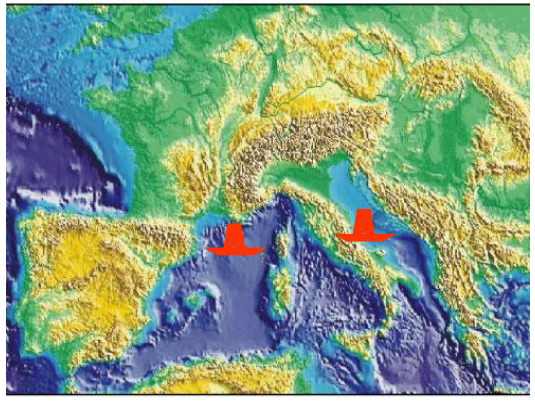
PROMESS1- Final Report

PROMESS 1 Support for Research Infrastructures

PROMESS 1
PROfiles across Mediterranean Sedimentary Systems. Part 1.

FINAL REPORT
Sections 1 to 6

Contract n° : EVR1-CT-2002-40024
Duration : December 1st, 2002 – May 31st, 2006



http://www.pangaea.de/Projects/PROMESS1/

PROMESS Drilling

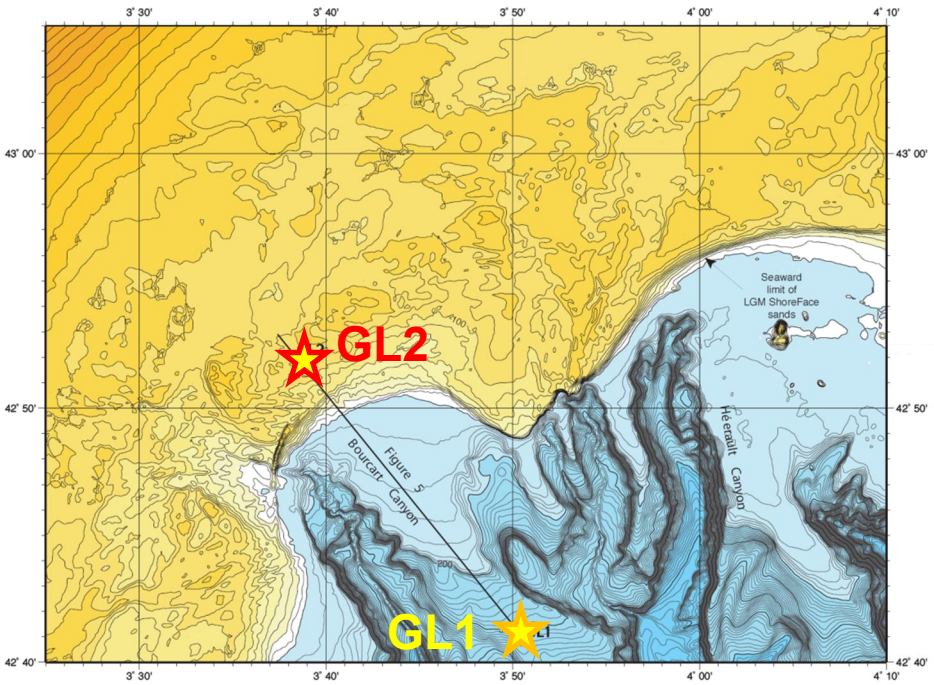
Alessandra Asioli[1], Claudio Pellegrini[1], Fabio Trincardi[2]

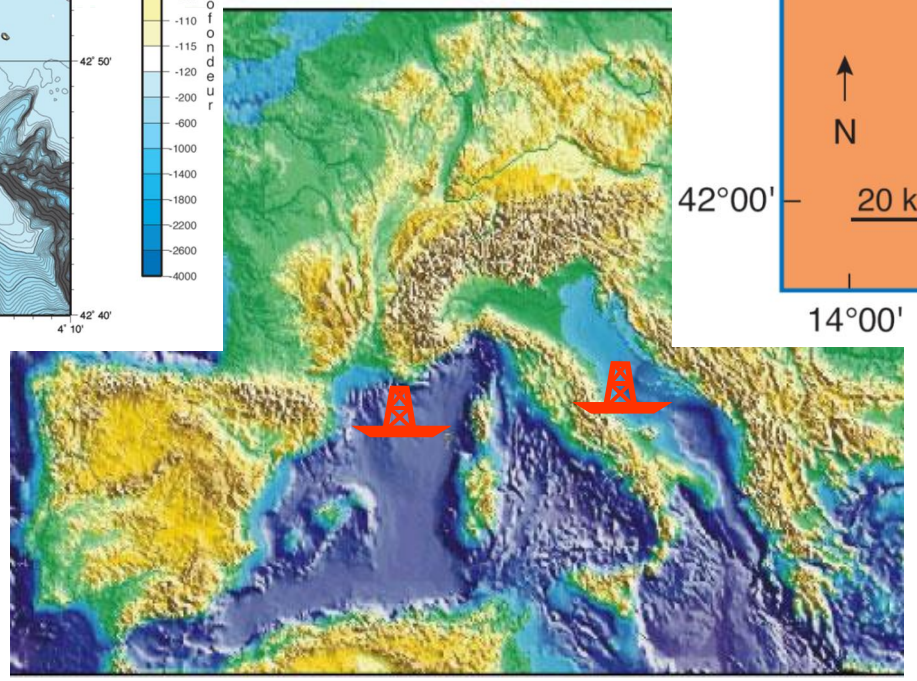
1 ISMAR-CNR, Bologna, 2 DSSTTA-CNR, Roma

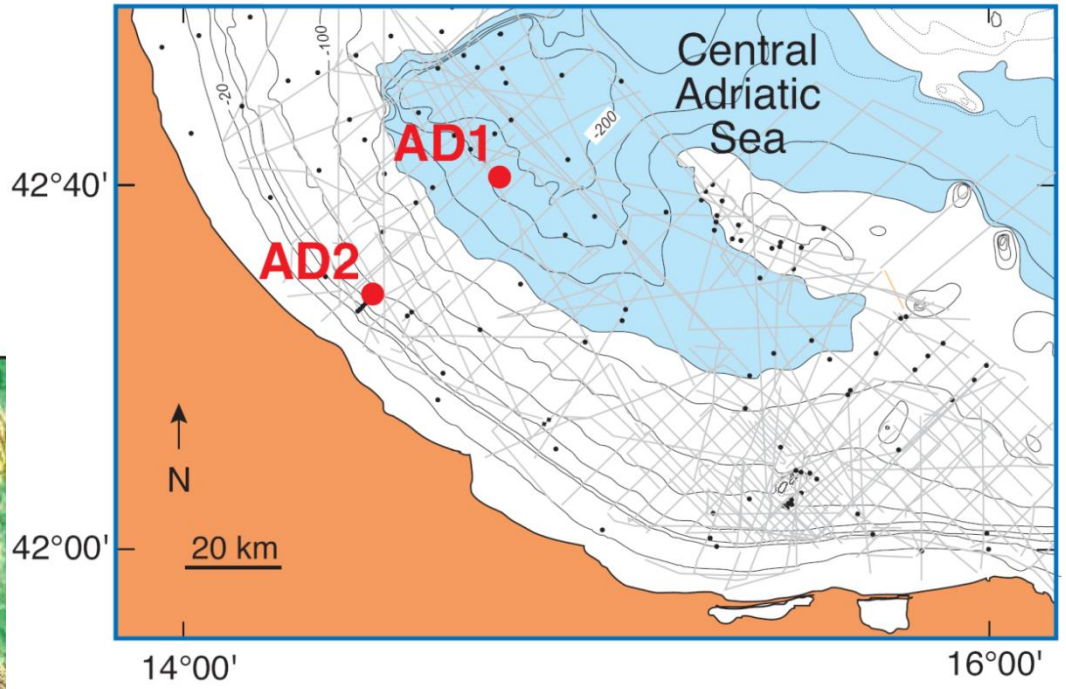
The EC funded project PROMESS 1 (PROfiles across MEditerranean Sedimentary Systems- Part 1) was part of a large Europe-US research programme of studies of deltaic margins “from source to sink” that also included “EURODELTA” and “EUROSTRATAFORM”, funded by the European Community in Europe and by the Office of Naval Research in the USA.

The general objective of PROMESS was to obtain comprehensive transects across two Deltaic Margins in the NW Mediterranean Sea (the Rhone and Catalan-Languedocian river system) and in the Adriatic (the Po and Apennine river system).

G/V Bavenit, cruise PROMESS 1, July 2004





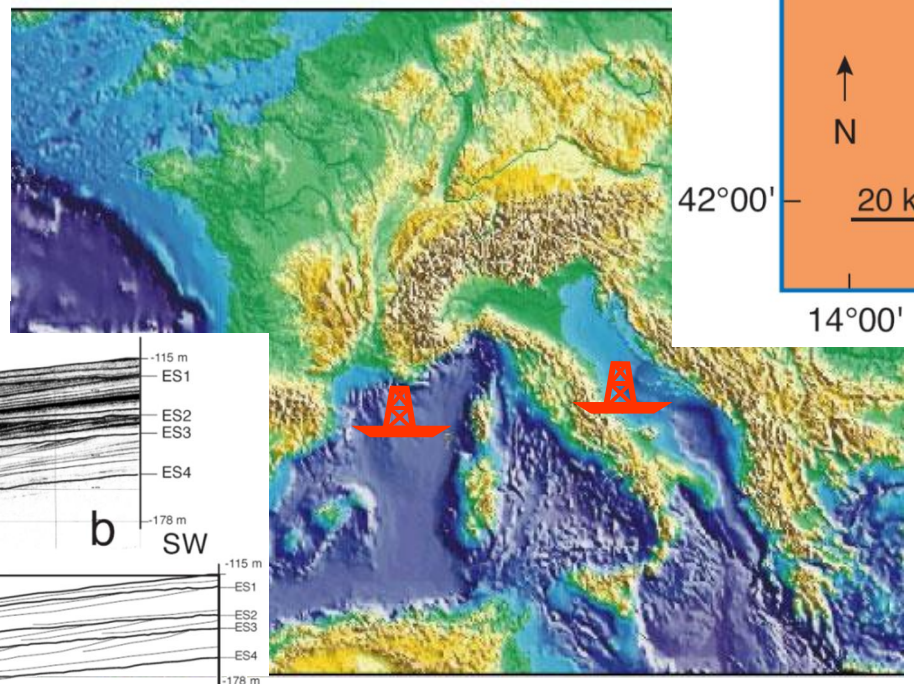


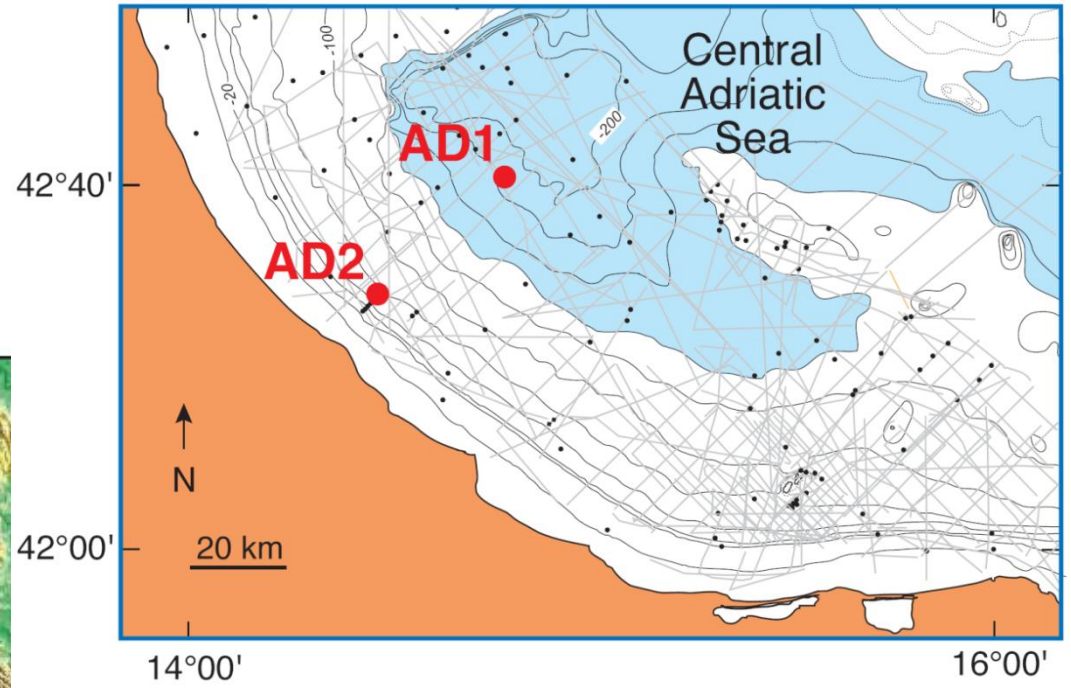
GL2 site: to characterize the very diverse seismic facies in terms of paleoenvironments, paleo-water depths and sedimentary processes. GL2 was successively emerged and submerged.

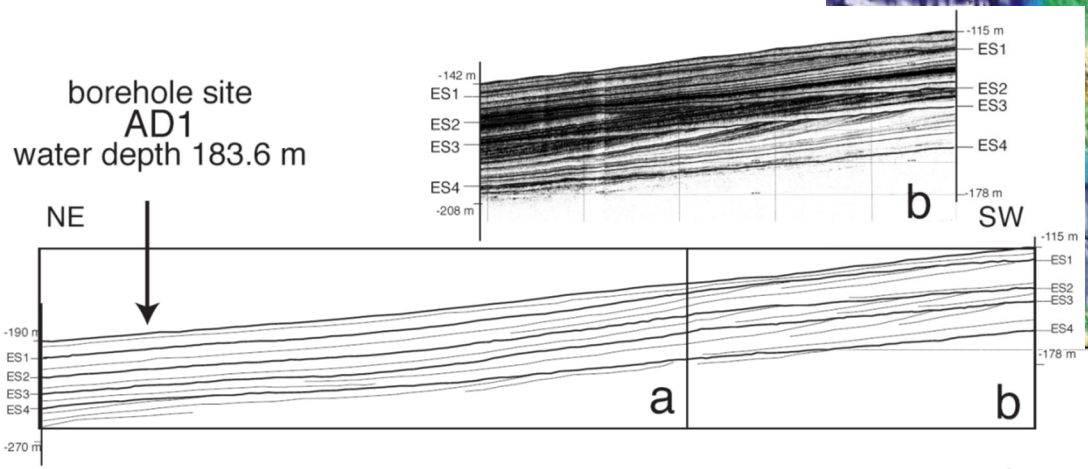
1. The two areas have a sufficiently broad continental shelf to permit an interpretation of seismic units and discontinuities in terms of relative sea-level changes, accommodation space and sediment supply (application of a sequence stratigraphic approach, as employed by the oil industry for exploration)
2. The combination of high sediment yield (Alps and the Apennines) and fairly high subsidence rate (250 m/Myr during the Quaternary along the shelf edge in the Gulf of Lions), together with low (Adriatic) to medium (Gulf of Lions) wave regime allowed exceptional preservation of expanded depositional sequences during the last 500 kyr

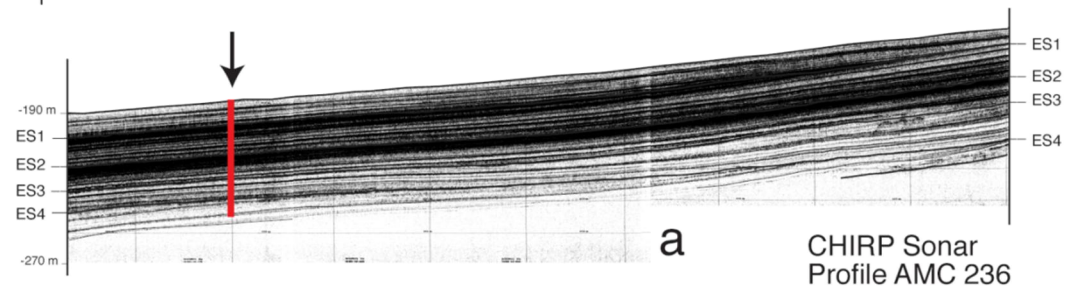
Goals of PRAD1 site (ca. 184m w.d.):

1) to obtain a continuous record of sedimentary processes and global changes during the last glacial cycles, for sequence stratigraphy, paleoceanography and paleoclimate reconstructions
2) to penetrate the deposits formed during the LGM from the Po lowstand delta

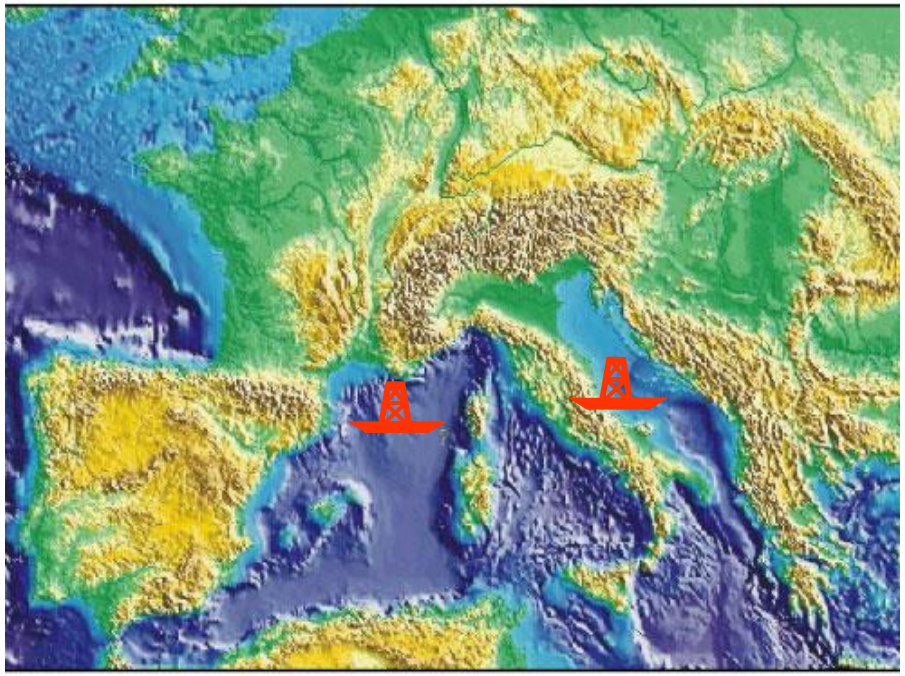






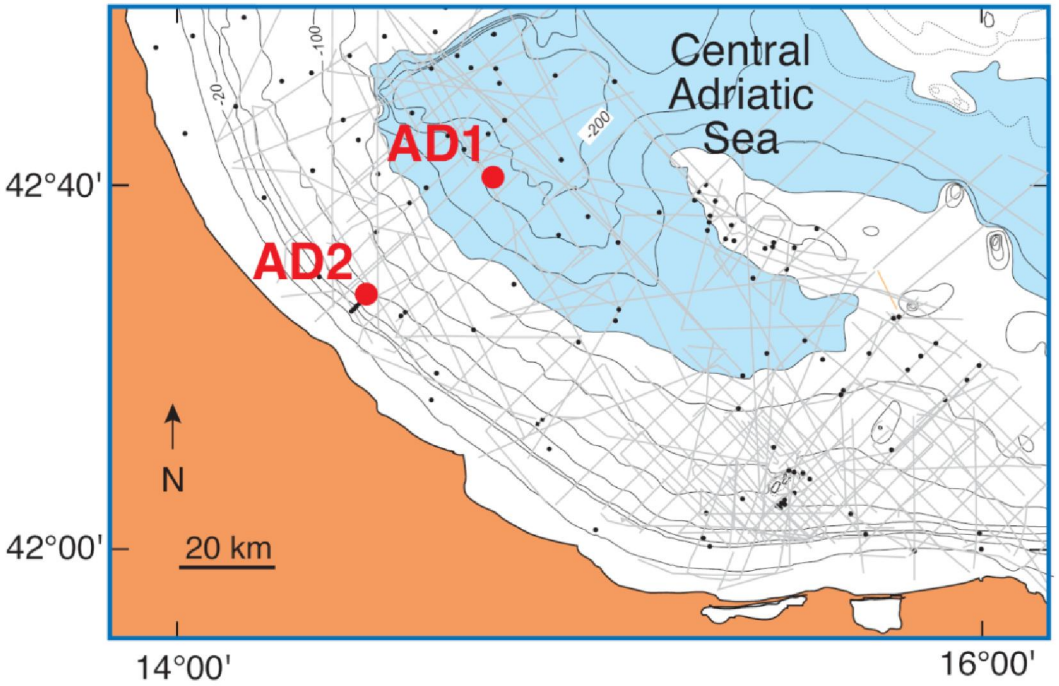


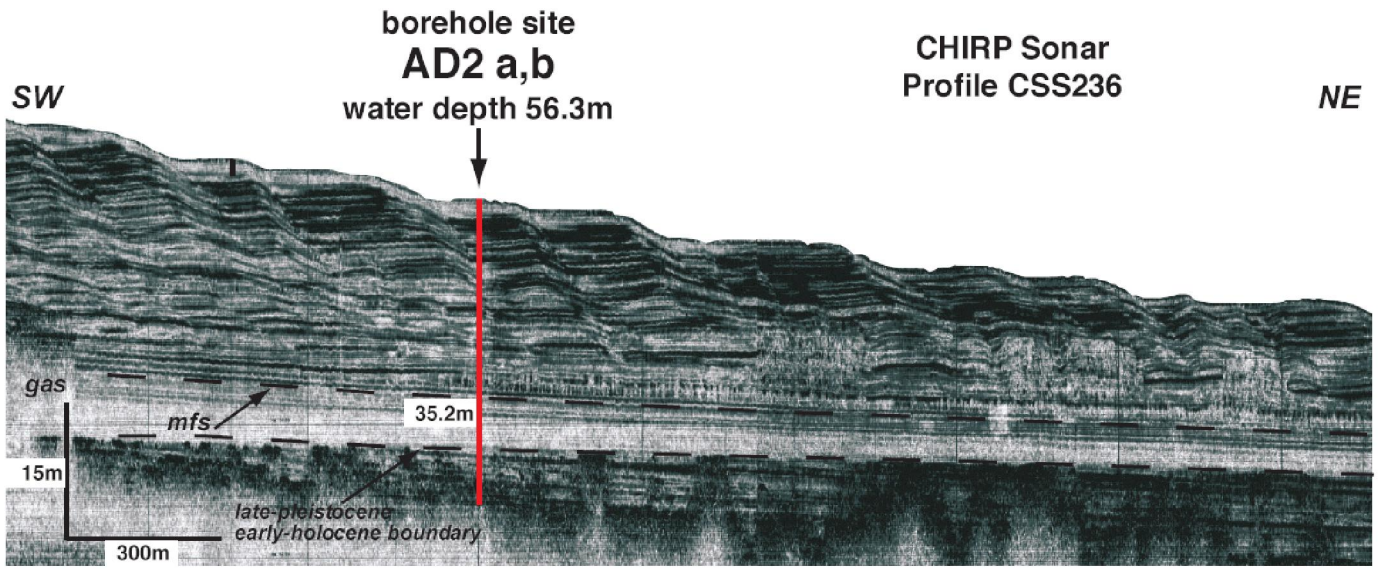
CHIRP Sonar
Profile AMC 236



Goals of PRAD2 site (ca. 56m w.d.):

1) to drill the late Holocene mud wedge in the area of its maximum thickness, where it shows seafloor and subsurface undulations rooted on the mfs and interpreted as sediment deformation features and/or bedforms.
2) to reach the sedimentary record of the last relative sea level rise through a surface that marks a change in seismic-reflection geometry from a progrational unit (B/A–YD age) to the overlying early Holocene





PROMESS1 project received before the submission several supporting letters by Oil Companies……

bp

Dr. David G Roberts
Global Exploration Advisor

BP Exploration
Building C
Chertsey Road
Sunbury on Thames
Middlesex
TW16 7LL
United Kingdom

Dr Serge Berne
IFREMER DRO/GM
BP 70
29280 PLOUZANE
France

1932 760545
1932 760000
932 760434
.com

Dear Serge

PROMESS DRILLING PROPOSAL

I welcomed the opportunity to read the PROMESS proposal for scientific drilling on the Rhone and Po deltas in both shallow and deep water.

I think this is an original and innovative proposal that embodies integration across a number of geoscience disciplines and drilling technologies and platforms. This type of high resolution stratigraphic study based on both seismic and drilling allows interrogation of the eustatic and climatic forcing of Quaternary sequence stratigraphy over the last 500kyr in a way that the role of glacio-eustatic effects can be isolated thus allowing proper assessment of eustatic vs. tectonic events. Added to this, study of the proximal parts of the deltaic system will allow linkage to coeval sequences deposited on the adjacent deep sea fan. The analysis of the source to sink programme has great value in understanding sediment transport into deepwater areas and as such may have wider application to deep water hydrocarbon exploration. I particularly like the way the proposal has been built on previous seismic and coring studies that provide the context to formulate both hypothesis and methodology in this excellent proposal.

I wish you every success.

Yours sincerely

David G Roberts (Prof)
Distinguished Advisor

5th Framework Programme October 2001 PROMESS 1
Proposal for EESD-Support for Research Infrastructures

TOTAL FINA ELF

Exploration & Production

DGEP/SCR/RD/DEL

IFREMER
DRO/GM
BP 70
29280 PLOUZANE

Attention of Serge BERNE

Réf. : 01-20
Objet : Interest of TFE in the Promess Project Proposal

Pau, 2 October 2001

Dear Sir,

The project is in line with geophysical and geological projects which have accumulated a huge amount of data from drainage basin to shelf, slope and deep offshore environment on Golfe du Lion and Adriatic Sea.

The proposed coring program is aimed at properly calibrating previous geophysicaly based interpretation. This should allow integration of glacio-eustatic sea level changes, mass wasting, high frequency climatic and sediment supply as well as volcanic and earthquakes effects.

As oil exploration and production company the expected results should give us a better understanding and prediction of the spatial organisation of shelf and upper slope reservoirs and seals, which represent the vast majority of all presently producing fields.

We confirm our interest in the proposed project.

Regards.

P. Mauriaud

Geophysical and Geological Program Manager

Adresse postale : 64018 Pau Cedex
Tél. 33 (0) 5 59 83 40 00 - Télex petra 560604F

JEODI has as its objective to prepare Europe's participation in IODP which will commence in Autumn 2003. As part of IODP, Europe intends to operate mission specific geo-technical platforms in particular in shallow waters and in ice-covered regions in which the other vessels of IODP cannot work. We are particularly interested in the PROMESS project as it provides us with a "test case" that we can use to establish the European infrastructure for IODP. In particular JEODI will be able to provide the following services for the PROMESS project:

JEODI
Joint European Ocean Drilling Initiative

John Ludden
Project co-ordinator

Dr Serge Berné
IFREMER
Géoscience Marines
Plouzane

10 October 2001

Dear Serge,

This letter is to confirm that the JEODI project, a Thematic Network funded by the EC for the implementation of IODP in Europe, is willing to work with the PROMESS group in preparing for scientific drilling on the Rhone Fan.

JEODI has as its objective to prepare Europe's participation in IODP which will commence in Autumn 2003. As part of IODP, Europe intends to operate mission specific geo-technical platforms in particular in shallow waters and in ice-covered regions in which the other vessels of IODP cannot work. We are particularly interested in the PROMESS project as it provides us with a "test case" that we can use to establish the European infrastructure for IODP. In particular JEODI will be able to provide the following services for the PROMESS project:

Technical advice on the best technology for undertaking drilling in shallow waters and various lithologies of the Gulf of Lions and the Adriatic;
Advice on the best use of down-hole logging tools as part of the PROMESS project:
Advice on access to shore-based scientific facilities for core-handling, storage, sampling etc..
Public relations outreach concerning the socio-economic objectives of the PROMESS project.

The JEODI management group met in Paris in September 2001 and is highly enthusiastic about working with the PROMESS group and I hope the EC is able to fund your proposal.

Yours sincerely

John Ludden

By testing problems in a real situation, from preparation of the cruise to final dissemination of results, PROMESS 1 constituted a test of the capability of the European Community to contribute to the future IODP programme through "Mission Specific Platforms". One of the tasks was to report on the experience gained during the project, for helping the European scientific community to realise similar cruises in the future.

… and one from JEODI

FUGRO

FUGRO FRANCE S.A.

Siège Social et Bureau Principal
26, Avenue des Champs Pierreux
92 022 Nanterre Cedex
Tel : 01 55 69 14 14
Fax : 01 55 69 14 15

Nanterre, October 9th 2001

IFREMER
DRO/GM
B.P. 70
29280 PLOUZANE
France

Attention: Mr. Serge Berné
Co-ordinator PROMESS 1 Project

O/Ref. : AP/cma – ce. 192

Object: PROMESS 1

To whom it may concern.

Fugro France has designed and utilise specific seismic and geotechnical equipment for characterisation of sea-floor physical and geotechnical properties. These measurements are necessary for many offshore applications such as transoceanic telecommunication cable laying and burial, pipeline burial, design of new anchoring systems (e.g. suction caissons) or installation of platform foundations.

We particularly refer to our bottom-towed sledges :Gambas® and Rhobas® systems. The Gambas system is equipped for generating seismic P-waves directly onto the seabed and the Rhobas is designed to perform electrical resistivity measurements throughout the subsurface sediments. These tools are now operational for industrial operations on the continental shelf but also along the continental margins in water depths of up to 1 800m. The capabilities of these systems are continuously extended: addition of S-wave generation, increase of penetration depth. Correlating geophysical and geotechnical data in various marine sediments is the key to successful and economical site investigations in deep waters.

The new data that are going to be collected within Promess 1 in the Gulf of Lions and other European continental margins are of great interest for testing the capabilities of such equipments, calibrating the data and extending the data base under well controlled conditions.

We are interested in enhanced co-operation with research groups working in the field of sedimentary studies and slope stability along the shelf-edge and continental slope. We strongly support the initiative and would be interested in developing in the future more integrated activities, including sea-going operation for testing new equipments in reference areas.

Alain Puech
Technical Manager
Fugro France

The PROMESS1 coordinator was IFREMER (PI Dr Serge Bernè).

The project involved 12 partners from 9 different institutions (5 european countries)

Promess 1 Partners

N°	Institution/organisation	Address	Post code	Town/city	Country	Title	Family name	First Name	Telephone	Fax	E-mail
1	Ifremer (co-ordinator)	Département Géosciences Marines, B.P. 70	29280	Plouzané cedex	France	Dr.	Berné	Serge	33-2.98.22.42.49	33-2.98.22.45.70	serge.berne@ifremer.fr
2	Istituto di Geologia Marina, Consiglio Nazionale delle Ricerche (CNR-IGM)	Via Gobetti, 101	40129	Bologna	Italy	Dr.	Trincardi	Fabio	39-051 639 88 72	39-051 639 89 40	fabio.trincardi@bo.ismar.cnr.it
3	British Geological Survey	Murchison House, West Mains Road	EH9 3LA	Edinburgh	UK	Mr.	Skinner	Alister	44- 131 440 5012 44- 131 650 0278 44-448 2700	44- 131 668 4140	acsk@bgs.ac.uk
4	Institut für Geowissenschaftliche Gemeinschaftsaufgaben (GGA)	Stilleweg 2	30655	Hannover	Germany	Dr.	Wonik	Thomas	49-511 643 3517	49-511 643 3665	w onik@gga-hannover.de
5	University of Salamanca, Facultad de Ciencias	Departamento de Geologia	37008	Salamanca	Spain	Dr.	Flores	José-Abel	34-92 32 94 497	34-92 32 94 514	flores@usal.es
6	Université de Bretagne Occidentale (UBO)	UMR 6538, IUEM, Place Nicolas Copernic	29280	Plouzané cedex	France	Dr.	Rabineau	Marina	33-2 98 49 87 28	33-2 98 49 87 60	marina.rabineau@univ-brest.fr
7	University of Bremen	Fachbereich Geowissenschaften, Klagenfurter Strasse	28359	Bremen	Germany	Dr.	Schneider	Ralph	33-05 40 00 88 62	33-05 40 00 08 48	rschneider@epi.uni-kiel.de
8	University of Barcelona	CRC Marine Geosciences, Dept. D'Estratigrafia, Facultat de Geologia, Campus de Pedralbes	O8028	Barcelona	Spain	Dr.	Canals	Miquel	39-93 402 13 60	34-93 402 13 40	miquelcanals@ub.edu
9	CNRS Brest DR 17	JRU 6538	29280	Plouzané cedex	France	Dr.	Rabineau	Marina	33-2 98 49 87 28	33-2 98 49 87 60	marina.rabineau@univ-brest.fr
10	Université de Lyon 1	JRU 5125, Lab. PaléoEnvironnement et PaléobioSphère (UMR 5125), 27, bd. Du 11 novembre	69622	Villeurbanne cedex	France	Dr.	Suc	Jean-Pierre	33-04 72 44 85 90 06 80 46 72 53 (mobile)	33-4 72 44 83 82	jean-pierre.suc@univ-lyon1.fr suc.jean-pierre@w anadoo.fr
11	CNRS, JRU 5125	Lab. PaléoEnvironnement et PaléobioSphère, 27, bd. Du 11 novembre	69622	Villeurbanne cedex	France	Dr.	Suc	Jean-Pierre	33-04 72 44 85 90 06 80 46 72 53 (mobile)	33-4 72 44 83 83	jean-pierre.suc@univ-lyon1.fr suc.jean-pierre@w anadoo.fr
12	Consejo Superior de Investigaciones Cientificas (CSIC)	Department of Environmental Chemistry, Jordi Girona, 18	O8034	Barcelona	Spain	Dr.	Grimalt	Joan O.	34-93 400 61 22	34-93 204 59 04	jgoqam@iiqab.csic.es

+ Sub-contractor for drilling operations : Fugro Engineers B.V. (Netherlands)

Partners from the U.S. Eurostrataform project were also involved in “Promess 1”

Partner 2 (CNR-IGM, Italy):

- Fabio Trincardi (leader)
- Luigi Vigliotti (magnetic properties)
- Antonio Cattaneo and Domenico Ridente (sedimentology, seismic stratigraphy)
- Andrea Piva and Alessandra Asioli (micropaleontology)
- Marco Taviani (macropaleontology)

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+ Sub-contractor for drilling operations : Fugro Engineers B.V. (Netherlands)

Partners from the U.S. Eurostrataform project were also involved in “Promess 1”

Submission of proposal: October 2001

Evaluation report: January 3rd 2002 (result: GO)

Start: December 1st 2002

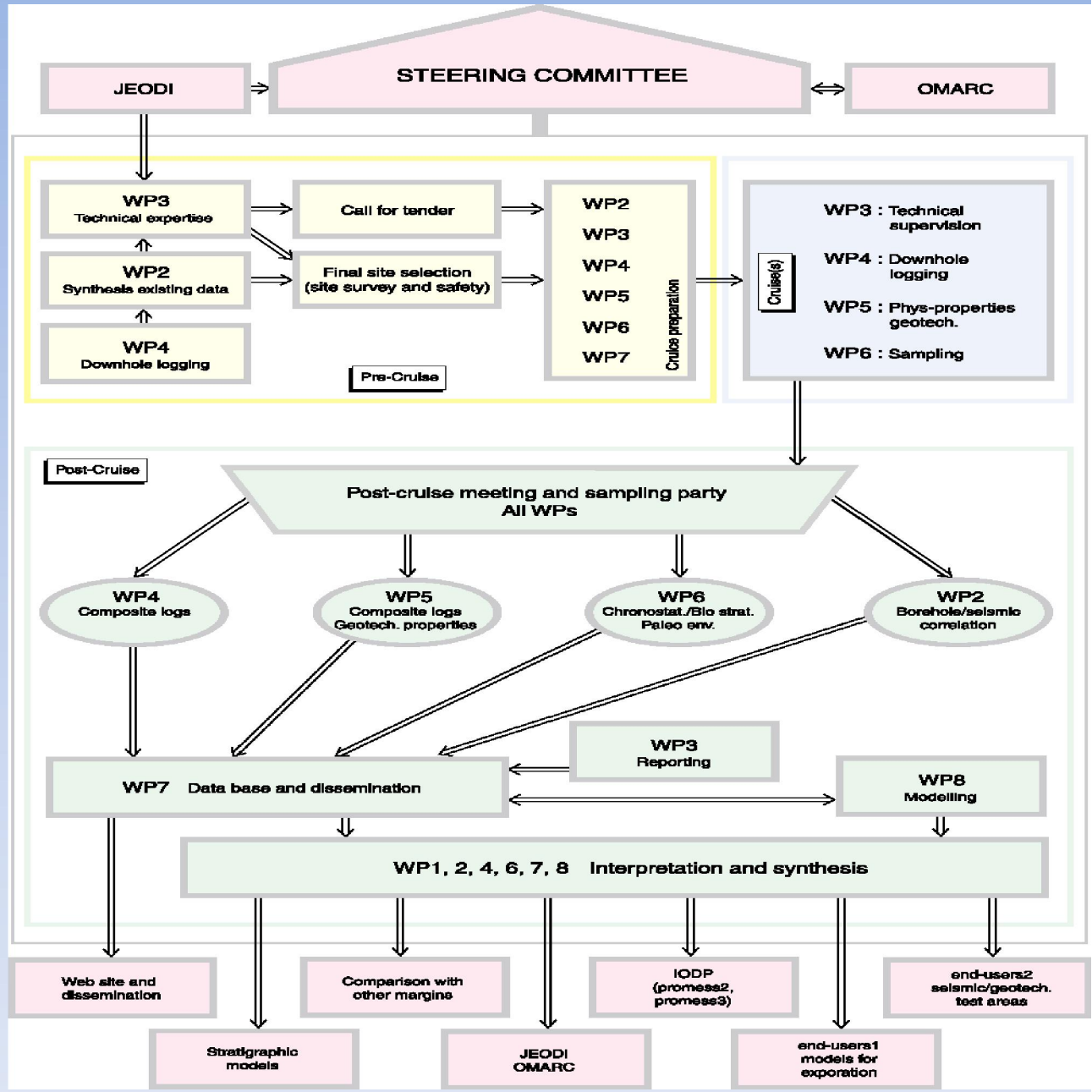
Call for tender publication: January 2003 (two applicants: FUGRO Engineers BV and SEACORE)

Call for tender selection: July 2003 (FUGRO Engineers BV selected for offering an up to date corer, onboard equipment already tested in many circumstances, cruise schedule better fitting, flexibility for time frame)

Cruise: 27 days (24th June 2004- 22th July 2004)

End of project: May 31st 2006

Total costs: € 3.6 million (ca. € 1.4 million for the cruise)



Recovery of the core liner from the piston coring system

The deepest core

Core sampling

Great attention was paid to the technical preparation of the cruise following an (iSAS)/IODP standard (site surveying, safety and environmental issues), <u>in order to demonstrate the feasibility of conducting scientific-driven projects with vessels usually employed by the industry.</u>

iSAS/IODP Site Summary Forms:

Form 1 - General Site Information

Please fill out information in all gray boxes
Revised 7 March 2002

New ■ Revised □

Section A: Proposal Information

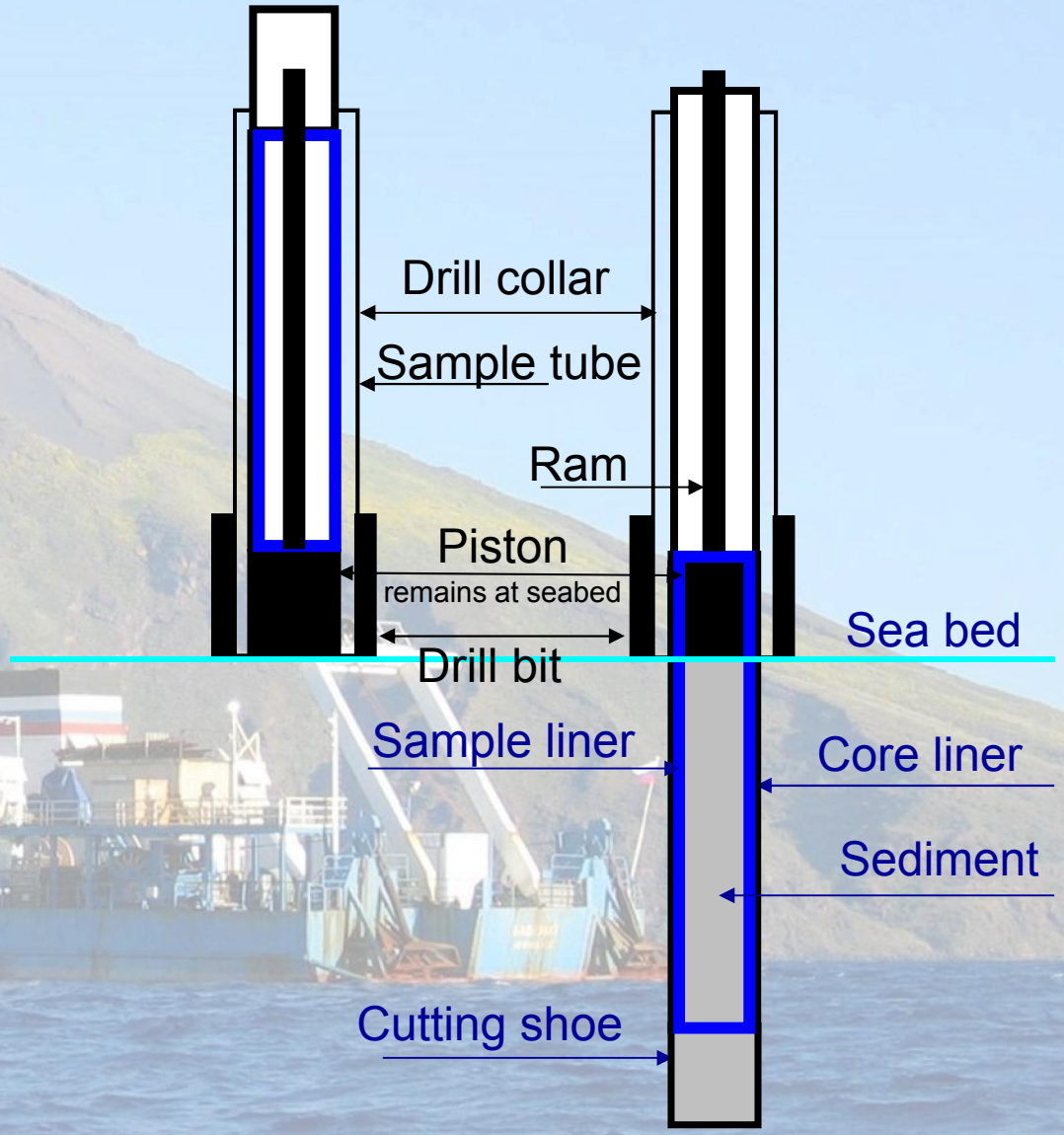
Title of Proposal:	PROMESS 1
Date Form Submitted:	May 2003
Site Specific Objectives with Priority (Must include general objectives in proposal)	Access to a continuous sedimentary record of the last ca. 400 kyr in a zone (upper slope) where sedimentation rate was high (about 1 m/kyr) during glacial periods. First priority
List Previous Drilling in Area:	Autan 1 (39 km to the ENE) Mistral 1 (33 km to the NNE) Tramontane 1 (48 km to the ENE)

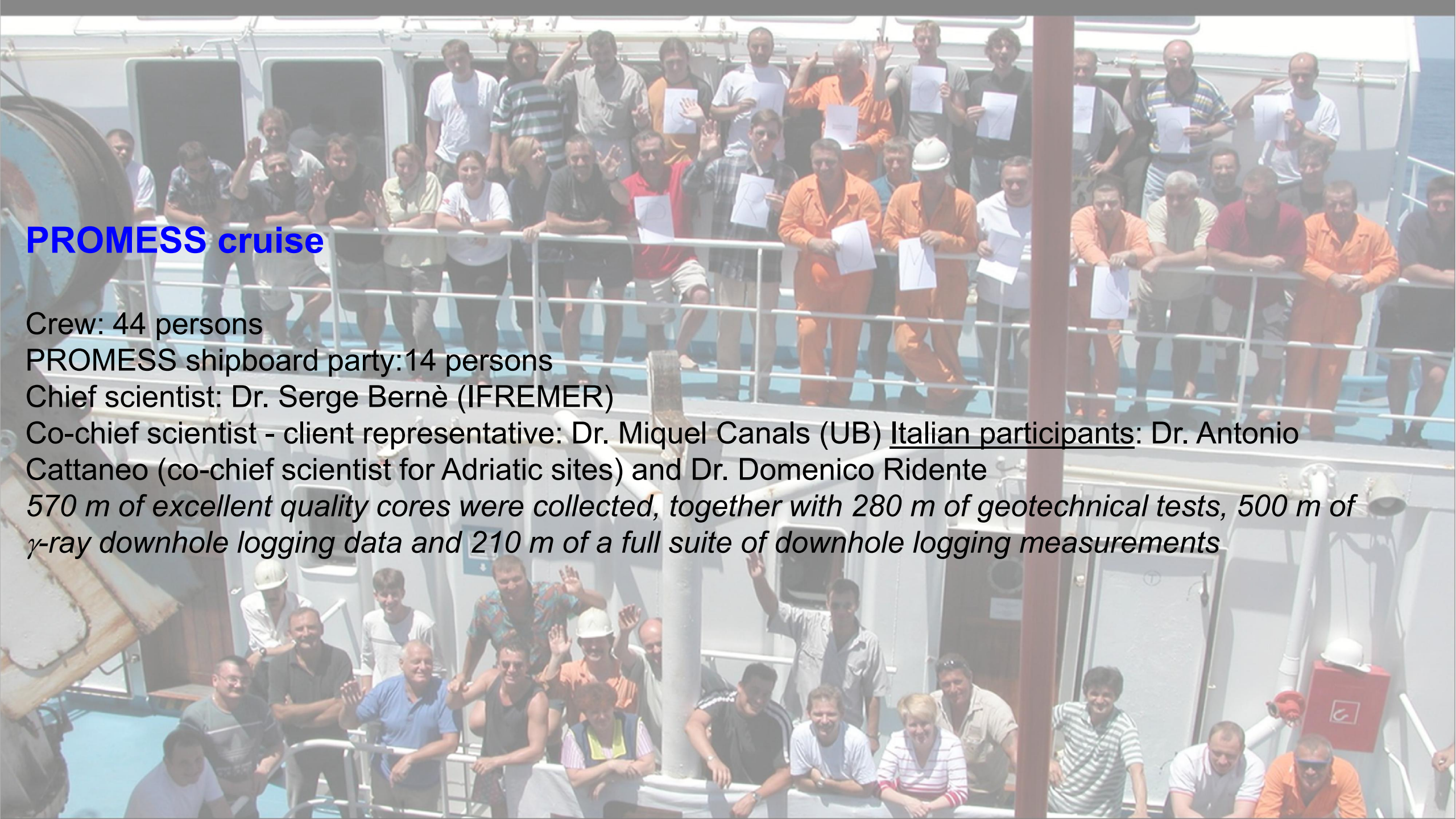
Section B: General Site Information

Site Name: (e.g. SWPAC-01A)	**GL1**	If site is a reoccupation of an old DSDP/ODP Site, Please include former Site #	Area or Location:	Western Mediterranean Sea (Gulf of Lions)
Latitude:	Deg: **N42°**	Min: **41.389'**	Jurisdiction:	International waters
Longitude:	Deg: **E3°**	Min: **50.260'**	Distance to Land:	79 km to Spain, 81 km to France
Coordinates System:	**WGS 84**			
Priority of Site:	Primary: 1	Alt:	Water Depth:	**300 m**

G/V Bavenit

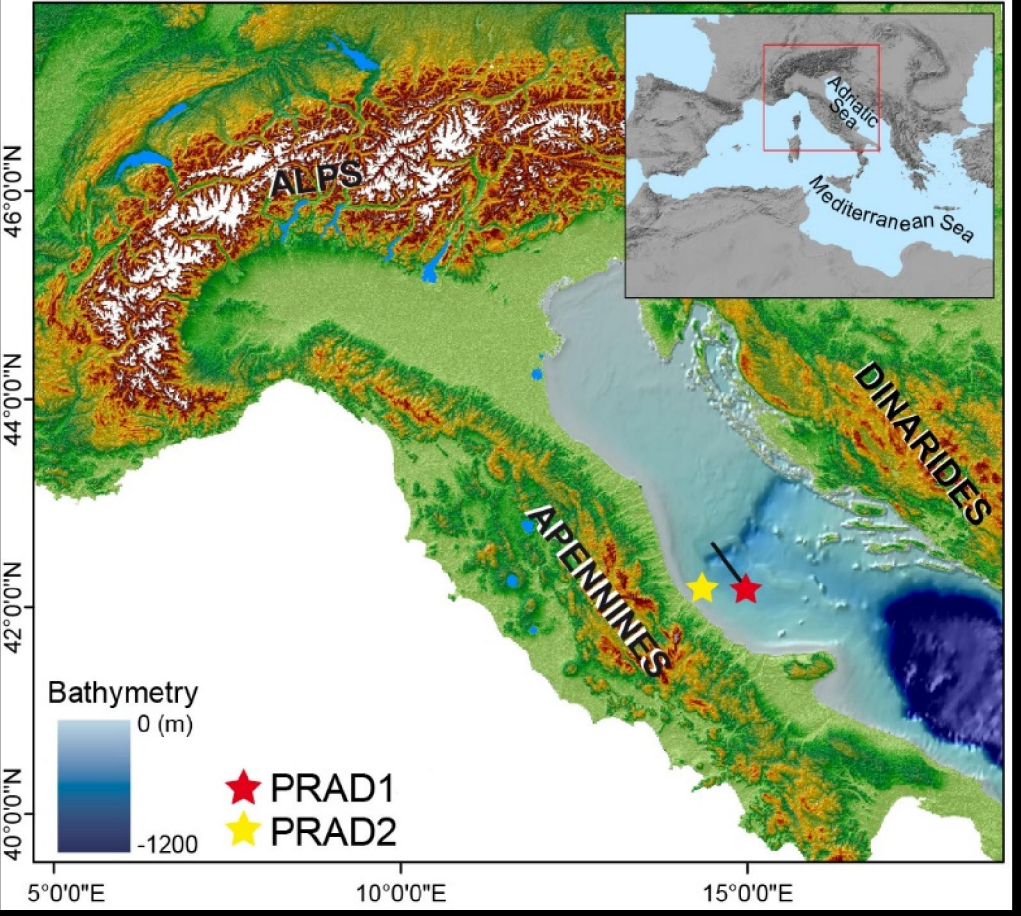
Owner: Russian company AMIGE
Operator: FUGRO Engineers BV
Lenght: 85.8m
Breadth: 16.80m
Depth: 8.40m
Draft: 5.60m
Derrick heigh above keel: 42m
Dynamic Positioning System: DGPS
Corer: standard piston corer by FUGRO
Cores segments: 83cm long, 67mm internal diameter (plastic liner tube specifically designed for the project)

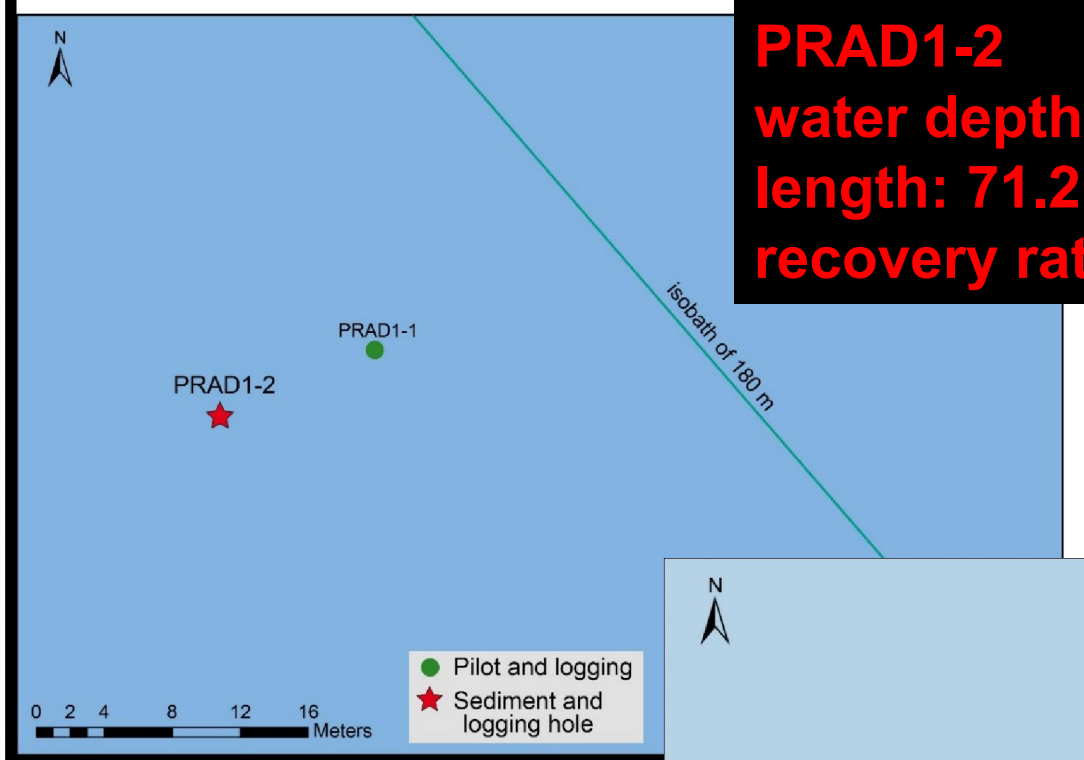




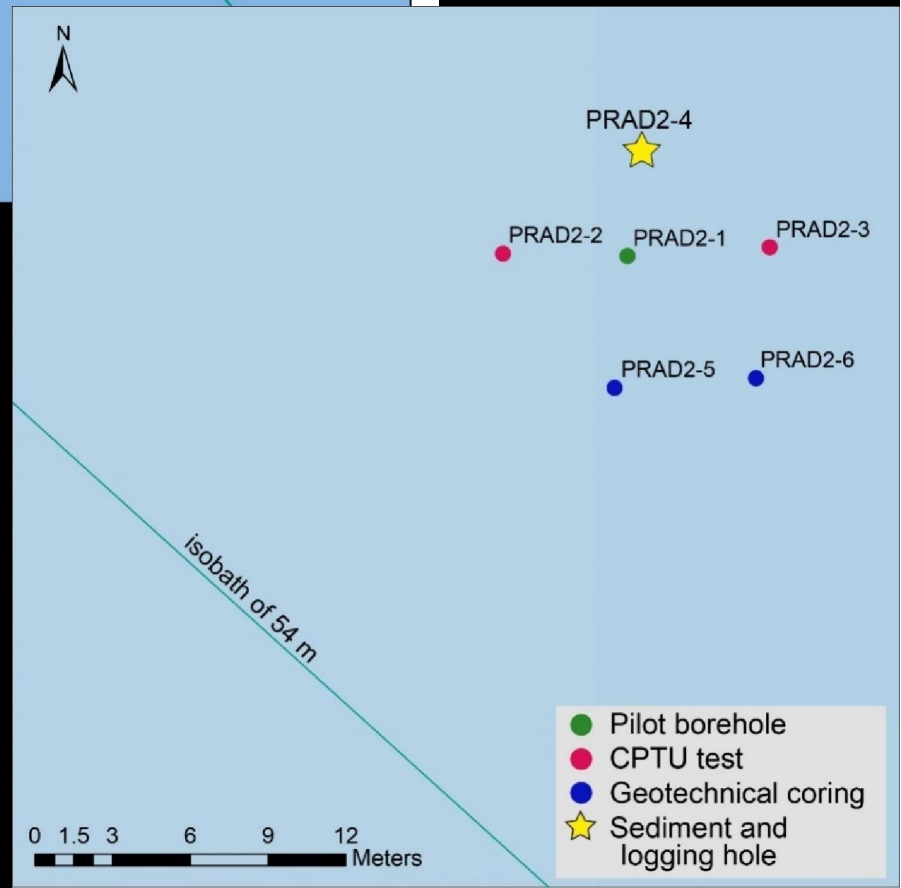
PROMESS cruise

Crew: 44 persons
PROMESS shipboard party:14 persons
Chief scientist: Dr. Serge Bernè (IFREMER)
Co-chief scientist - client representative: Dr. Miquel Canals (UB) Italian participants: Dr. Antonio Cattaneo (co-chief scientist for Adriatic sites) and Dr. Domenico Ridente
570 m of excellent quality cores were collected, together with 280 m of geotechnical tests, 500 m of γ-ray downhole logging data and 210 m of a full suite of downhole logging measurements





PRAD1-2
water depth: 185m
length: 71.2m (89 sections)
recovery rate: 99.96%



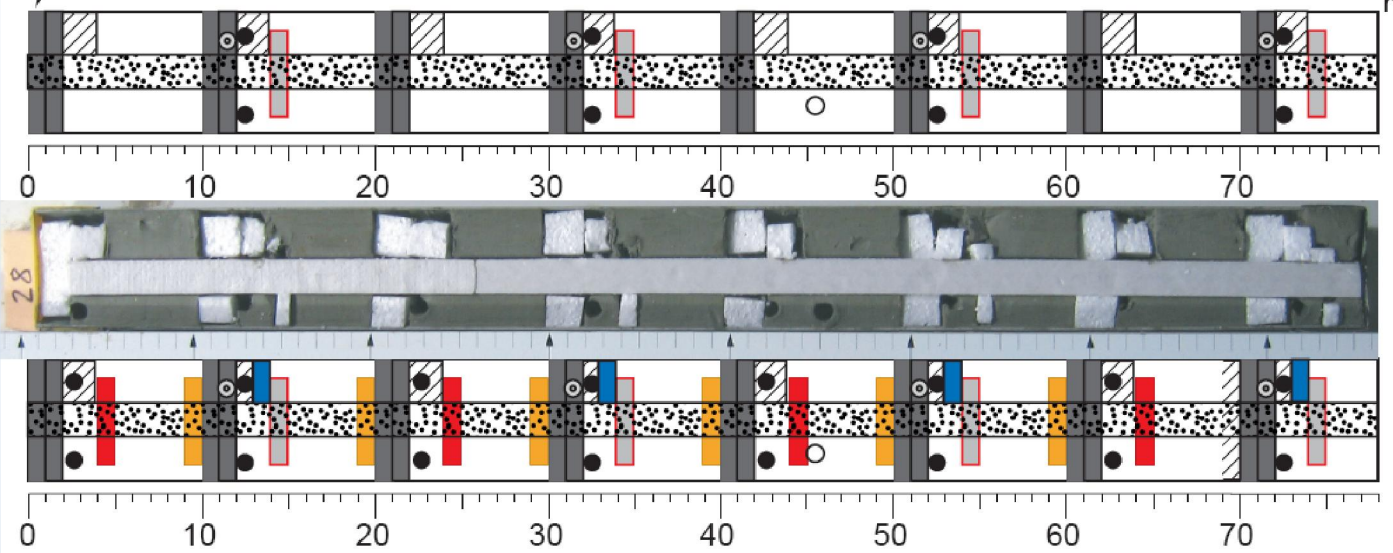
PRAD2-4
water depth: 56m
length: 32m (42 sections)
recovery rate: 95.52%

SAMPLING PROMESS1 PRAD1-2

top of the sediment = 0 of each section

total core length (without core shoes) = m 71.2
n. of sections = 89
n. of core shoes = 23
max-min length of core sections = cm 87 - 69

general scheme PRAD1-2-n
(valid for sections 40-89)
SCALE 1/4
1 cm = 0.25 mm



example of PRAD1-2-28

symbol	analysis	LAB	responsible scientist	tool	storage	volume (cc)	sampling interval	ca. TOT samples	samples / section	depth in section (cm)
	paleomagnetism	ISMAR	Trincardi / Vigliotti	U-channel	U-channel	312	continuous	89	1/1 section	continuous
	Forams Nannos	ISMAR / IGG U Sal	Trincardi / Asioli Flores	blade	1 bag	30 (=2cm tck) or 28(-2cc Ca/Mg)	10 cm	712	8 /1 section	0, 10, 20, 30,, 40, 50, 60, 70
	Pollen sections 1-28	U Lyon	Suc	blade	bag	10 (2x2x2.5) 5 (2x1x2.5)	10 cm	224+	8 / 1 section	2-4, 22-4, 42-4, 62-4 12-3, 32-3, 52-3, 72-3
	Pollen sections 29-89	U Lyon	Suc	blade	bag	10 (2x2x2.5)	10 cm	488= 712	8 / 1 section	2-4, 22-4, 42-4, 62-4 12-3, 32-3, 52-3, 72-3 Many shifts of 1-2cm
	NEXT Pollen sampling (s.1-28)	U Lyon	Suc	blade	bag	5 (2x1x2.5)	20 cm		4 / 1 section	13-14, 33-34, 53-54 73-74
	Ca/Mg	ISMAR	Trincardi	syringe 2cc	syringe 2cc in bag	2	20 cm 10 cm sect 23-40	356+ 68= 424	4 /1 sections or 8 / 1 sect	11, 31, 51, 71 or 1, 11, 21, 31, 41, 51, 61, 71
	Grain-Size Clay Mineralogy	U Barc	Canals / Frigola	syringe 2cc	bag	(1.5+1.5)=3	20 cm 10 cm sect 26-40	356x2+ 56x2= 412	4x2 / 1 section or 8x2 / 1 sect	12, 32, 52, 72 or 2, 12, 22, 32, 42, 52, 62, 72
sampled SET1 SET2	Biomarkers Organic Carbon	CSIC (red/orange ONLY for MIS 5 SEC 25-40)	Grimalt Grimalt	blade blade	aluminium aluminium	5 5	20 cm 20 cm 10 cm	356 60 90	4 /1 sections 4 /1 sec 6 /1 sec	14, 34, 54, 74 4, 24, 44, 64 9,19,29,39,49,59,69
	Carbonates	U Barc	Canals / Frigola	syringe 2cc	bag	0,5	ca 80 cm	89	1 / 1 section	45

After the cruise the cores were moved to IFREMER, Brest, and sampled for the planned analysis according to the scheme here reported.

PROMESS1 cores are stored in the IODP repository at Bremen

PRAD1-2

PRAD2-4

PRAD1-2 + PRAD2-4

PARAMETER	MEASURE	REFERENCE
Core pictures	yes	General data set, available
visual description	yes	General data set, available
color reflectance and lightness	every 1cm	General data set, available
MSCL (P-wave velocity, γ density, porosity)	every 1cm	General data set, available
magnetic susceptibility	every 1cm	General data set, available
XRF core scanner (K, Ca, Ti, Mn, Fe, Cu, Sr, V, Cr, Co, Ni, Zn, Pb)	every 2 cm	General data set, available
X-ray		unpublished
Geotechnical measurements	(in situ: CPTU, in lab: strenght tests)	Sultan et al. (2008); Urgeles et al. (2011)
$\delta^{18}O$ e $\delta^{13}C$ planktic (*G. bulloides*) and benthic (*G. bulloides*) foram	every 10cm (average)	Piva et al. (2008a,b)
Forams semiquantitative analysis		Asioli (unpublished)
Alkenones	every 20cm	Piva et al. (2008a,b)
Planktic forams counting	every 10cm (average)/6-10kyrs BP	Piva et al. (2008a,b); Pellegrini et al. (2017); Pellegrini et al. (JMPG submitted); unpublished
Benthic forams counting	every 10cm (average)/6-10kyrs BP	Piva et al. (2008a,b); Pellegrini et al. (2017); Pellegrini et al. (JMPG submitted); unpublished
Ostracods counting	every 10cm (last deglaciation/Holocene)	Unpublished Ms thesis UniTS
Mollusks	every 10cm (average)	Taviani (unpublished)
Grain size (sortable silt)	every 10-20 cm	Frigola J, (UB) unpublished
Magnetic properties (inclination, declination, ARM, SIRM, NRM, secular variation)	every 1 cm	Vigliotti (2008); Vigliotti et al. (2011); Piva et al. (2008a,b)
tephrochronology	Micro + macro tephra (0-200kyrs BP)	Bourne et al. (2010, 2015)

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Article
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Climatic cycles as expressed in sediments of the PROMESS1 borehole PRAD1-2, central Adriatic, for the last 370 ka: 1. Integrated stratigraphy

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Sedimentary response to climate and sea level changes during the past ~400 ka from borehole PRAD1-2 (Adriatic margin)

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Climatic cycles as expressed in sediments of the PROMESS1 borehole PRAD1-2, central Adriatic, for the last 370 ka: 2. Paleoenvironmental evolution

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Papers related to the PROMESS 1 project

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A geomechanical approach for the genesis of sediment undulations on the Adriatic shelf

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JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 115, B12106, doi:10.1029/2010JB007687, 2010

Subsidence pattern in the central Adriatic and its influence on sediment architecture during the last 400 kyr

V. Maselli,[1,2] F. Trincardi,[2] A. Cattaneo,[3] D. Ridente,[4] and A. Asioli[5]

The Holocene 18,1 (2008) pp. 141–152

Palaeomagnetic and rock magnetic analysis of Holocene deposits from the Adriatic Sea: detecting and dating short-term fluctuations in sediment supply

L. Vigliotti,[1]* K.L. Verosub,[2] A. Cattaneo,[3] F. Trincardi,[1] A. Asioli[4] and A. Piva[1]

Mar Geophys Res (2011) 32:49–69
DOI 10.1007/s11001-011-9125-1

ORIGINAL RESEARCH PAPER

A review of undulated sediment features on Mediterranean prodeltas: distinguishing sediment transport structures from sediment deformation

Roger Urgeles · Antonio Cattaneo · Pere Puig · Camino Liquete · Ben De Mol · David Amblàs · Nabil Sultan · Fabio Trincardi

Revista Española de Micropaleontología, 42 (3), 2010, pp. 345-358

ISSN: 0556-655X

Sea surface dynamics and coccolithophore behaviour during sapropel deposition of Marine Isotope Stages 7, 6 and 5 in Western Adriatic sea

Áurea Narciso[1], José-Abel Flores[2], Mário Cachão[1,3], Francisco Javier Sierro[2], Elena Colmenero-Hidalgo[2], Andrea Piva[4] and Alessandra Asioli[5]

Quaternary Science Reviews 29 (2010) 3079–3094

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Distal tephra record for the last ca 105,000 years from core PRAD 1-2 in the central Adriatic Sea: implications for marine tephrostratigraphy

A.J. Bourne [a,*], J.J. Lowe [a], F. Trincardi [b], A. Asioli [c], S.P.E. Blockley [a], S. Wulf [d,1], I.P. Matthews [a], A. Piva [e], L. Vigliotti [b]

Quaternary Science Reviews 116 (2015) 28–43

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Tephrochronology of core PRAD 1-2 from the Adriatic Sea: insights into Italian explosive volcanism for the period 200–80 ka

A.J. Bourne [a,*], P.G. Albert [b,1], I.P. Matthews [a], F. Trincardi [c], S. Wulf [d], A. Asioli [e], S.P.E. Blockley [a], J. Keller [f], J.J. Lowe [a]

Ital.J.Geosci. (Boll.Soc.Geol.It.), Vol. 130, No. 1 (2011), pp. 106-118, 7 figs., 2 tabs. (DOI: 10.3301/IJG.2010.29)

Magnetic properties of the youngest sapropel S1 in the Ionian and Adriatic Sea inference for the timing and mechanism of sapropel formation

Luigi Vigliotti (*), Alessandra Asioli (**), Caterina Bergami (*), Lucilla Capotondi (*) & Andrea Piva (***)

The combined effect of sea level and supply during Milankovitch cyclicity: Evidence from shallow-marine $\delta^{18}O$ records and sequence architecture (Adriatic margin)

D. Ridente, F. Trincardi, A. Piva and A. Asioli

Geology 2009;37;1003-1006
doi: 10.1130/G25730A.1

How to make a 350-m-thick lowstand systems tract in 17,000 years: The Late Pleistocene Po River (Italy) lowstand wedge

Claudio Pellegrini[1*], Vittorio Maselli[2,1], Fabiano Gamberi[1], Alessandra Asioli[3], Kevin M. Bohacs[4], Tina M. Drexler[4], and Fabio Trincardi[1]

GEOLOGY, April 2017; v. 45; no. 4; p. 327–330 | Data Repository item 2017096 | doi:10.1130/G38848.1 | Published online 3 February 2017

Palaeogeography, Palaeoclimatology, Palaeoecology 309 (2011) 215–228

Contents lists available at ScienceDirect

Palaeogeography, Palaeoclimatology, Palaeoecology

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Impact of climate and sea level changes on the ventilation of intermediate water and benthic foraminifer assemblages in the Gulf of Lions, off South France, during MIS 6 and 7

Aleix Cortina [a,*], Francisco Javier Sierro [a], Beatriz González-Mora [a], Alessandra Asioli [b], José Abel Flores [a]

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The 100-ka and rapid sea level changes recorded by prograding shelf sand bodies in the Gulf of Lions (western Mediterranean Sea)

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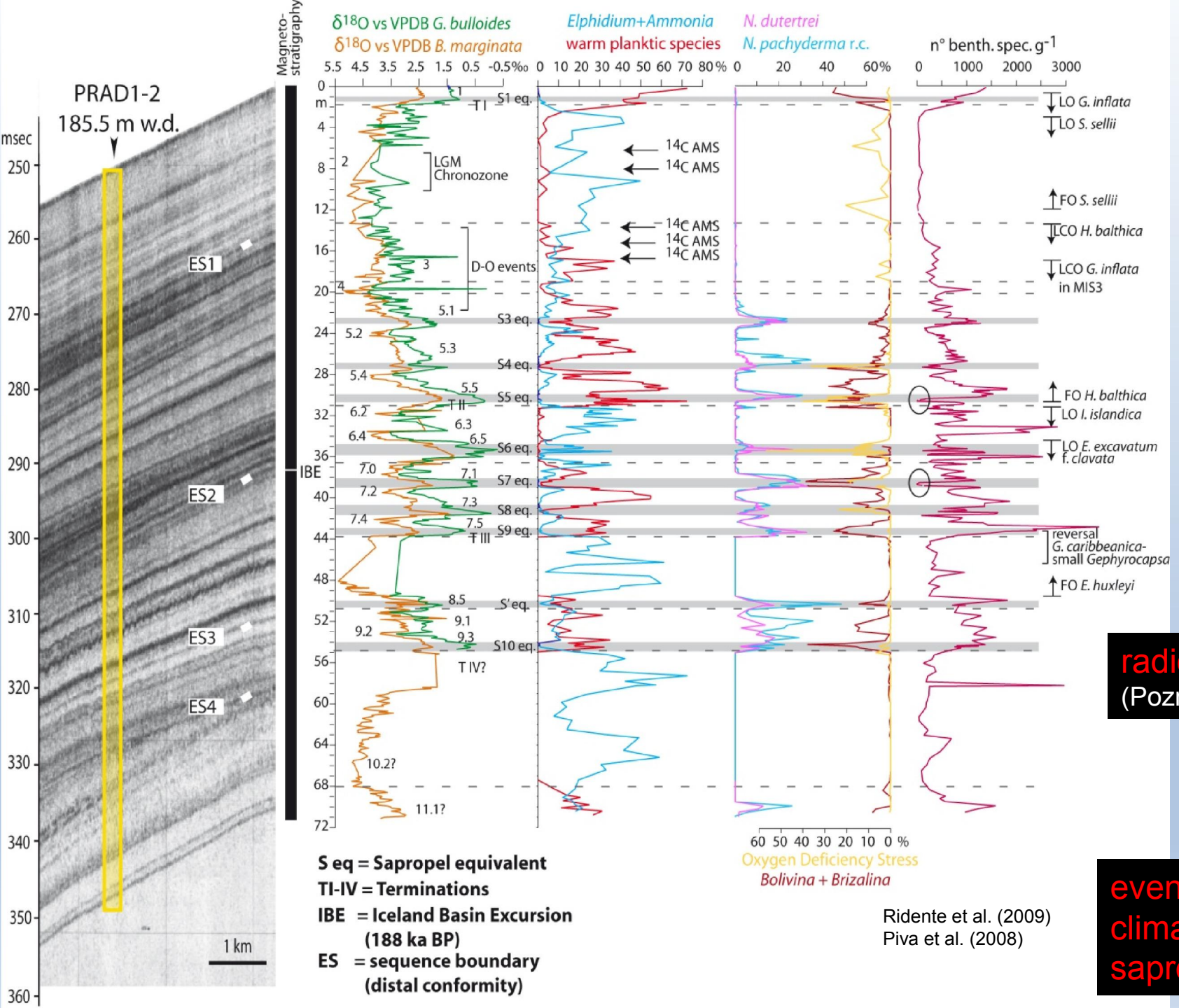


Ridente et al. (2009)
Piva et al. (2008)

PROMESS1 main outcomes:

1) Stratigraphic record at milankovian and sub-milankovian scale

magnetostratigraphy
(ISMAR-BO)

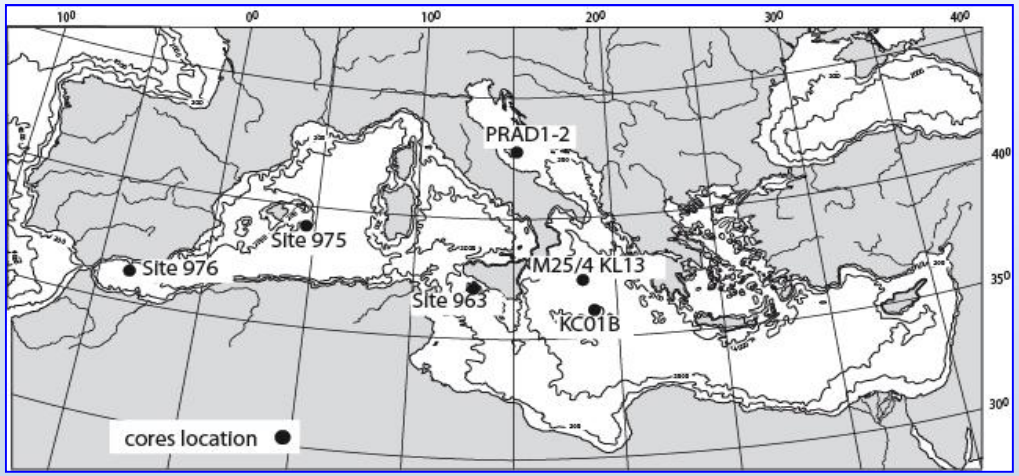
radiometric datings (^{14}C AMS, Ar/Ar)
(Poznan, NOSAMS WHOI, LSCE/CNRS/Gif)

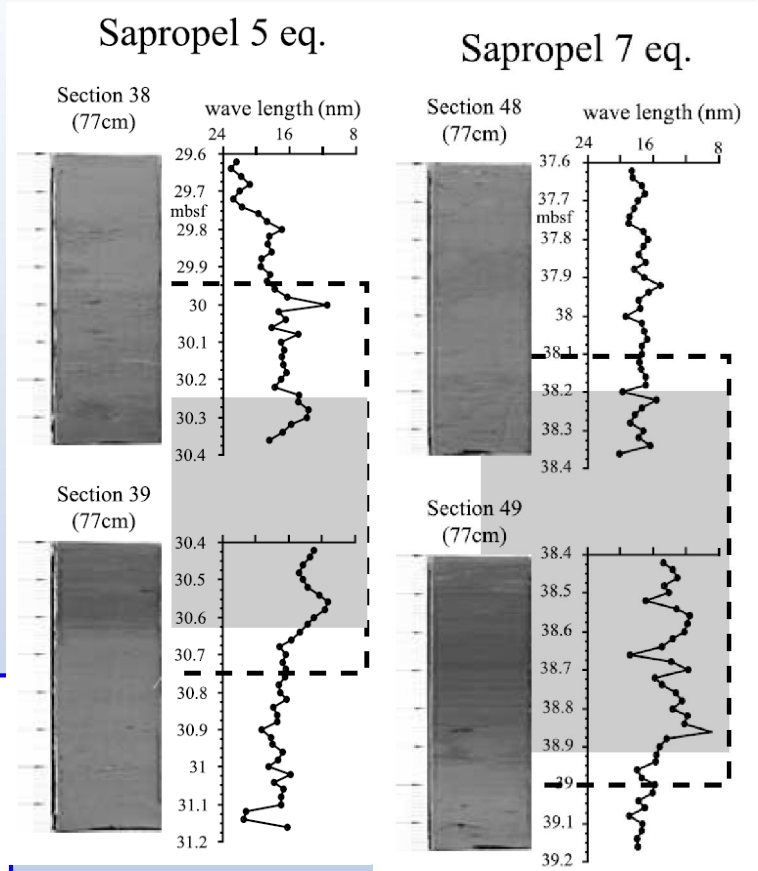
forams and calcareous nannoplankton bioevents
(IGG, USAL)

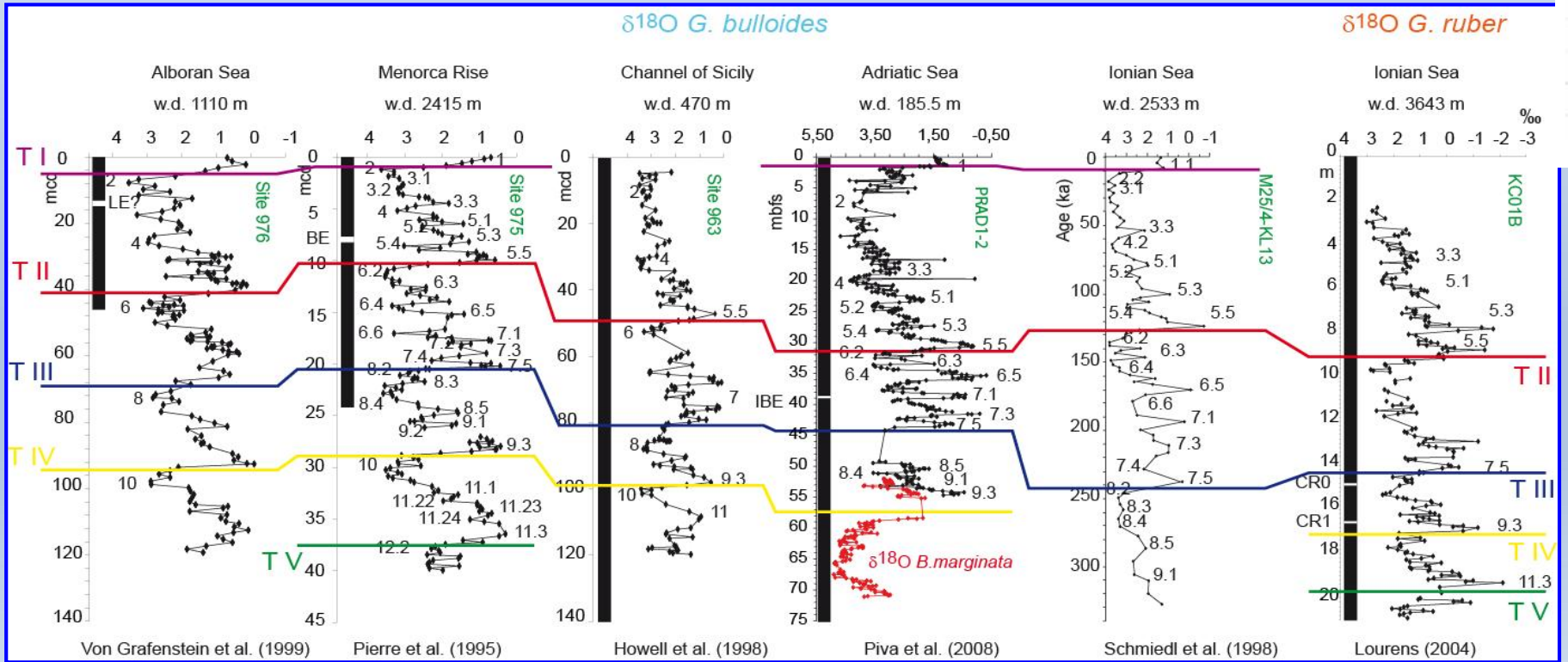
event-stratigraphy
climate cyclicity
sapropel chronology

δ^{18}O stratigraphy
(CAU Kiel)

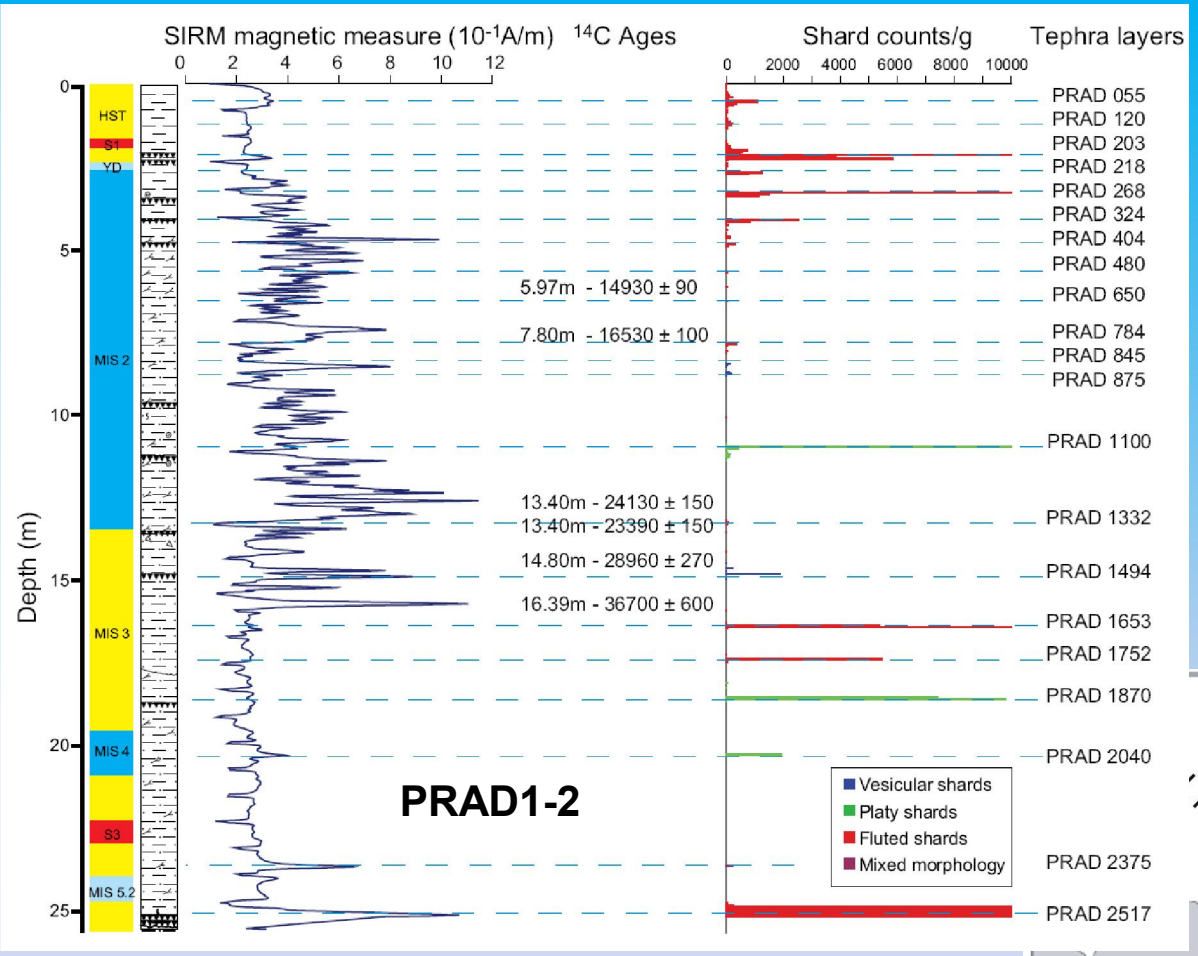
2) Stratigraphic record well comparable with other deeper Mediterranean reference sites







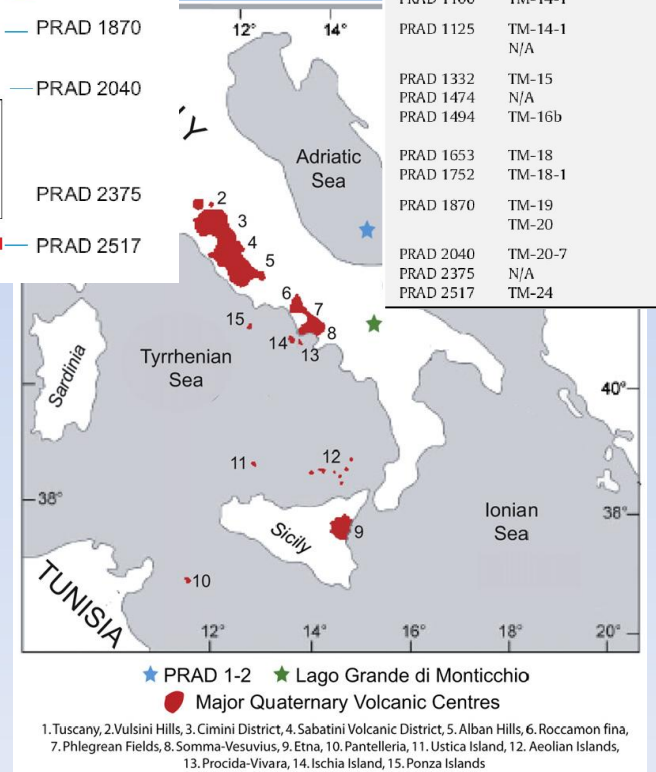
3) Presence of dark, laminated sediments coeval with sapropels deposited in the Eastern Mediterranean



Summary of eruptives geochemically matched between PRAD 1-2 and the Lago Grande di Monticchio data of Wulf et al. (2004, 2008). References for the raw ^{14}C dates are provided in the text. Radiocarbon dates were calibrated using OXCAL Version 4.1 (Bronk Ramsey, 2009) and the INTCAL 04 calibration curve for radiocarbon dates < 20 cal ka BP. (Reimer et al., 2004) or the Hughen et al. (2006) calibration curve for dates > 20 cal ka BP.

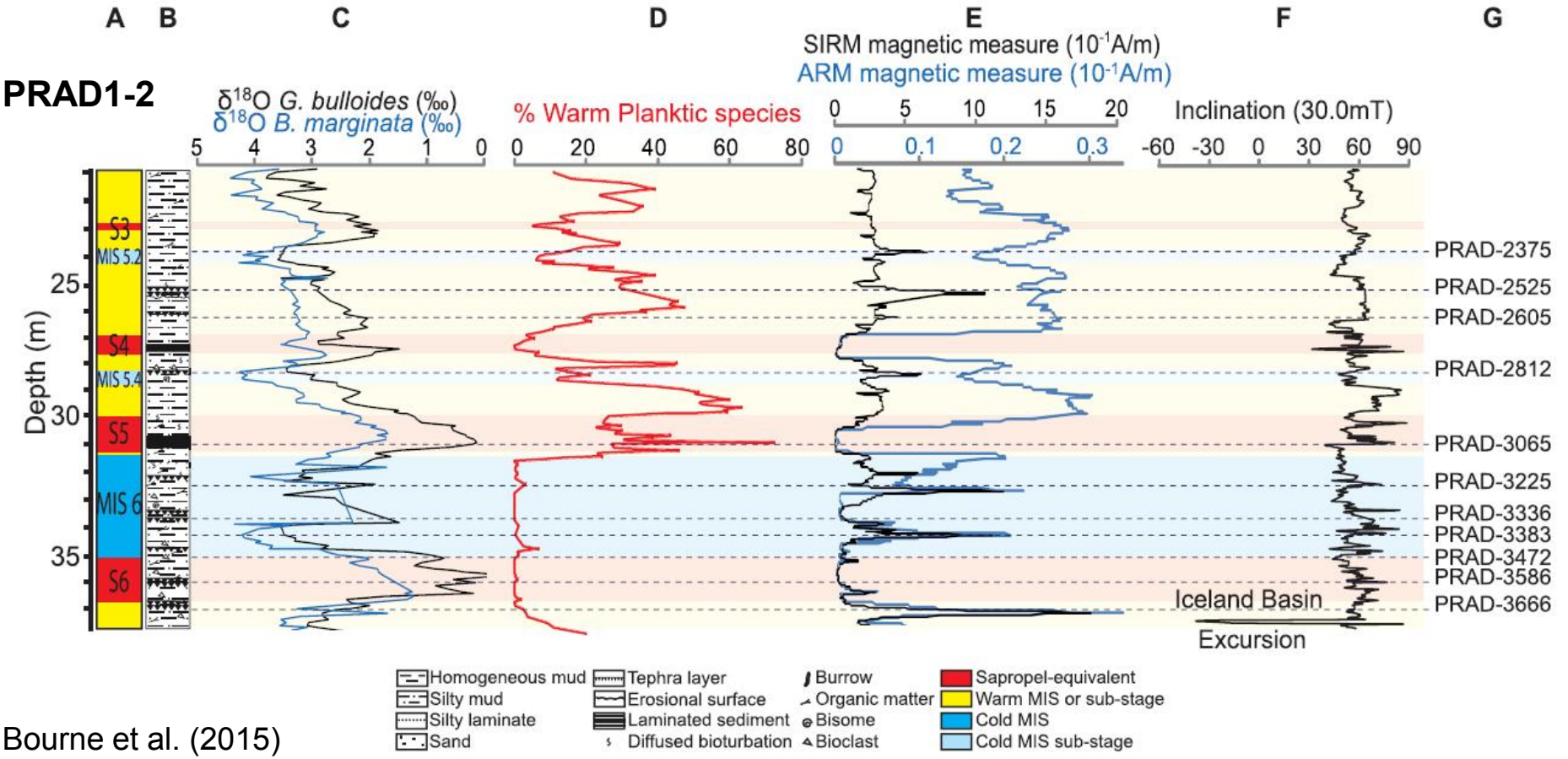
PRAD 1-2 tephra	Monticchio tephra	Origin	Volcanic event	Calibrated 2σ age (cal yr)	Dating method	Dated material
PRAD 055	TM-5	Phlegrean fields	Agnano Monte Spina	4690–4300 BP	^{14}C	Charcoal (proximal tephra)
PRAD 120	TM-6-1a	Phlegrean fields	Fondi di Baia	9690–9440 BP	^{14}C	Base-soluble soil carbon
PRAD 203	TM-7b	Phlegrean fields	Pomici Principali	12,760–11,770 BP	^{14}C	Underlying charcoal (proximal tephra)
	TM-8 (reworked)		Neapolitan Yellow Tuff	14,320–13,900 BP	^{14}C	Underlying paleosols (proximal tephra)
PRAD 218	TM-8	Phlegrean fields	Neapolitan Yellow Tuff	14,320–13,900 BP	^{14}C	Underlying paleosols (proximal tephra)
PRAD 268	N/A	Phlegrean fields	N/A	N/A	N/A	N/A
PRAD 324	N/A	Phlegrean fields	N/A	N/A	N/A	N/A
PRAD 404	N/A	Phlegrean fields	N/A	N/A	N/A	N/A
PRAD 480	N/A	N/A	N/A	N/A	N/A	N/A
PRAD 566	N/A	N/A	N/A	N/A	N/A	N/A
PRAD 608	N/A	N/A	N/A	N/A	N/A	N/A
PRAD 650	TM-10	Phlegrean fields	Lagno Amendolare	15,850–15,110 BP	^{14}C	Underlying paleosols (distal tephra)
	TM-10-1 (reworked?)		St. Angelo Tuff	16, 610–15,030 BP	Varves	LGdM sediment chronology)
PRAD 784	TM-12 TM-10-1 (reworked)	Vesuvius Ischia	Greenish/Verdoline St. Angelo Tuff?	19,480–19,050 BP	^{14}C	Charcoal (proximal tephra)
PRAD 845	TM-10-1 TM-13 (reworked)	Ischia Vesuvius	St. Angelo Tuff? Pomici di Base	22,240–21,150 BP	^{14}C	Underlying paleosols (proximal tephra)
PRAD 875	TM-13	Vesuvius	Pomici di Base	22,240–21,150 BP	^{14}C	Underlying paleosols (proximal tephra)
	TM-14-1 (reworked)	Ischia	Faro di Punta Imperatore	22,420–20,280 BP	Varves	LGdM sediment chronology
PRAD 1100	TM-14-1	Ischia	Faro di Punta Imperatore	22,420–20,280 BP	Varves	LGdM sediment chronology
PRAD 1125	TM-14-1 N/A	Ischia N/A	Faro di Punta Imperatore N/A	22,420–20,280 BP N/A	Varves N/A	LGdM sediment chronology N/A
PRAD 1332	TM-15	Phlegrean fields	Y-3	30,500–30,100 BP	^{40}Ar/^{39}Ar	Sanidine (proximal tephra)
PRAD 1474	N/A	N/A	N/A	N/A	N/A	N/A
PRAD 1494	TM-16b	Vesuvius	Codola (base)	29,921–28,896 BP	^{14}C	Underlying paleosols (proximal tephra)
PRAD 1653	TM-18	Phlegrean fields	Campanian Ignimbrite	39,390–39,170 BP	^{40}Ar/^{39}Ar	Sanidine (proximal tephra)
PRAD 1752	TM-18-1	Ischia	SMP1-a	38,680–35,000 BP	Varves	N/A
PRAD 1870	TM-19 TM-20	Ischia	Monte Epomeo Green Tuff s.s. Unita di Monte S. Angelo (Y-7)	56,400–55,600 BP	^{40}Ar/^{39}Ar	Sanidine (distal tephra)
PRAD 2040	TM-20-7	Ischia	Pignatiello Formation	79,120–71,580 BP	Varves	LGdM sediment chronology
PRAD 2375	N/A	N/A	N/A	N/A	N/A	N/A
PRAD 2517	TM-24	Phlegrean fields	X-5	107,000–103,000 BP	^{40}Ar/^{39}Ar	Sanidine (distal tephra)

Bourne et al. (2010)



4) Tephrochronology (micro and macrotephra)

PRAD1-2



Bourne et al. (2015)

Table 4

Summary of the tephra layers identified in PRAD 1-2, their correlation to Monticchio tephra layers and known volcanic events. n = number of geochemical determinations obtained. Classifications (based on Le Bas et al., 1986): Tr = trachyte, P = phonolite, TP = tephriphonolite. Modelled 2σ age range from Table 2.

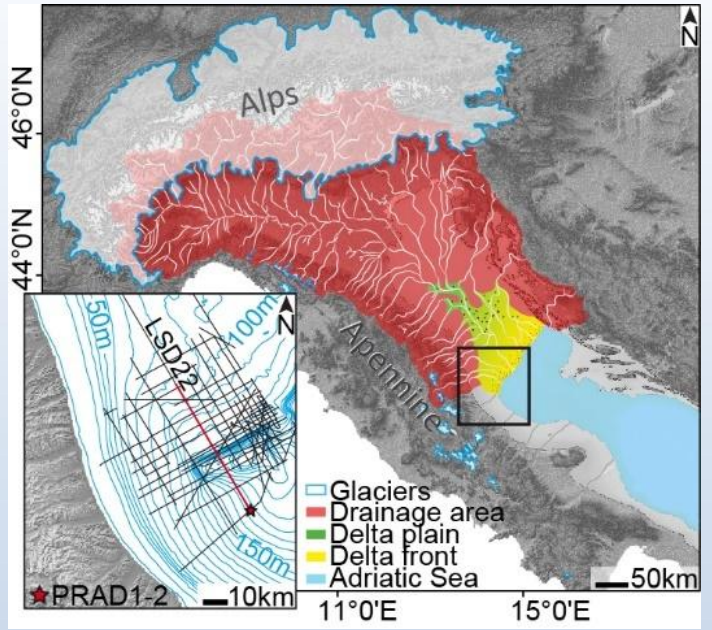
PRAD 1-2 tephra	n	Classification	Monticchio tephra layer	RF95-7 tephra layer	Origin	Volcanic event	Published date (ka BP)	Dating method	Modelled 2σ age (cal yr BP)
PRAD-2375	8	Unknown	TM-22	N/A	Pantelleria	Ignimbrite z unit	79.3 ± 4.2	$^{40}Ar/^{39}Ar$	86,390–83,217
PRAD-2525	92	P/Tr	TM-23-11	N/A	CVZ	POP-1	92.4 ± 4.6	$^{40}Ar/^{39}Ar$	95,198–90,915
PRAD-2605	28	P	Unknown	N/A	CVZ	N/A	N/A	N/A	100,686–94,270
PRAD-2812	27	P/Tr	TM-27	N/A	CVZ	X-6	108.9 ± 1.8	$^{40}Ar/^{39}Ar$	111,778–106,053
PRAD-3065	N/A	N/A	Unknown	N/A	Unknown	Unknown	N/A	N?A	136,638–108,912
PRAD-3225	13	P	TM-38?	322 cm	Vico	Ignimbrite D unit	125.6 ± 6.3	Varves	139,162–121,283
PRAD-3336	10	P	Unknown	335 cm	Roman	W-1	140 ka	N/A	142,369–127,513
PRAD-3383	11	P/Tr	TM-39	N/A	CVZ	Unknown	130.5 ± 6.5	Varves	144,859–129,202
PRAD-3472	11	Tr	N/A	N/A	Unknown	Unknown	N/A	N/A	151,045–131,171
PRAD-3586	10	P	N/A	410/419 cm	Vico	V-2/Sutri Formation	151 ± 3.0	$^{40}Ar/^{39}Ar$	160,474–132,360
PRAD-3666	10	P	N/A	450 cm	Latium	Unknown	N/A	N/A	181,077–156,346

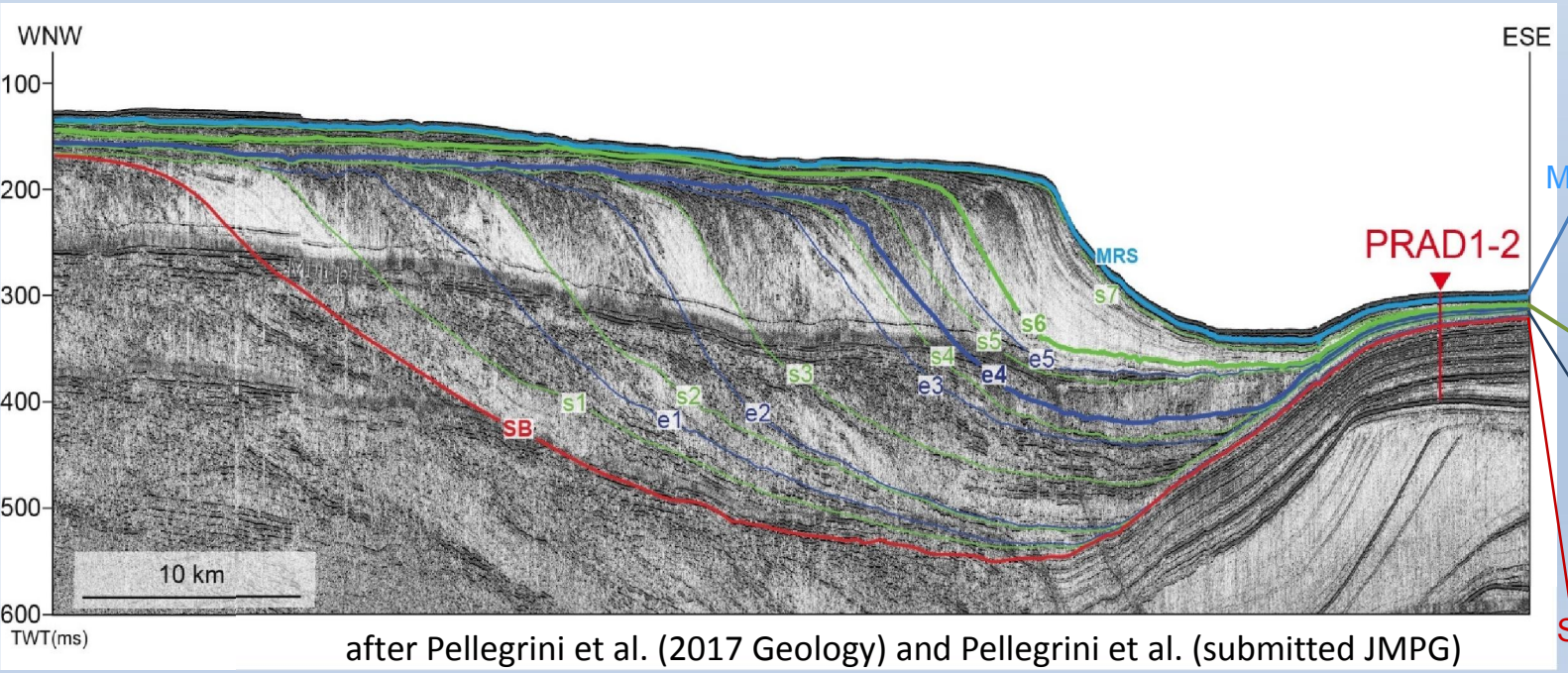
ExxonMobil ISMAR Istituto di Scienze Marine

ExxonMobil-ISMAR contract EM08382 (2013-2016)

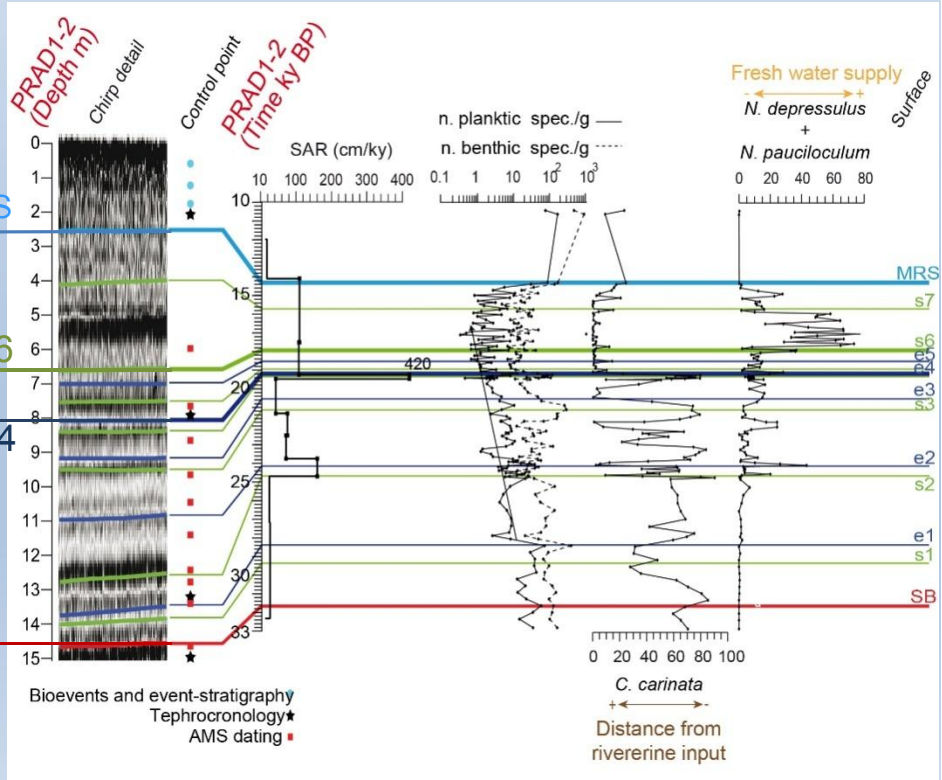
5) PRAD1-2 borehole allowed to:

- calibrate the seismic grid
- dating the LGM progradational wedge of the Central (each clinothem is 400 to 5000 years in time and > 100 m thick)
- provide detailed (secular to millennial) paleoenvironmental reconstruction of the LGM





after Pellegrini et al. (2017 Geology) and Pellegrini et al. (submitted JMPG)



The Promess partners attending the final meeting during EGU in Vienna (April 2006)