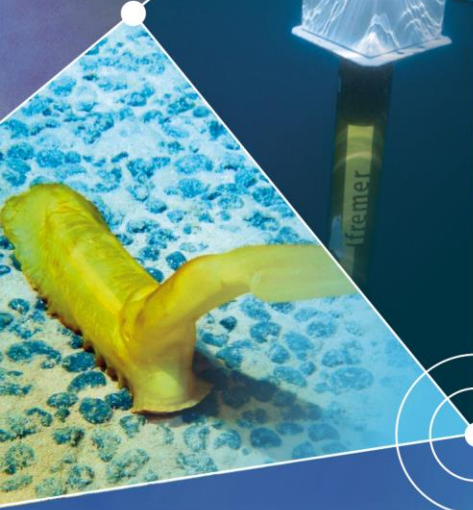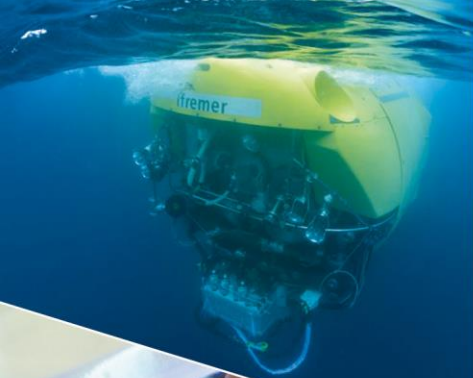# IMAGERY WORKING GROUP
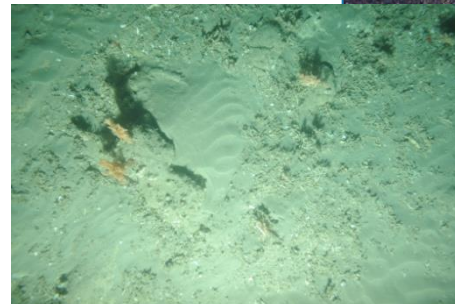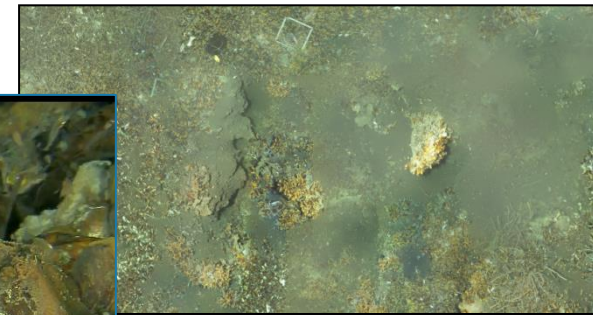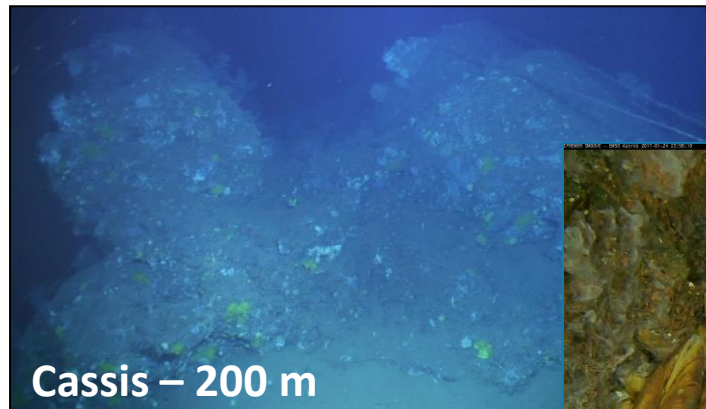
BREST, MAY 29-31, 2018

Background and history

- ## First meeting in June 2013

  Deep-sea (LEP, LERPAC), coastal (DYNECO), geology (GM), engineering (SM, NSE)

- ## Technical team:

  Acquisition systems, new optical sensors evolutions

  Post-processing software upgrades (Matisse, Adélie) for the new sensors

- ## Scientific teams:

  Use of acoustic and optical imagery for habitat mapping at different spatial scales (coastal, geology, deep-sea)
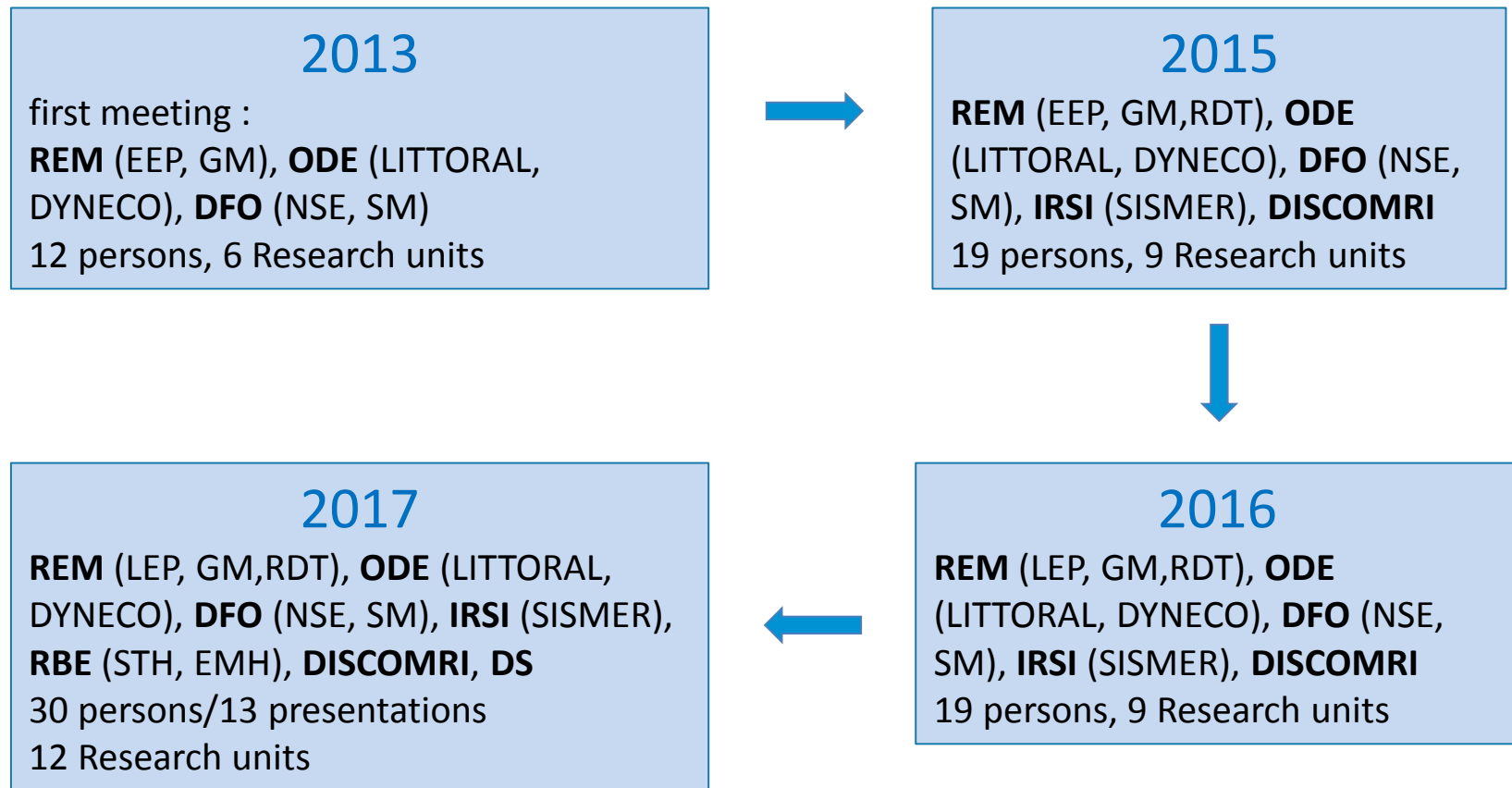
Common task
Contribute to define sensor requirements for the new vehicles (HROV, new AUV):
Optical + acoustic sensors

Background and history

Focused on the analyses of marine optical imagery with a strong benthic component (does not include microscope, SEM imagery)

Cassis – 200 m

Lucky Strike – 1700 m

Golfe de Gascogne

Bréhat cable

Evolution of the working group

2013

first meeting :
REM (EEP, GM), **ODE** (LITTORAL, DYNECO), **DFO** (NSE, SM)
12 persons, 6 Research units

2015

REM (EEP, GM,RDT), **ODE** (LITTORAL, DYNECO), **DFO** (NSE, SM), **IRSI** (SISMER), **DISCOMRI**
19 persons, 9 Research units

2017

REM (LEP, GM,RDT), **ODE** (LITTORAL, DYNECO), **DFO** (NSE, SM), **IRSI** (SISMER), **RBE** (STH, EMH), **DISCOMRI**, **DS**
30 persons/13 presentations
12 Research units

2016

REM (LEP, GM,RDT), **ODE** (LITTORAL, DYNECO), **DFO** (NSE, SM), **IRSI** (SISMER), **DISCOMRI**
19 persons, 9 Research units

- Imagery group reached 95 people
- Deep sea, continental margin, coastal areas
- Transects (spatial), fixed cameras (temporal)

Agenda of the 2017 meeting

Five themes were discussed

- Acquisition
- Image processing
- Methodologies and strategies for acquisition and analyses
- Taxonomical identification
- Data storage and management :

Do we have the competences and resources in house?
Can we mutualize and standardize tools and methods ?
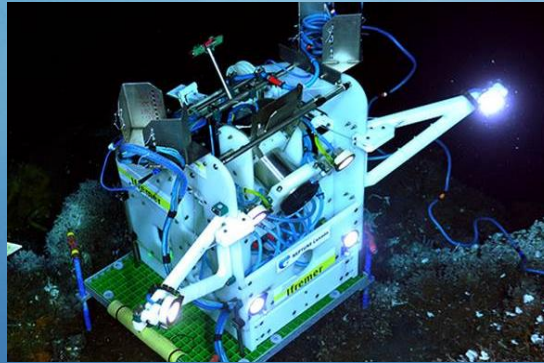
Acquisition

Census of existing camera systems and underwater vehicles, sensor development, acquisition protocols

Round of presentations from all areas from the coast to the deep
Compilation of all existing system has been completed
Developing sensors and underwater vehicles is one of the mission and specificity of the institute. All competences are in house.
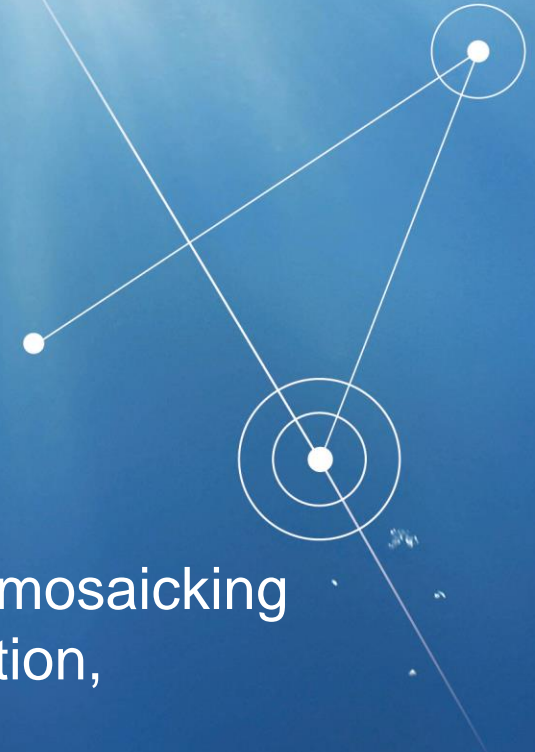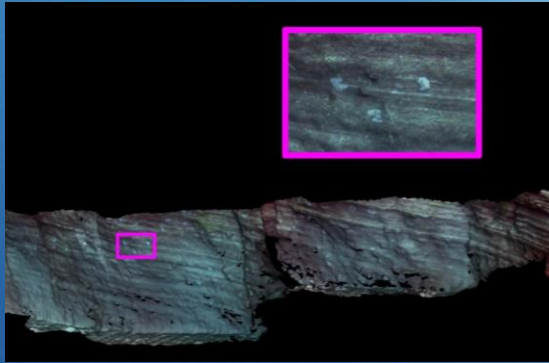
Image processing

Hand processing software (Adélie), Matisse (mosaicking and image correction), automation (classification, identification, segmentation)


- Huge lack of resources (human and tools) to process the acquired data: bottleneck
- Lack of follow-up and consistency in tools development (post-docs) and data archiving (annotations)

Image processing

- All attempts of automation for animal classification with computer algorithms have failed because of the level of complexity of the images and lack of follow-up

- Two approaches:
  - Algorithm training (machine/deep learning) with images already annotated (need to standardize the databases)
  - Agree on a common collaborative tool that can satisfy all needs within the institute (Adelie/Biigle)

With the exponential increase in the use of the imagery at Ifremer, need to develop methods of image processing in house and collaboration and increase the human resources associated
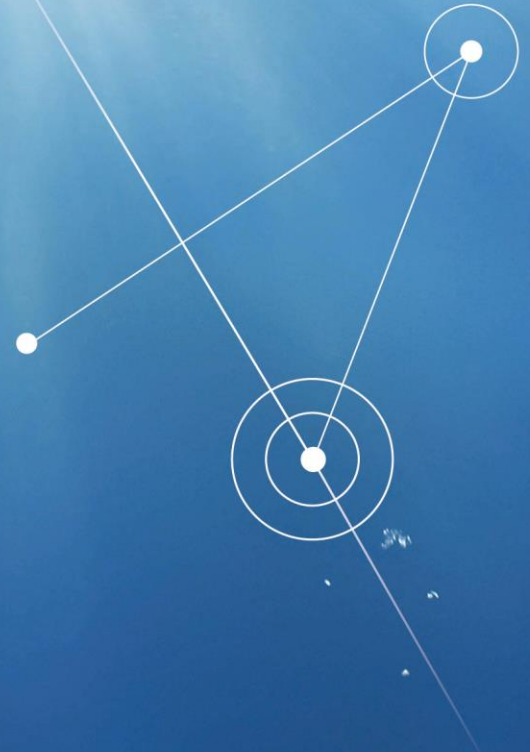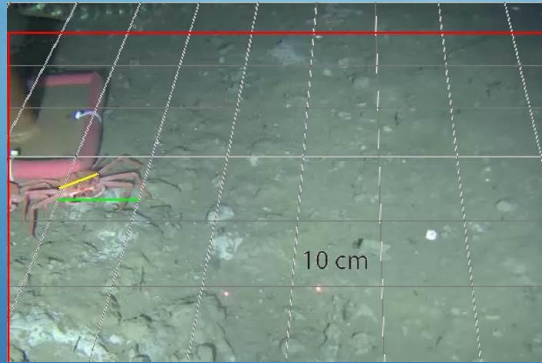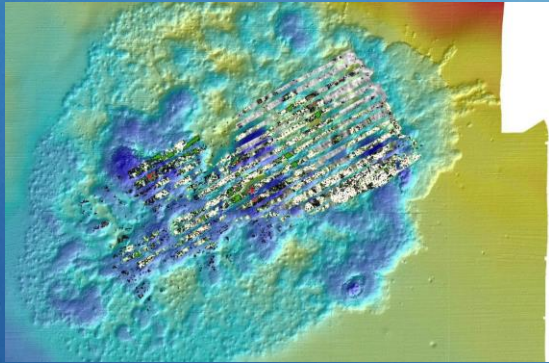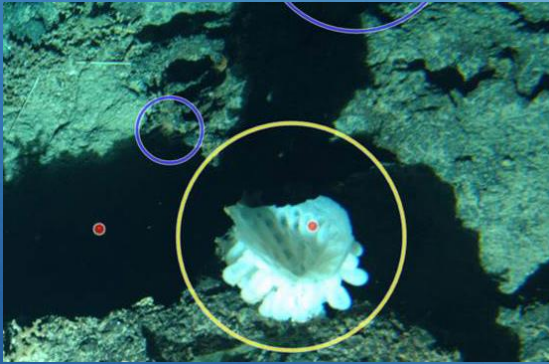
Methodologies and strategies for acquisition and analyses

optical and acoustic coupling, microscale mapping, behaviour studies

- Coupling of optical and acoustic data: georeferencing
- Difficulty in dealing with highly diverse data acquired with different recording and navigation systems
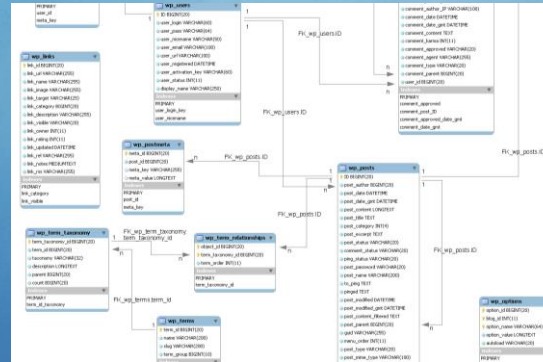- Coupling with environmental data

Taxonomic identification

Define limits associated with species identification using imagery (in relation to taxa and geographic areas)

- Require help from taxonomists (tropical deep-sea benthos)
- Define the limits: common classification tools (e.g. CATAMI)
- Catalogues (Atlantic deep-sea fauna)

Data storage and management
Central database, new data management tools?

- Develop a common database
- Need to standardise annotation protocols
- Increase the value of existing database ?

Conclusions

- Imagery is an important tool in benthic ecology which use is increasing within the institute (coast to the abyss).

- Images = data $\rightarrow$ require the development of new sensors, processing tools, and standardised protocols

- Ifremer possesses the tools and competences for sensor development and data management but lack resources to support images processing

Conclusions

- Imagery is an important tool in benthic ecology which use is increasing within the institute (coast to the abyss).

- Images = data → require the development of new sensors, processing tools, and standardised protocols

- Ifremer possesses the tools and competences for sensor development and data management but lack resources to support images processing

- **Need for a transverse new structure « Imagery unit » within the institute to 1) develop/lead projects for software and algorithms development and protocol standardisation, 2) process the images, and 3) facilitate data storage and management (both images and annotation results)**

Decision to focus the 'second' meeting on image processing