

....HYPOX partner institutions

Partner 7:

INGV (Roma, Italy)



....HYPOX partner institutions: INGV



Istituto Nazionale di
Geofisica e Vulcanologia www.ingv.it



THE INSTITUTE

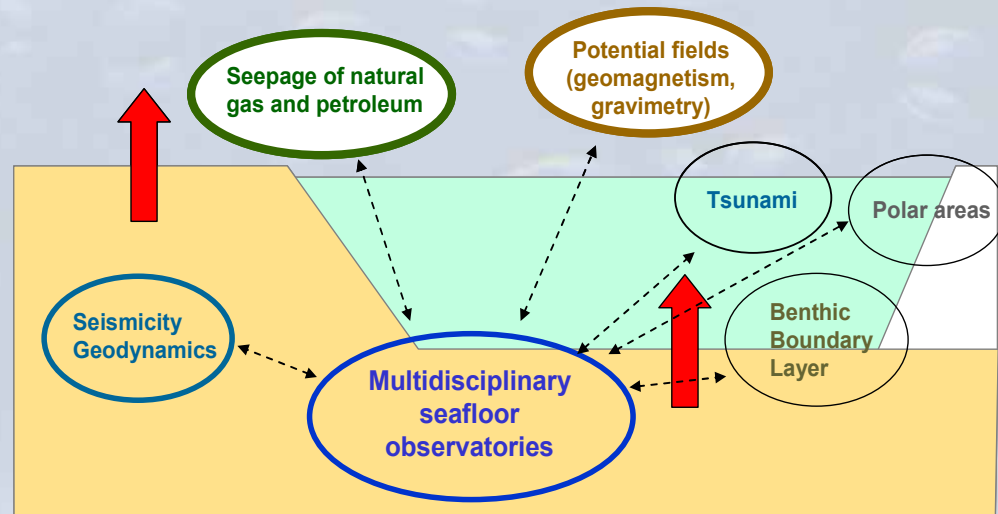
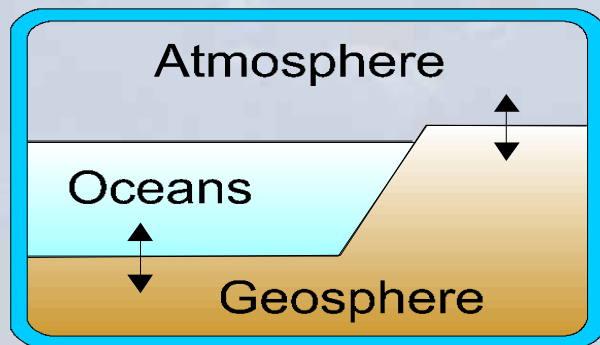
Currently the largest European body dealing with research in geophysics and volcanology, and environmental implications

research, monitoring (*technology*), surveillance (*seismicity, volcanoes*)

Headquarter in Rome; main facilities in Milano, Bologna, Pisa, Napoli, Catania, Palermo.

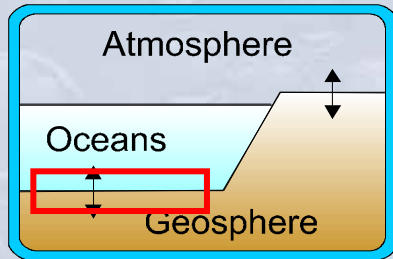


RIDGE Research Unit Geophysical-environmental processes at the geosphere-ocean-atmosphere interface

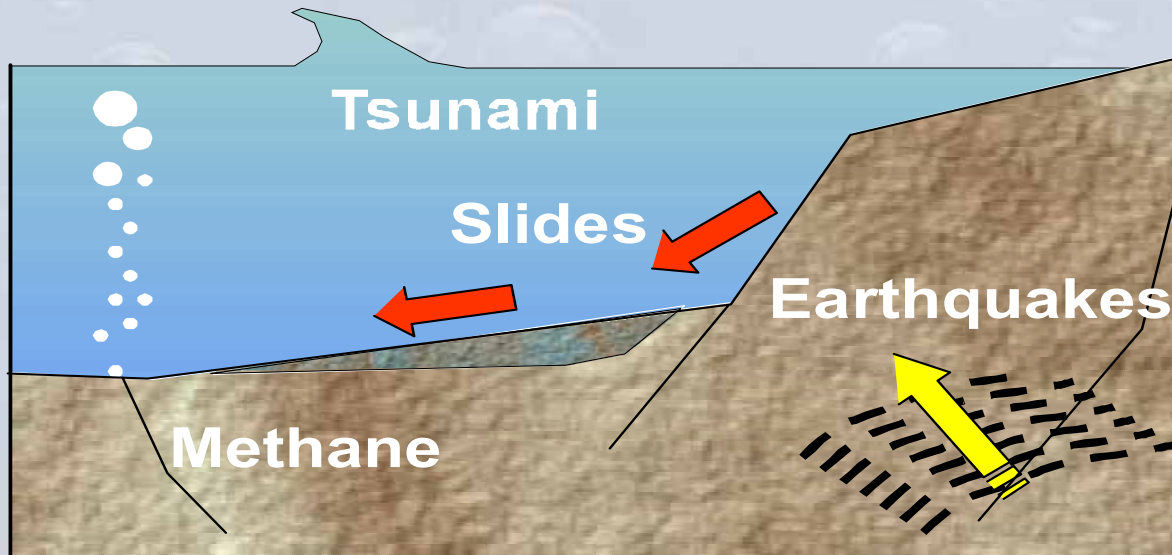


....HYPOX partner institutions: INGV

Submarine monitoring of geophysical and environmental processes

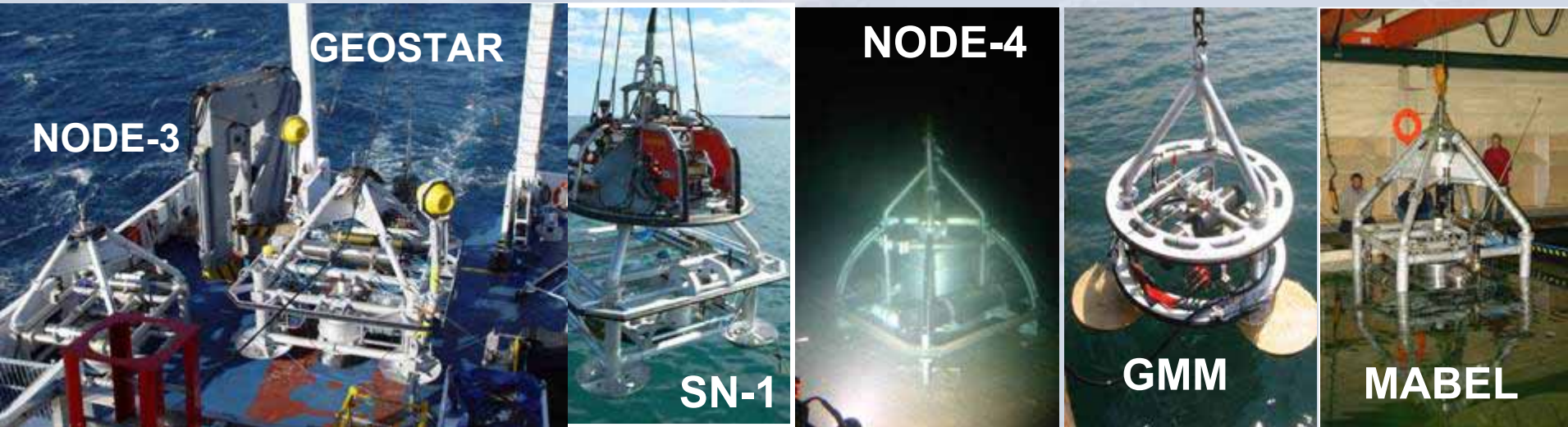


**Simultaneous monitoring of different parameters
(cause-effect links, interactions between different
systems)**



....HYPOX partner institutions: INGV

Endowment of a fleet of 6 Stations (GEOSTAR-class)



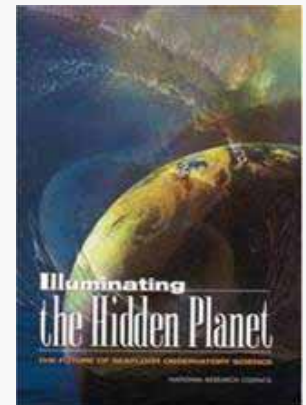
Compliant with the SEAFLOOR OBSERVATORY requirements and definition by US NSF (*Illuminating the Hidden Planet: The Future of Seafloor Observatory Science, 2000*)

MULTIDISCIPLINARITY (MULTIPARAMETRIC)

SAME TIME-REFERENCE FOR ALL SENSORS

AUTONOMOUS DATA QUALITY CHECKS

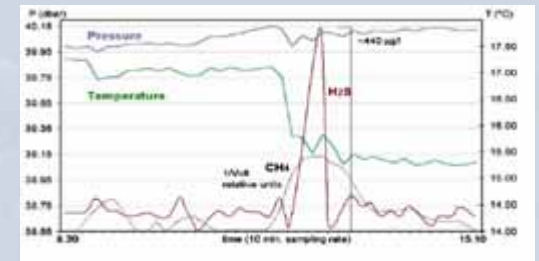
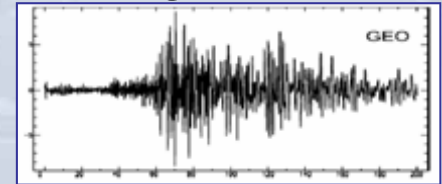
DATA COMMUNICATION



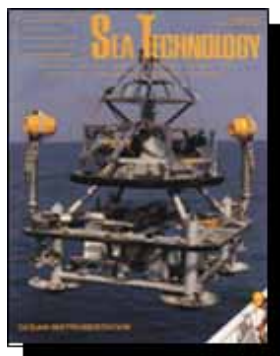
Monitoring at sea:

Scientific and technological activity

- **Geophysical studies**
(seismic analysis, geomagnetism, gravimetry)
- **Environmental studies**
(marine geochemistry, physical oceanography)
- **Test of sensors**
(commercial, prototypes...)
- **Development of innovative sensors**
(radioactivity, magnetometer)
and modules/observatories



GEOSTAR-class SEAFLOOR OBSERVATORIES Main publications



GEOPHYSICAL RESEARCH LETTERS, VOL. 32, L07303, doi:10.1029/2004GL021975, 2005

High quality seismological recordings from the SN-1 deep seafloor observatory in the Mt. Etna region

Stephen Monna, Francesco Frugoni, Caterina Montuori, Laura Beranzoli, and Paolo Favali¹

Earth Planets Space, **55**, 361–373, 2003

Mission results from the first GEOSTAR observatory (Adriatic Sea, 1998)

Laura Beranzoli¹, Thomas Braun¹, Massimo Calcarà¹, Paolo Casale¹, Angelo De Santis^{1,4}, Giuseppe D'Anna¹,
Domenico Di Mauro¹, Giuseppe Etiope¹, Paolo Favali^{1,4}, Jean-Luc Fuda², Francesco Frugoni¹,
Fabiano Gamben¹, Michael Maram¹, Claude Millot², Caterina Montuori¹,
and Giuseppe Smriglio^{1,1*}

Eos, Transactions, American Geophysical Union, Vol. 81, No. 5, February 1, 2000

European Seafloor Observatory Offers New Possibilities for Deep-Sea Study

Geo-Mar Lett

DOI 10.1007/s00367-006-0040- © Springer-Verlag 2006

Monitoring of a methane-seeping pockmark by cabled benthic observatory (Patras Gulf, Greece)

Giuditta Marinaro • Giuseppe Etiope • Nadia Lo Bue •
Paolo Favali • George Papatheodorou •
Dimitris Christodoulou • Flavio Furlan •
Francesco Gasparoni • George Ferentinos •
Michel Masson • Jean-François Rolin



2009 Contents lists available at ScienceDirect

Nuclear Instruments and Methods in Physics Research A

journal homepage: www.elsevier.com/locate/nima

EMSO: European multidisciplinary seafloor observatory

Paolo Favali^{a,b,*}, Laura Beranzoli^a



Physics of the Earth and Planetary Interiors 108 (1998) 175–183

PHYSICS
OF THE EARTH
AND PLANETARY
INTERIORS

GEOSTAR: a GEophysical and Oceanographic Station for Abyssal Research

L. Beranzoli^{a,*}, A. De Santis^a, G. Etiope^a, P. Favali^a, F. Frugoni^a, G. Smriglio^a,
F. Gasparoni^b, A. Marigo^b

GEOPHYSICAL RESEARCH LETTERS, VOL. 29, NO. 19, 1898, doi:10.1029/2001GL014072, 2002

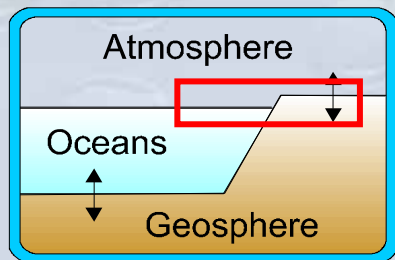
Warming, salting and origin of the Tyrrhenian Deep Water

J.-L. Fuda,¹ G. Etiope,² C. Millot,¹ P. Favali,² M. Calcarà,² G. Smriglio,² and E. Boschi²

Environmental Geology (2004) **46:1053–1058**

GMM—a gas monitoring module for long-term detection of methane leakage from the seafloor

G. Marinaro • G. Etiope • F. Gasparoni • D. Calore • S. Cenedese • F. Furlan
M. Masson • F. Favali • J. Blandin

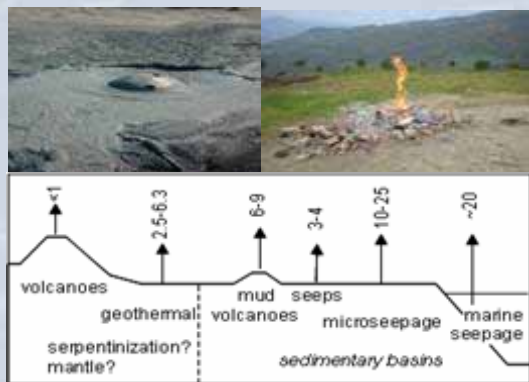


Origin, migration and emission of hydrocarbons

GAS SEEPAGE

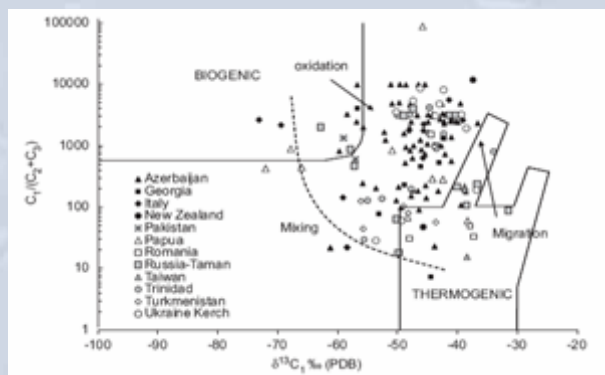
Environment

Greenhouse-gas emission
Environmental hazards



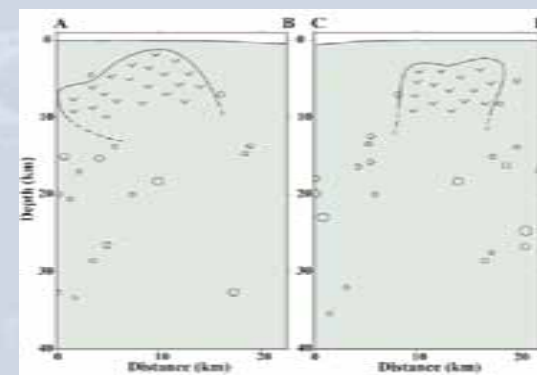
Petroleum exploration

Gas origin,
reservoir detection



Tectonics - geophysics

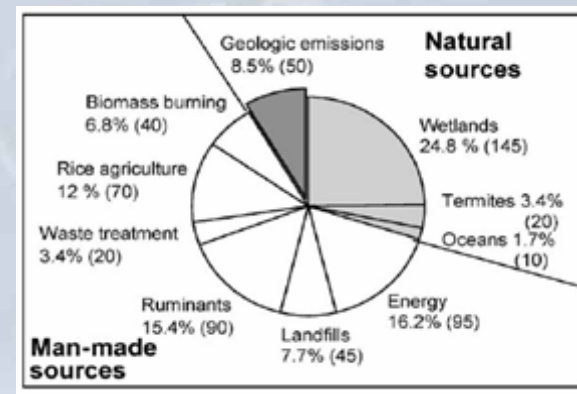
Saline tectonics
gas and seismicity



Main results:

- **Geo-emissions are the 2nd natural source of CH₄**

- Global and European emission estimates acknowledged by IPCC (4^o AR), US-EPA and EEA (EMEP/CORINAIR)



Chemosphere 49 (2002) 777–789

CHEMOSPHERE

Geologic emissions of methane to the atmosphere

Giuseppe Etiope ^{a,*}, Ronald W. Klusman ^b

Geology; June 2004; v. 32; no. 6; p. 465–468;

Methane emission from mud volcanoes in eastern Azerbaijan

G. Etiope Istituto Nazionale di Geofisica e Vulcanologia, Section of Roma 2, via Vigna Murata 605, Rome, Italy
A. Feyzullayev Geology Institute of Azerbaijan, National Academy of Sciences, H. Cavid pr. 29A, Baku, 370143, Azerbaijan
C.L. Baciu Babes-Bolyai University, Department of Geology, M. Kogalniceanu Strasse 1, Cluj-Napoca, Romania
A.V. Milkov BP America, Exploration and Production Technology, Houston, Texas 77079, USA

GEOPHYSICAL RESEARCH LETTERS, VOL. 35, L09307, doi:10.1029/2008GL033623, 2008



Reappraisal of the fossil methane budget and related emission from geologic sources

Giuseppe Etiope,¹ Keith R. Lassey,² Ronald W. Klusman,³ and Enzo Boschi¹



Atmospheric Environment 38 (2004) 3099–3100

ATMOSPHERIC ENVIRONMENT

www.elsevier.com/locate/atmosenv

New Directions: GEM—Geologic Emissions of Methane, the missing source in the atmospheric methane budget [☆]



Available online at www.sciencedirect.com

ScienceDirect

Global and Planetary Change 63 (2008) 76–88

GLOBAL AND PLANETARY CHANGE

www.elsevier.com/locate/gloplacha

Did geologic emissions of methane play any role in Quaternary climate change?

Giuseppe Etiope^{a,*}, Alexei V. Milkov^b, Edward Derbyshire^c



Contents lists available at ScienceDirect

Marine and Petroleum Geology

journal homepage: www.elsevier.com/locate/marpetgeo

Terrestrial methane seeps and mud volcanoes: A global perspective of gas origin

Giuseppe Etiope^{a,*}, Akper Feyzullayev^b, Calin L. Baciu^c

Environmental Geology (2004) 46:997–1002

A new estimate of global methane flux from onshore and shallow submarine mud volcanoes to the atmosphere

Giuseppe Etiope · Alexei V. Milkov



Available online at www.sciencedirect.com



ScienceDirect

Atmospheric Environment 43 (2009) 1430–1443

ATMOSPHERIC ENVIRONMENT

www.elsevier.com/locate/atmosenv

Natural emissions of methane from geological seepage in Europe

Giuseppe Etiope^{*}



Available online at www.sciencedirect.com



ScienceDirect

Journal of Volcanology and Geothermal Research 165 (2007) 76–86

Journal of Volcanology and Geothermal Research

www.elsevier.com/locate/jvolgeores

Natural emissions of methane from geothermal and volcanic sources in Europe

G. Etiope^{a,*}, T. Fridriksson^b, F. Italiano^c, W. Winiwarter^d, J. Theloke^e

23 JANUARY 2009 VOL 323 SCIENCE www.sciencemag.org

Earth's Degassing: A Missing Ethane and Propane Source

Giuseppe Etiope^{1*} and Paolo Ciccioli²

HYPOX objectives

“ In summary, HYPOX will develop a research platform for understanding past, present and future impacts of natural variation, global change and land use on **oxygen depletion**. HYPOX will gather long-term data on the oxygen status of aquatic ecosystems, and on feedbacks to the System Earth. HYPOX observatories will consist of continuous sensor systems and accompanying field studies and experiments in a wide range of European aquatic ecosystems.”

We will investigate critical parameters for the prediction of trends in oxygen depletion in surface and deeper waters including

- input of oxygen by mixing with oxygen-rich water masses
- oxygen production by photosynthesis
- oxygen consumption by respiration of organic matter
- **oxygen consumption by chemical and biological oxidation of reduced substances** → **Gas (CH₄) seepage**
- oxygen degassing by warming
- intrusion of oxygen depleted waters

INGV role

Seepage-related hypoxia

a) oxygen consumption by CH₄ oxidation

b) up-welling (driven by density changes) of deep oxygen-poor water into the photic zone and surface layer

What I need and how I can get it
(scientific requirements and technical spec)

Causes and effects
(practical implications)

Data for end-users

Field studies
(Black Sea)

Field studies
(Greece)



WP No	Work package title	Type of activity*	Lead partner no	Lead partner short name	Person - months	Start month	End month
WP 1	Improving and integrating in situ observation capacities of oxygen depletion	RTD	7	INGV	62	1	36
WP 2	Modeling and prediction of short and long term factors affecting oxygen depletion in different systems	RTD	16	KNAW	108	1	36
WP 3	Existing and future impacts of hypoxia on ecosystems	RTD	2	AWI INGV	88	1	36
WP 4	Indicators of past hypoxia dynamics: improving long term records by abiotic and biotic proxies	RTD	4, 9	IBSS / ITU	100.5	1	36
WP 5	Knowledge base on oxygen depletion: Data sharing, standardization and interoperability according to GEOSS	RTD	10	Uni-HB INGV	62.5	1	36
WP 6	Assessing in situ oxygen depletion in shelf and open seas	RTD	6	IFREMER INGV	172.5	1	36
WP 7	Assessing in situ oxygen depletion in land locked water bodies	RTD	11	SAMS INGV	146	1	36
WP 8	Coordination, dissemination and outreach	RTD	1	MPG-MPIMM	81.5	1	36
		TOTAL			821		

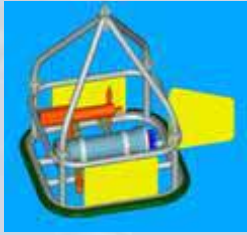
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Instrumentation

For spatial surveys

MEDUSA

Module for Environmental
Deep-Under-Sea Analysis



For long-term monitoring

GMM GAS MONITORING MODULE

