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SEAGAS: A Brazilian-European project to compare gas hydrate systems on the Atlantic and Mediterranean ocean margins

Daniel Praeg^{1,2}, João Marcelo Ketzer¹, Sébastien Migeon², Tadeu dos Reis³, Cleverson Silva⁴, Vikram Unnithan⁵







Global

Fellowships

GFs: 12-24 months for the outgoing phase plus

12 month return phase in Europe







¹Instituto do Petróleo e dos Recursos Naturais do PUCRS, Porto Alegre, RS, BRASIL ²Géoazur (UMR7329 CNRS), Valbonne, Cote D'Azur, FRANCE ³Universidade do Estado do Rio de Janeiro, Faculdade de Oceanografia, Brazil ⁴Universidade Federal Fluminense, Department of Geology, Niterói – RJ, Brazil ⁵Jacobs University Bremen, GERMANY





Marie Skłodowska-Curie Actions (MSCA)

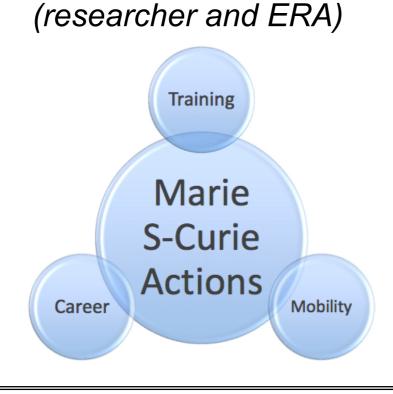


Global Fellowships international collaboration (outgoing & return hosts)

• skills training & exchange (researcher and hosts)

career development

research benefit to





MSCA-GF-SEAGAS Objectives



Research Objective

1st comparison of gas hydrate dynamics on ocean margins that undergo different forms of climate forcing: open Atlantic margin of Brazil and semi-enclosed Mediterranean Sea

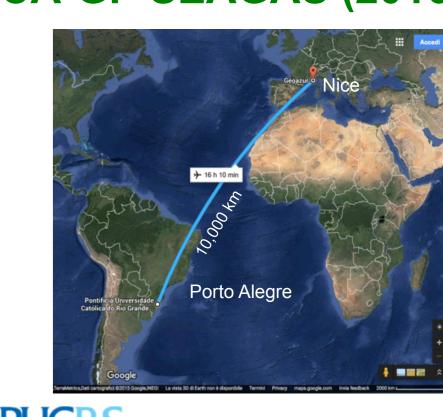
> Training Objective

To diversity the competencies of the researcher and the two hosts, through joint research activities adressing shared research interests

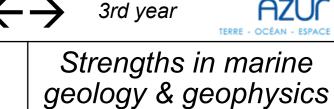
Strategic Objective

To stimulate the development of future projects involving Brazilian and European scientists in mutually beneficial research activities

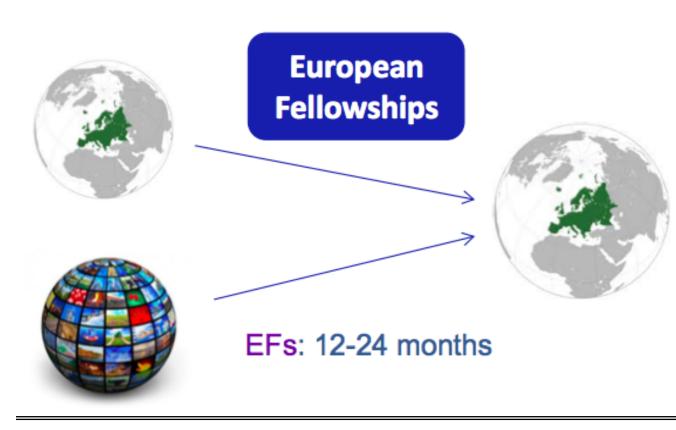
MSCA-GF-SEAGAS (2016-2019)



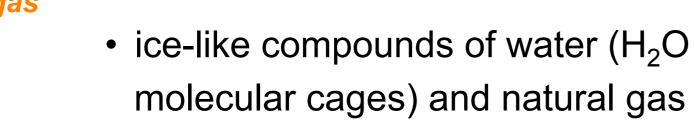




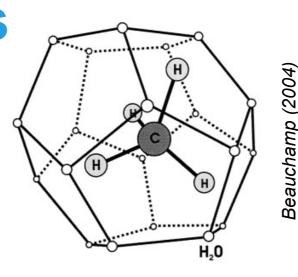
geochemistry Shared interests in building capacity in gas hydrate research



Gas Hydrate – Ice that Burns



(CH₄), a powerful greenhouse gas



1 m³ solid yields up to $160 \text{ m}^3 \text{ of gas}$

on conservative

estimates, form

the largest

natural reserve

of carbon on

Earth

gas concentrators - mainly methane

water

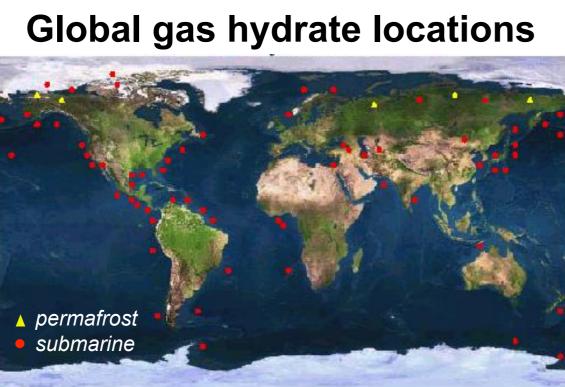
Formation dependent on :

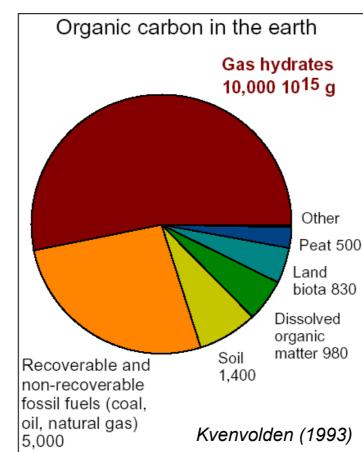
- pressure (higher)
- temperature (lower)
- a source of gas

Found in:

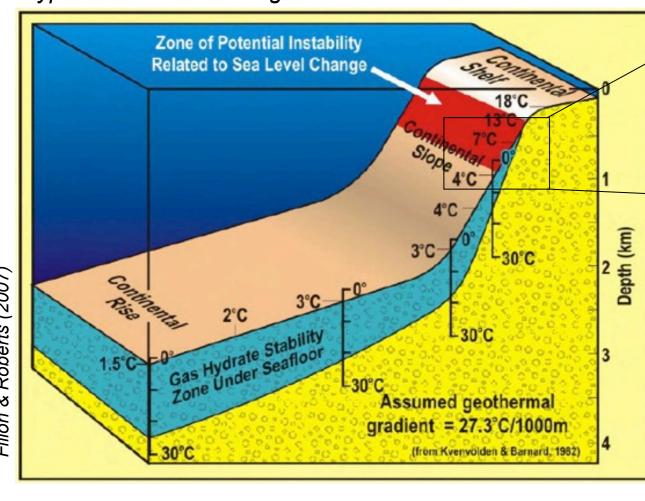
- areas of permafrost
- water depths >300 m
- mainly on continental margins (natural sources of gas)

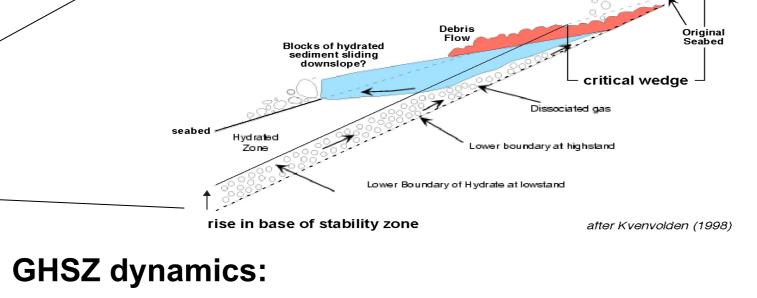
Land (cold) Seas (deep) Depth of Permafrost Gas Hydrate -20 -10 0 10 20 30





Submarine gas hydrate stability zone (GHSZ) Typical continental margin :

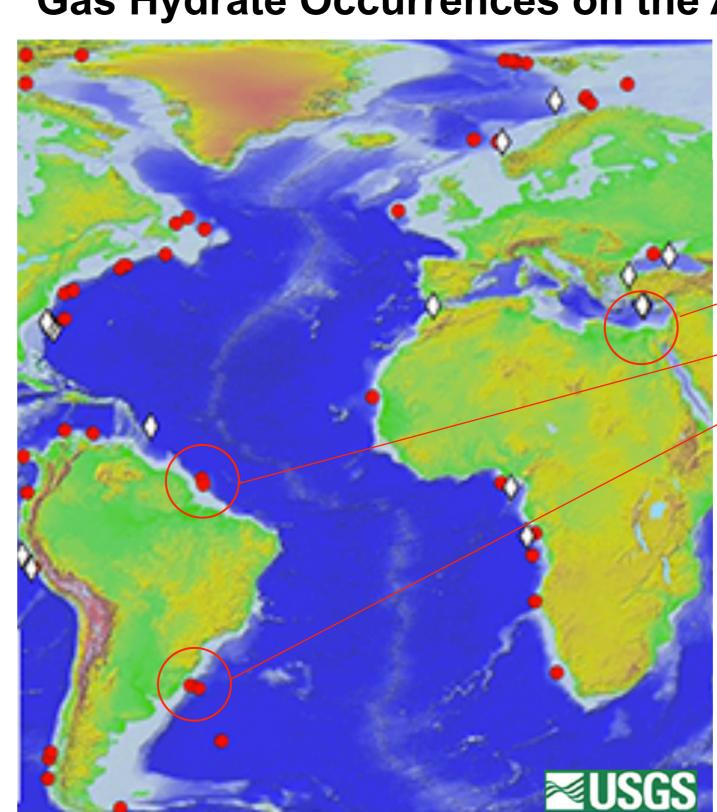




- thickens/thins over time, with changes in sea level (pressure) and water temperature
- release of gas and water may trigger submarine landslides (and more gas release)

SEAGAS Study Areas and Project Structure

Gas Hydrate Occurrences on the Atlantic-Mediterranean margins



Source: USGS Gas Hydrates Project

Expected

changes in gas

hydrate stability

for a post-

glacial rise in

both sea level

and bottom

water

temperatures

Gas hydrate sampled Gas hydrate inferred (seismic)

Nile fan Amazon fan Rio Grande cone -

SEAGAS study areas

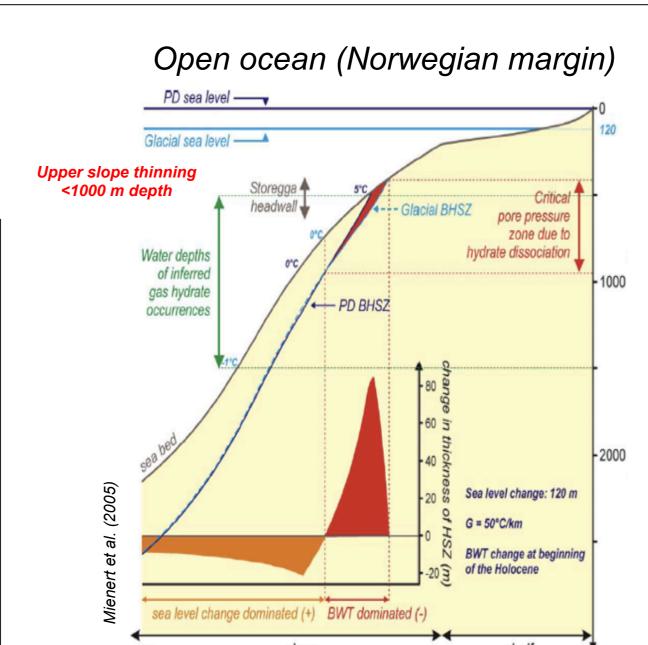
enclosed sea open Atlantic

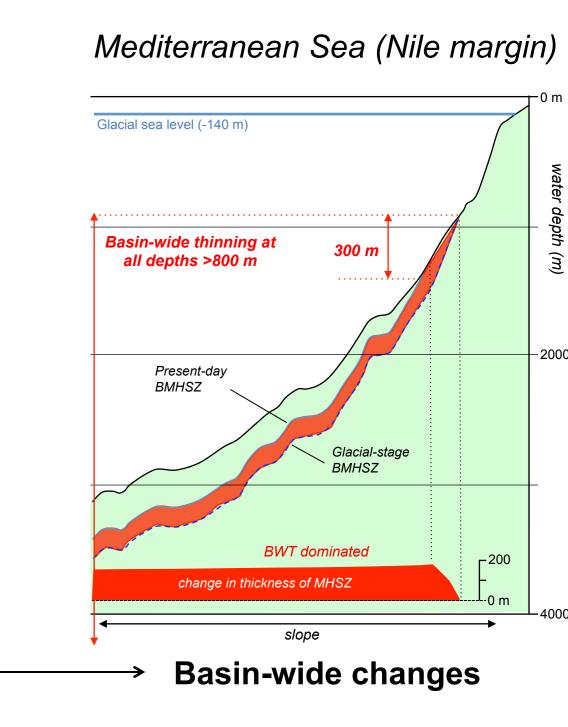


Project structure

- Numerical modelling of gas hydrate stability to guide interrogations of datasets held by hosts on the Brazilian and Nile margins
- generate hypotheses to test through the acquisition of new data, during a joint research campaign to the Nile or Amazon deep-sea fans

SEAGAS conceptual framework: first comparison of gas hydrate systems on margins that have undergone different forms of glacial-interglacial (10⁴ yr) climate forcing





Changes on upper slope

Proposals submitted to French national ship-time programme

SEAGAS proposed French-Brazilian campaigns

Aim: to test hypotheses on gas hydrate dynamics through the joint acquisition of multi-

disciplinary data (geological/geochemical/geothermal/geotechnical/geophysical)

MSCA

Opportunities for Researchers



Where to find more information

- Website MSCA: http://ec.europa.eu/msca
- H2020 Participants Portal: http://ec.europa.eu/research/participants/portal
- Euraxess Links Brazil: https://euraxess.ec.europa.eu/worldwide/brazil



CONFAP/FAPs: "Guidelines for the preparation of research proposals in collaboration with proposals submitted to EU Horizon 2020 (http://www.fapesp.br/9775)

HORIZONTE 2020 Aberto para o

Nile fan - SEAGAL

Submitted 09/2016 by S. Migeon (, ranked top priority, decision on vessel scheduling expected 2018-2019

Amazon fan – AMARYLLIS

Submitted 09./2016 by A. Govein (CNRS), ranked second priority; resubmitted 09/2017 (for 2019-2020)



Scientific drilling proposal in preparation - IODP

• Amazon fan - submission led by UFF planned for 2018, campaign possible in 2019-2020



Acknowledgement

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References Beauchamp B (2004) Natural gas hydrates: myths, facts and issues. Comptes Rendus Geoscience 336 (9): 751-765.

Marie Skłodowska-Curie actions

successful research career

A pocket guide:

Your passport to a

Fillon RH and Roberts HH (2007) AAPG Search and Discovery Article #30051 Kvenvolden KA (1993) Gas hydrates—Geological perspective and global change. Reviews of Geophysics 31: 173–187. Kvenvolden KA (1998) Methane hydrate – a major reservoir of carbon in the shallow geosphere? Chemical Geology 71: 41-51. Mienert J, Vanneste M, Bünz S, Andreassen K, Haflidason H, Sejrup H-P (2005) Ocean warming and gas hydrate stability on the mid-Norwegian margin at the Storegga Slide. Marine and Petroleum Geology 22: 233–244.