Gas hydrates have been studied as potential drivers of global climate change, and in relation to geohazard assessment or derived base flow. The main variables controlling the gas-hydrate stability zone (GHSZ) are gas composition, geothermal gradient, pressure (barometric), and salinity temperatures. Two regions (Antarctica and western European marginal areas) were selected for calculation of the theoretical base of the GHSZ based on free and publicly available data and as part of the international GAMH project database (Geological Analysis and Resource Assessment of Natural Hydrates). The results of calculations for both regions demonstrate the density and reliability of those free and public datasets and model fairly large, in areas where the surface temperature is well known, such as the Mediterranean sea and to the Gulf of Oman, the presence of geophysical properties such as bottom and sub-bottom bathymetry structures correlate well with the location of the theoretical base of the GHSZ. However, in other areas with a low density of structural and very fast bottom profiling (seismic), it has not been possible to produce a complete model of the geological gradient, and now it has been possible to assess the influence of bottom water currents in controlling near-bottom temperatures. In these cases, the uncertainty is higher, and it has not been possible to achieve a clear correlation between the base of GHSZ and the geological and geophysical features (Bottom Simulating Reflection, seafloor topography, seafloor or sub-bottom bathymetry).

Acknowledgement
GAMH project, GeoERA - Grant 171,002

Hydrographic Evidence and Indicators

Geophysical Indicators

Oceanographic variables

Theoretical depth in meters of the gas-hydrate stability zone (GHSZ) for pure methane in three areas (Antarctic and western European marginal areas) calculated applying the method of John et al. (2005) with the gathers of the available databases of gas hydrate stability (GHSZ) from both regions.
A pan-European GIS focused on gas hydrates: a research base-line in geohazards and geological storage of CO2

Ricardo León¹, Christopher Rochelle⁵, André Burnol³, Carmen Julia Giménez- Moreno¹, Tove Nielsen⁴, John Hopper⁴, Isabel Reguera¹, Pilar Mata¹, Margaret Stewart², Silvia Cervel¹.

¹ Geological survey of Spain (IGME). Rios Rosas 23, 28003 Madrid, Spain.
² British Geological Survey (BGS), The Lyell Centre, Research Avenue South, Edinburgh, EH14 4AP, UK.
³ Bureau de Recherches Géologiques et Minières (BRGM). Orléans, France.
⁴ Geological Survey of Denmark and Greenland (GEUS), Copenhagen, Denmark.
⁵ British Geological Survey (BGS), Environmental Science Centre, Nicker Hill, Keyworth, Nottingham, NG12 5GG, UK.

* corresponding author: r.leon@igme.es
A pan-European GIS focused on gas hydrates: a research base-line in geohazards and geological storage of CO2

GARAH project (GeoERA - GeoE.171.002)

WP-3
Hydrate assessment in the European continental margin and related risks

To develop a harmonized model for a pan-European gas hydrate data infrastructure. A GIS-database will be developed that includes key gas hydrate observations (both direct and indirect), relevant oceanographic variables (seafloor temperature, heat flow, bathymetry, sedimentation rates, etc.) and modelled hydrate stability thickness.

It will identify the critical knowledge gaps and provide information on areas of interest for future joint projects. It will also provide recommendations on how future data should be collected and stored to be fully interoperable. It will thus lay the groundwork for future projects related to improving models of the gas hydrate stability zone (GHSZ) along European margins. This is essential for assessments relating to geohazards and risks, assessments of the abundance of sediment-hosted gas hydrates, and evaluations of the role of CO2-rich hydrates for the geological storage of CO2.
A pan-European GIS focused on gas hydrates: a research base-line in geohazards and geological storage of CO2

Task 3A - Collection of data sources to be implemented in the hydrate related GIS-database

Task 3B - Definition of the data model structure and data loading.

Task 3C - Integration of results.
3A. Collection of data sources to be implemented in the hydrate related GIS-database

REPORT D3.1 of GARAH Project

835 information layers of information (10.75 Gb)

- data of pan-European scope coming from public and free databases such as EMODnet, PERGAMON or MIGRATE
- data of regional scope coming from scientific organizations
WP3 - Addressing knowledge gaps in the hydrate assessment in the European continental margins

**GARAHydrates – Data Model Structure**

**A. DVD CONTENTS**
- Geographic Information System Directory Structure
- GIS

**B. GEOLOGICAL & GEOCHEMICAL EVIDENCES-INDICATORS**
- GeoElement: Table

**C. OCEANOGRAPHIC VARIABLES & GEOLOGICAL CONSTRAINTS**
- Fluid Flow, Seafloor, Points, Features Points
- Sedimentary, Thickness, Raster

**D. FLUID FLOW SEAFLOOR INDICATORS**
- Fluid Flow, Seafloor, Points, Features Points

**GEOGRAPHIC INFORMATION SYSTEM DIRECTORY STRUCTURE**

**GIS**
- Flows
- Seafloor
- Points
- Features

**FLUID FLOW SEAFLOOR INDICATORS**
- Flows
- Seafloor
- Points
- Features

**OCEANOGRAPHIC VARIABLES & GEOLOGICAL CONSTRAINTS**
- Sedimentary
- Thickness

**FLUID FLOW SEAFLOOR INDICATORS**
- Flows
- Seafloor
- Points
- Features

**GEOLOGICAL & GEOCHEMICAL EVIDENCES-INDICATORS**
- GeoElement: Table

**GEOGRAPHIC INFORMATION SYSTEM DIRECTORY STRUCTURE**

**GIS**
- Flows
- Seafloor
- Points
- Features

**FLUID FLOW SEAFLOOR INDICATORS**
- Flows
- Seafloor
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- Features
TASK 3 B. Development of the Gas hydrate related-GIS
# Next steps

<table>
<thead>
<tr>
<th>Actions/Tasks/Deliverables</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data loading (task 3B)</td>
<td>June 2020</td>
</tr>
<tr>
<td>Deliverable D3.2: Hydrate related GIS-database</td>
<td>(M27)Sept. 2020</td>
</tr>
<tr>
<td>Task 3C. Integration of results</td>
<td>Dec. 2020</td>
</tr>
<tr>
<td>D3.3: Gas Hydrate overview report</td>
<td>(M33)March 2021</td>
</tr>
</tbody>
</table>
A pan-European GIS focused on gas hydrates: a research base-line in geohazards and geological storage of CO2

Thanks