marine imagery | Australian Centre for Field Robotics, University of Sydney (AU) |
| TransectMeasure | Transect analysis tool | SeaGIS (AU) |
| VARS | Validation & Reference System | MBARI (US) |
| VideoNav | Video navigation software | Institute of Marine Research (NO) |
| VIDEOMON | VIDEOMON MONitoring Software | Institute for Baltic Sea Research Warnemünde (GE) |
| VirtualVan | The Jason II Virtual Control Van System | Woods Hole Oceanographic Institution, NOAA (US) |
| VidLib | Web-based platform for analysing videos | MARUM/AWI/MPI Bremen |

→ Create one easy interface to access the long-term stores of image data in Germany



3. Ongoing work : Image Analysis



- Development of common imagery platform based on PANGAEA
- Compatible and linked with existing tools to enable flow of both imagery and analysis data
- Formulated crucial and desirable system requirements
- Challenge: copy right issues, property rights, access, short and funding

