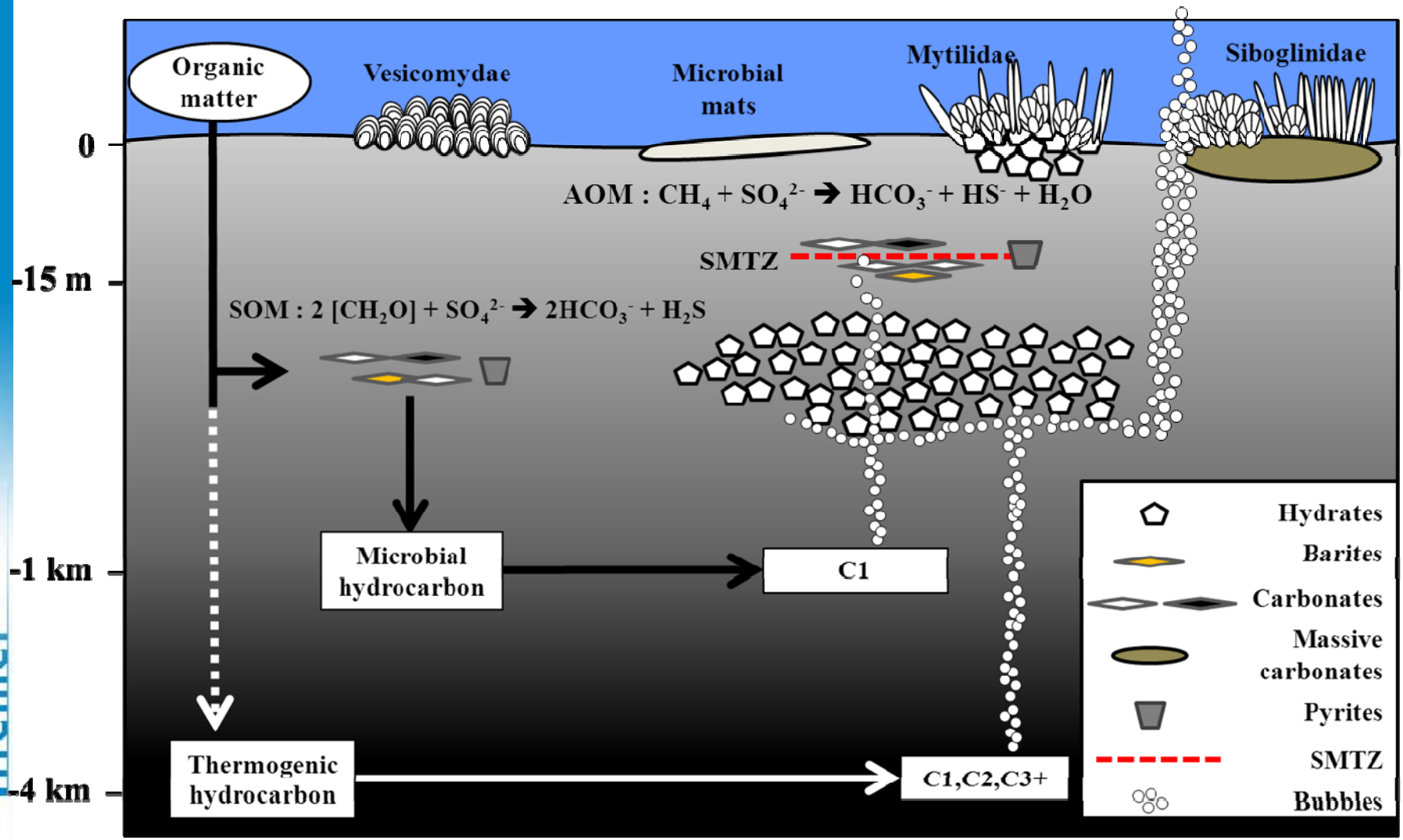
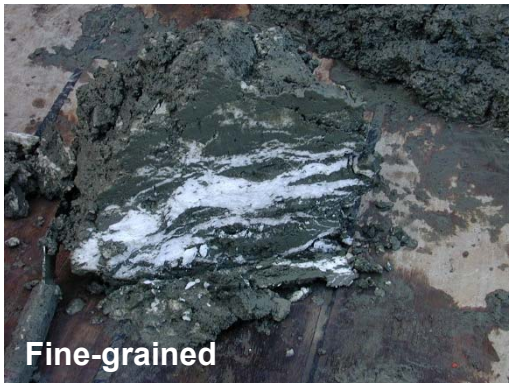
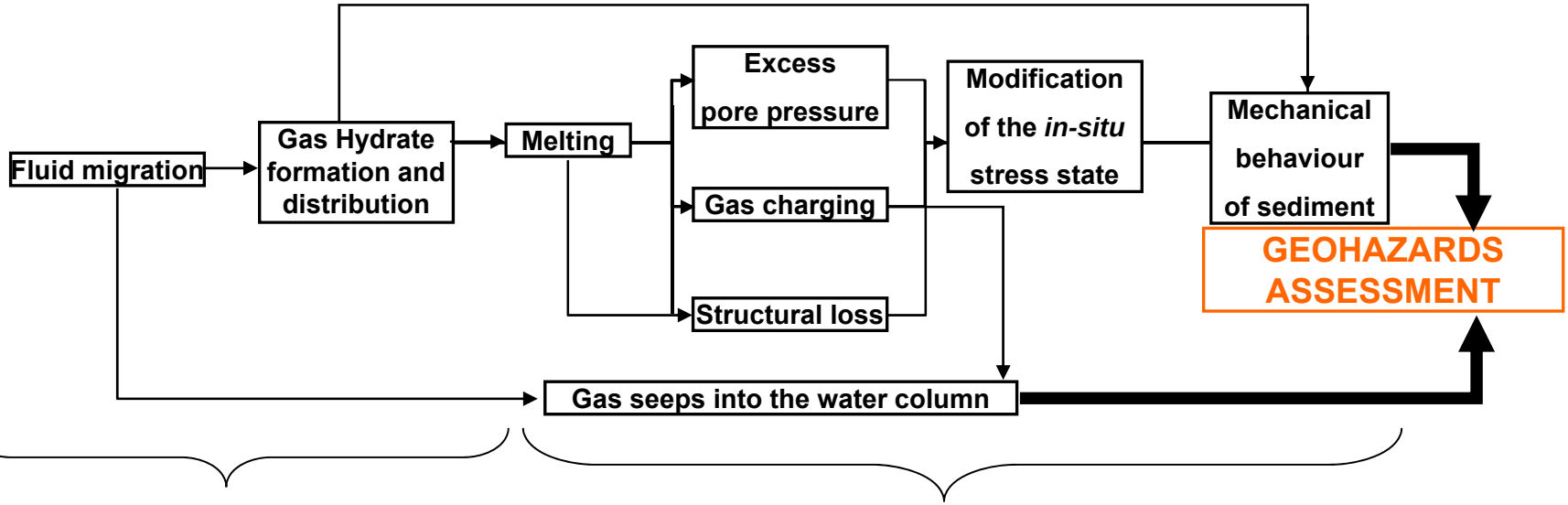
Overview on Marine Gas-Hydrate Research at Ifremer

Conceptual view of hydrate deposit and fluid migration on continental margins



Asssessing hazards related to hydrate- and free gas-bearing sediments





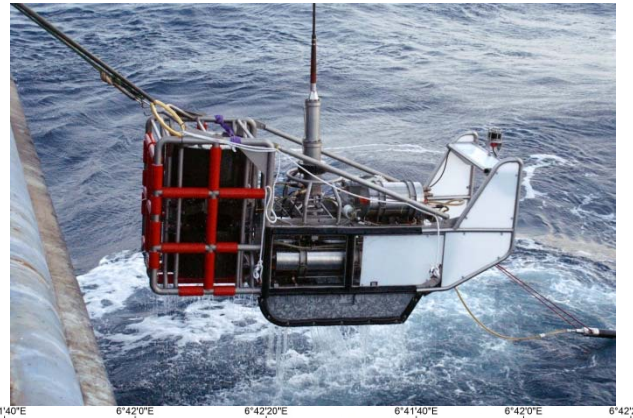
- Geophysics (Detection of gas-storage zones, assessment of hydrate distribution)
- Geochemistry (study of fluid origin, migration pattern and chemical reactivity)

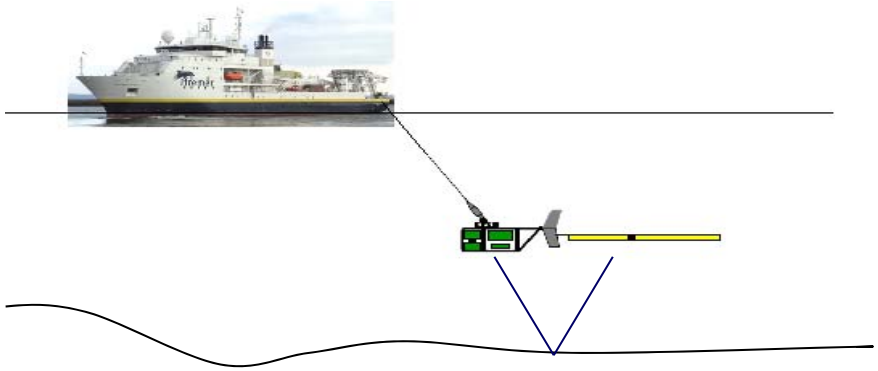
- Thermodynamics (Determination of hydrate stability field)
- Kinetics (kinetics of dissociation)
- Geotechnics (Determination of mechanical properties and estimation of seafloor stability)

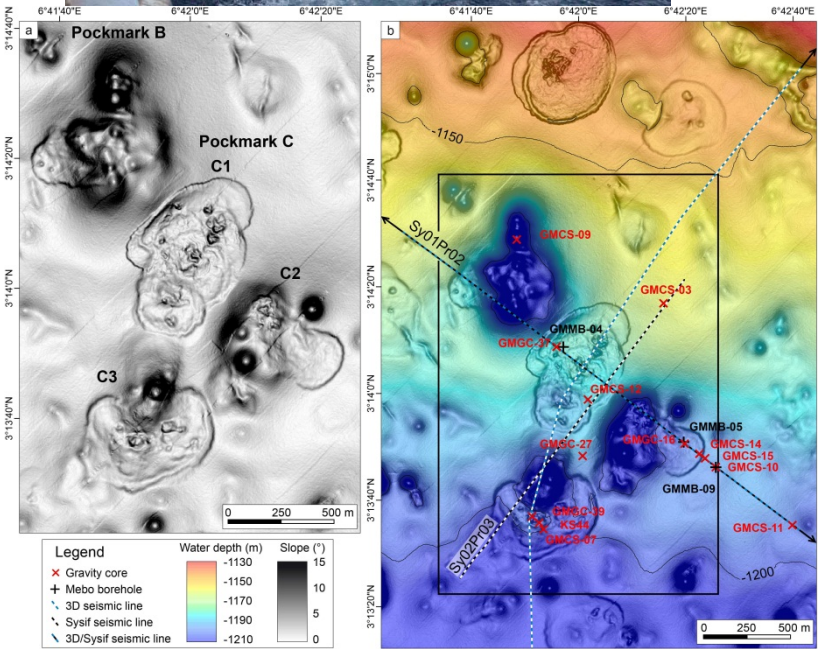
Hydrate detection and quantification

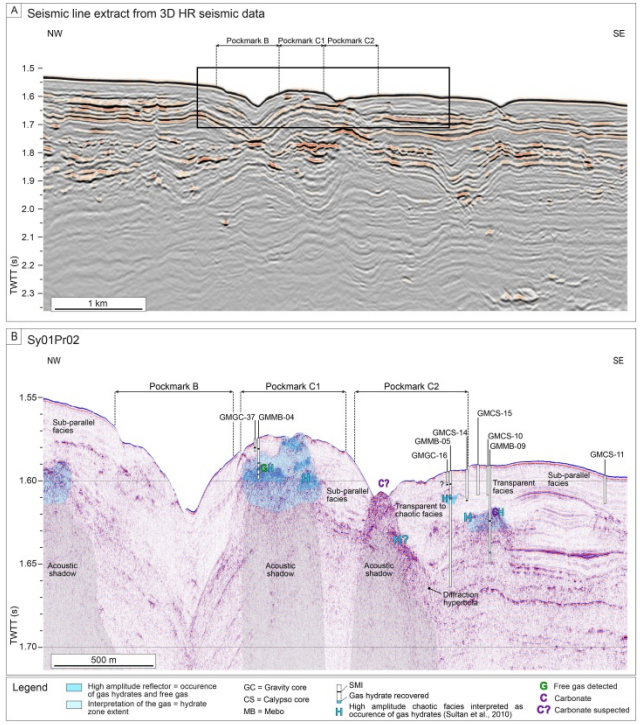
Geophysical investigation

Very High Resolution Investigation of the Gas-ydrate distribution zone by seismic survey



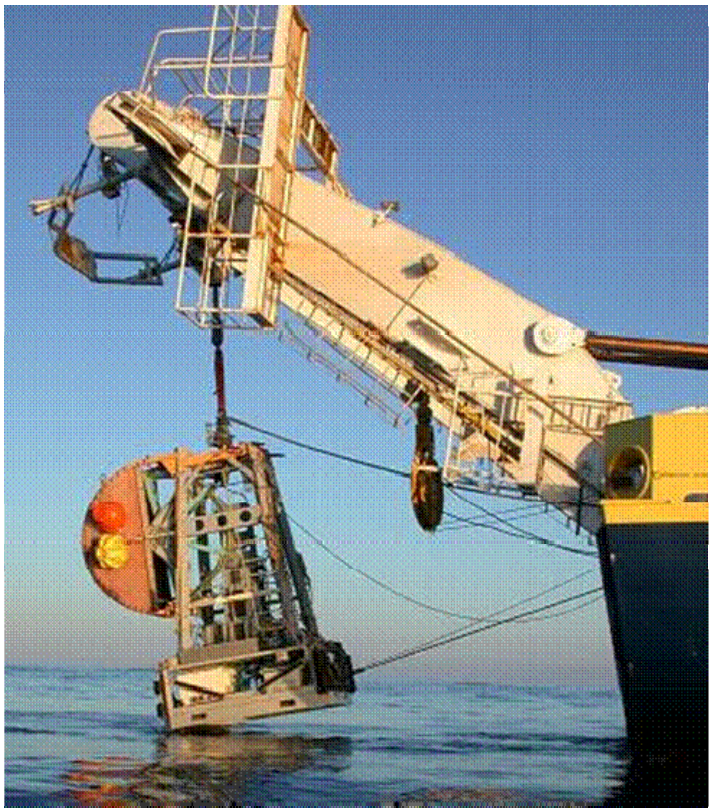




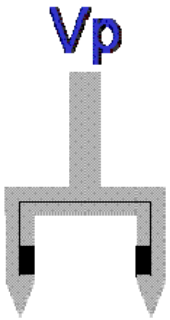


Mechanical property measurements

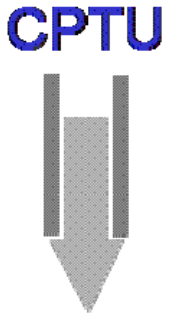
Geotechnical investigation



► **PENFELD**



- ***In situ*** **geotechnical measurements in deep sea (up to 6000 m of water depth)**



- **Maximum depth of investigation of 30 metres below the sea bottom.**

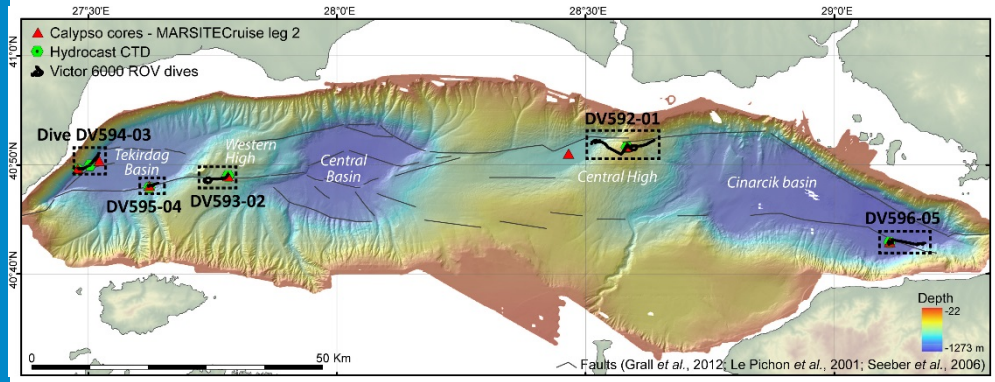
- **Combination of two special cones (classical *CPTu* cone and Sonic CPT)**

► **Interpretation of CPTu and Sonic CPT results**

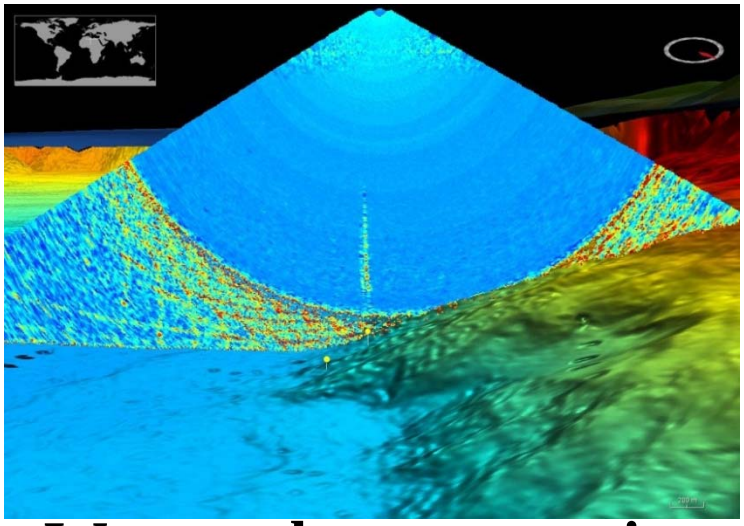
- ***Sediment classification***
- ***Shear zones***
- ***Free gas and gas hydrates detection***

Fluid migration and hydrate dynamics

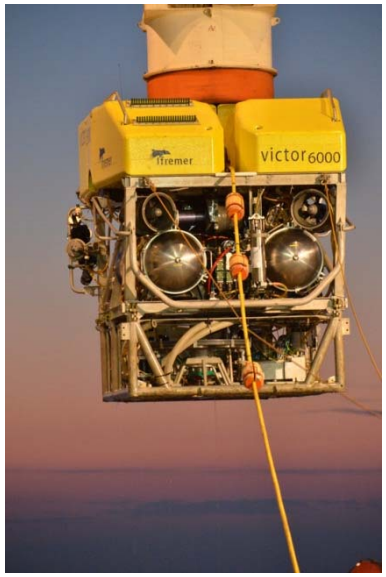
Geochemical investigation



Mapping



Water column acoustics



ROV Dive

CTD-Rosette/ sensors

Calypso coring

Lab investigations: physicochemical facilities

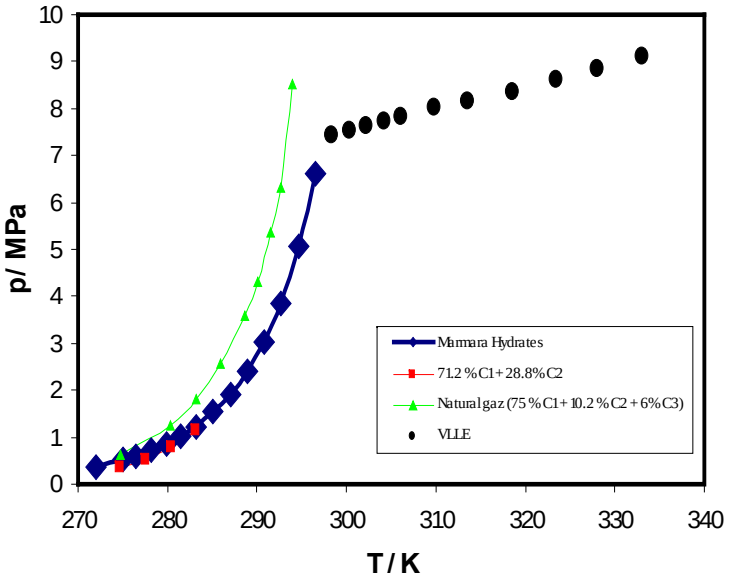
Raman spectrometer

HP apparatus to investigate hydrate-bearing sediment

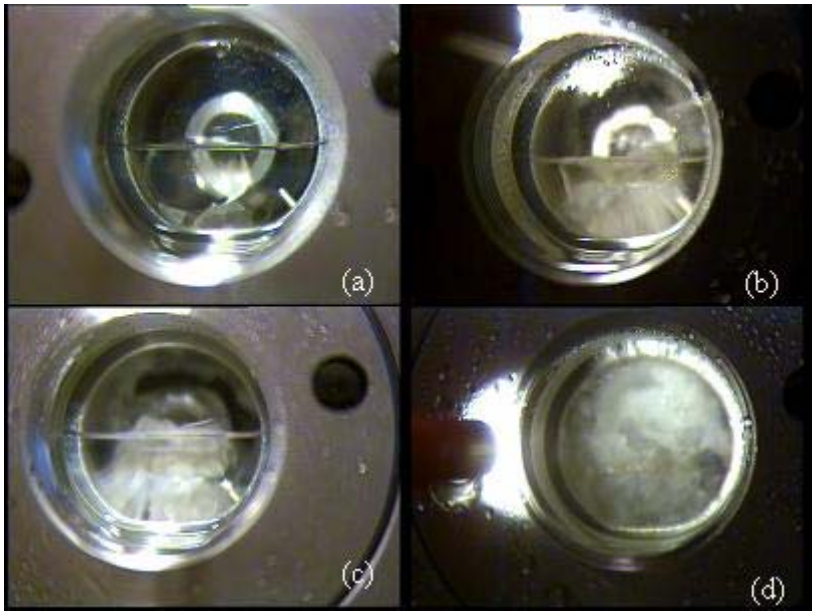
HP apparatus to investigate hydrates in bulk phase

Gas chromatography

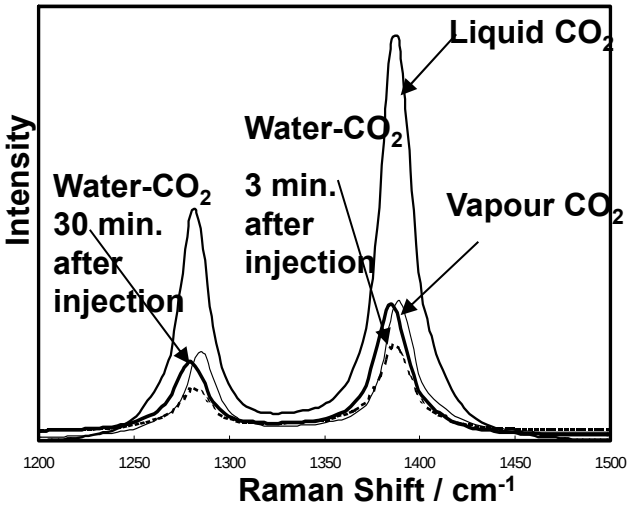
Thermodynamics and kinetics of gas hydrates



Stability regime of complex hydrates



Kinetics of CO_2 hydrate formation from liquid CO_2 and destabilisation by water injection



Marine gas hydrate - an indigenous resource of natural gas for Europe (MIGRATE) COST-Action ES1405

Main objectives:

- **To encourage cross-disciplinary** scientific and technological cooperations at **national and european** levels, in order to stimulate the development of multidisciplinary knowledge on the potential of gas hydrates as energy resource

- **To establish a panel of experts** advising on and working towards the realization of future applied hydrate projects

Efforts will be coordinated through 4 Working Groups (WG) focusing on:

- **WG1: Quantification of the exploitable amount of European methane hydrates**
- **WG2: Exploration, Production and Monitoring technologies**
- **WG3: Environmental challenges (geohazards, climate change)**
- **WG4: Integration, public perception, and dissemination**

Efforts will be coordinated through 4 Working Groups (WG) focusing on:

- **WG1: Quantification of the exploitable amount of European methane hydrates**

Bring together experts from various scientific disciplines (*e.g.* geophysics, sedimentology, geology, geochemistry) as well as industry, in order to evaluate, reprocess and complement the multiplicity of data sets produced by hydrocarbon industries and researchers.

Efforts will be coordinated through 4 Working Groups (WG) focusing on:

➢ **WG2: Exploration, Production and Monitoring technologies**

- **Pool professionals in an active development of production and monitoring technologies, with respect to their economic feasibility and environmental soundness.**
- **Propose appropriate site-specific production and monitoring strategies.**

Efforts will be coordinated through 4 Working Groups (WG) focusing on:

- **WG3: Environmental challenges (geohazards, climate change)**

- **Review the environmental challenges associated with methane production from gas hydrates (evolution of seafloor stability and methane release into the water column, slope failure and seafloor stability).**
- **Impacts of production on benthic ecosystems and potential methane emissions reaching the atmosphere.**

Efforts will be coordinated through 4 Working Groups (WG) focusing on:

- **WG4: Integration, public perception, and dissemination**
  - **Coordinate and integrate the multidisciplinary work**
  - **Exchange of experience regarding all mentioned scientific and technical objective**
  - **Promote training and knowledge transfer opportunities for young scientists**

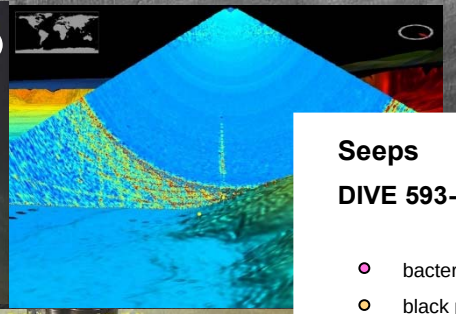
General information on MIGRATE:

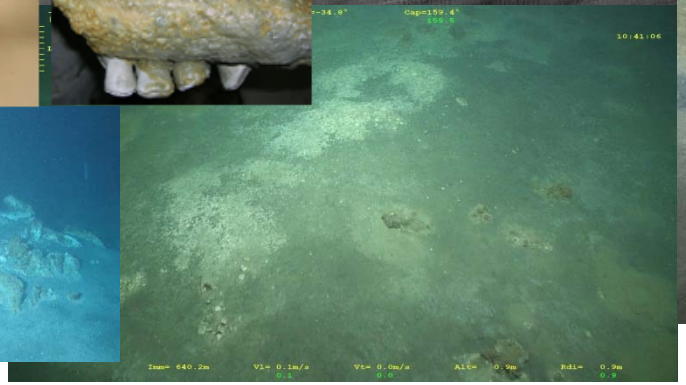
- **JRP: 15 member states for a total of around 140 scientists involved; Chairman: Klaus WALLMANN (Geomar)**
- **Four year project (runs until Mars 2019)**
- **Budget: 130 k€ devoted to networking (attending meetings and conférences, proposition of special sessions, workshop associated to WG meeting, etc.)**
- **One committee meeting/ year; 1-2 WG meetings/ year**

Dans l'attente de vous revoir au séminaire « Hydrates » à Brest fin mars

Merci,

Questions?





Seeps

DIVE 593-02

- bacterian mat
- black patch (focus)
- black patch (large)
- bubbles (low flux)
- bubbles (moderate flux)
- bubbles (strong flux)
- carbonate crust
- mussels
- oil drops
- oil seeping (discontinuous)