

## EUROPEAN GAS HYDRATE DISTRIBUTION MAP



This map has been created as part of WG1 activities within the COST action MIGRATE– “Marine gas hydrate - an indigenous resource of natural gas for Europe”. The map was produced by compiling different datasets provided by MIGRATE WG1 members and from scientific papers. The current maps are incomplete and will be updated over the course of the action.

Thirteen maps are presented containing the following hydrate indicators: Direct Sampling, Bottom Simulating Reflector (BSR), Gas Seepage, Pore Water Anomaly, Gas Chimney, Velocity Anomaly, High Reflectivity Zone, High Resistivity, Conventional Petroleum Provinces and Seabed Features. The background colour shows the depth of the base of the gas hydrate stability zone (BGHSZ) below the seabed calculated using bathymetric data from GEBCO 2014 grid, steady-state thermal gradients from the Global Heat Flow Database, bottom water temperatures from World Ocean Database 2013, pore-water salinity of 3.5 wt%, and assuming pure methane gas forming hydrates. The steady-state thermal profile generated using the above data is compared with the theoretical methane hydrate phase boundary estimated using the CSMHYD program (Sloan and Koh, 2008). The pressure information calculated by the program for a given temperature is converted to depth using standard values for density of seawater and acceleration due to gravity ( $g$ ) under the assumption of hydrostatic pressure. If the temperature from the thermal profile is lower than that of the theoretical phase boundary at a particular depth, methane hydrates are deemed to be stable at that location.

The European gas hydrate distribution map is in scale 1:20,000,000 and also indicates the location of twelve sites for which specific maps have been created (Table 1): Barents Sea, Nyegga, South-West Greenland, Svalbard, Eastern Mediterranean, Black Sea, Western Black Sea, Eastern Black Sea, Southern Black Sea, Western Sea of Marmara, Gulf of Cadiz, and North-West Spain (Gran Burato).

These maps were created by Adi Neuman (University of Haifa), Héctor Marín Moreno and Tim A. Minshull, and with the collaboration of Sunil Vadakkepuliambatta, Jörg Bialas, Vitor Magalhaes, Tove Nielsen, Katrin Schwalenberg, Günay Çifçi, Daniel Rey, Elena Piñero, Nick O’Neill, María del Pilar Mata Campo, Christopher A. Rochelle, Michela Giustiniani, Atanas Vasilev, John Robert Hopper and Yizhaq Makovsky.

For further information about the action visit the web: <https://www.migrate-cost.eu>

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**Table 1:** Map Index

Map Index	Map Name	Map Scale
1	Barents Sea	1:7000000
2	Nyegga	1:4000000
3	South-West Greenland	1:8000000
4	Svalbard	1:10000000
5	Eastern Mediterranean	1:2500000
6	Black Sea	1:6000000
7	Western Black Sea	1:1500000
8	Eastern Black Sea	1:1500000
9	Southern Black Sea	1:2700000
10	Western Sea of Marmara	1:500000
11	Gulf of Cadiz	1:2500000
12	North-West Spain, Gran Burato	1:1500000

## References

Sloan E. D. & Koh C. 2008, *Clathrate hydrates of natural gases*. 3rd ed., CRC press, Boca Raton, FL.

## Webpages

[http://www.gebco.net/data\\_and\\_products/gridded\\_bathymetry\\_data/gebco\\_30\\_second\\_grid/](http://www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_30_second_grid/)

<http://www.heatflow.und.edu/index2.html>

<https://www.nodc.noaa.gov/OC5/WOD13/>