

L'immersione scientifica nelle Scienze della Terra

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"Carlo Bo"



Il Geologo sott'acqua



Un po' di
storia...

Approccio alla Geologia subacquea





**Palombaro al
lavoro**



**Autorespiratore
ad Ossigeno
CRESSI. Numana
(AN), 1958**



**Autorespiratore ad Aria con erogatore “Mistral”.
Is. del Tino (SP), 1962**



**Il precursore dei
moderni respiratori ad
aria di R. Rouquaryol e
A. Denayrouze, 1864**

UNDERWATER MAPPING BY DIVING GEOLOGISTS¹

H. W. MENARD,² R. F. DILL,³ E. L. HAMILTON,² D. G. MOORE,² GEO. SHUMWAY,²
M. SILVERMAN,² AND H. B. STEWART³
San Diego and La Jolla, California



FIG. 2.—Geologists preparing for diving.

GEOLOGIC USE OF SELF-CONTAINED DIVING APPARATUS¹

ROBERT F. DILL² AND GEORGE SHUMWAY³
San Diego, California

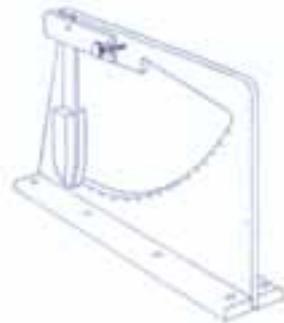


FIG. 3.—Dialometer for measuring sea floor dips and slopes.



FIG. 2.—Experimental "siphon" siltometer. Lower limb goes back up if sediment is present.

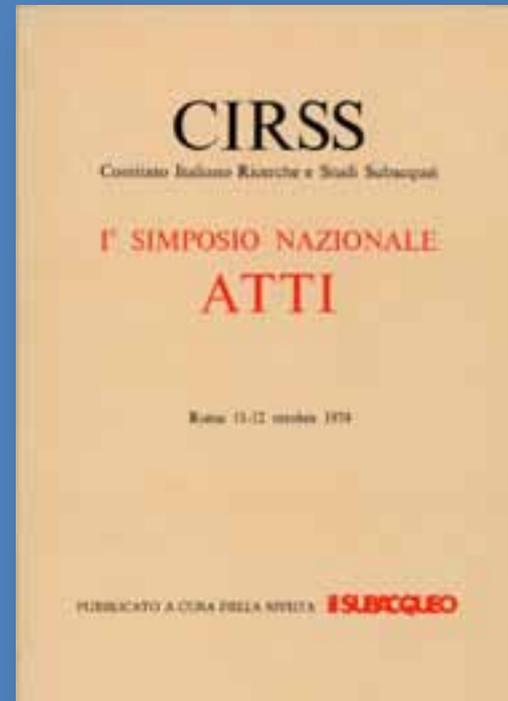
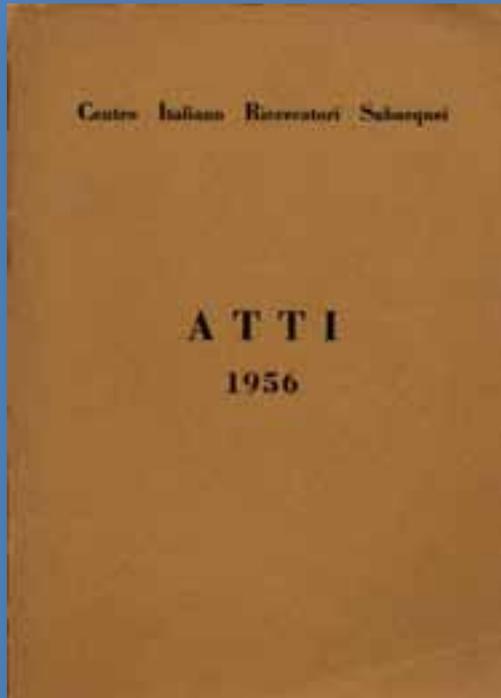


FIG. 4.—Experimental ripplemark measurer.



FIG. 1.—Aqualung as worn by diver.

Primi contributi scientifici



Prime indagini subacquee in apnea

Cala Gonone (NU), 1960

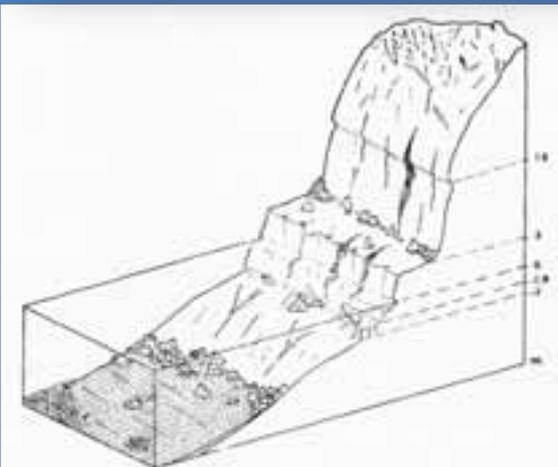
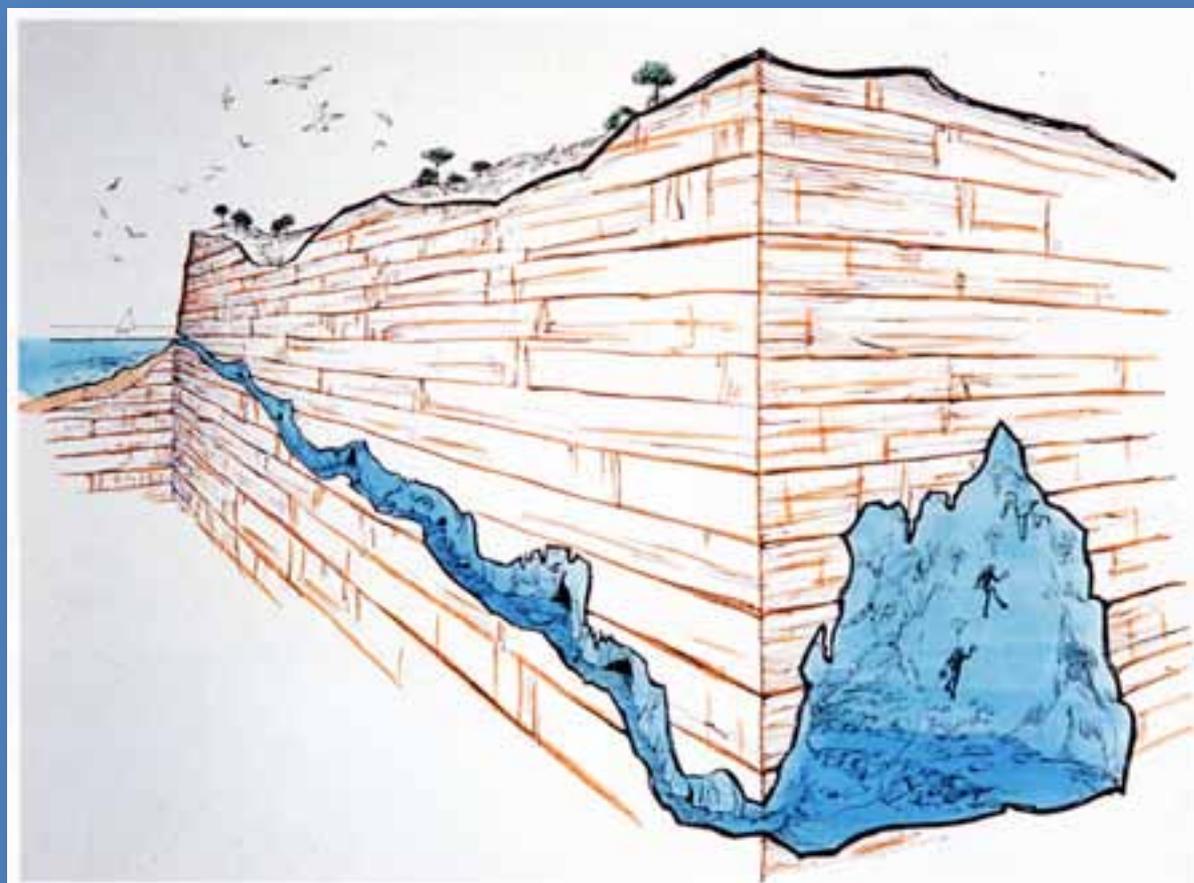


Fig. 4 — Schema delle mischie litorali di riva nel tratto studiato dal Golfo di Oronzi.



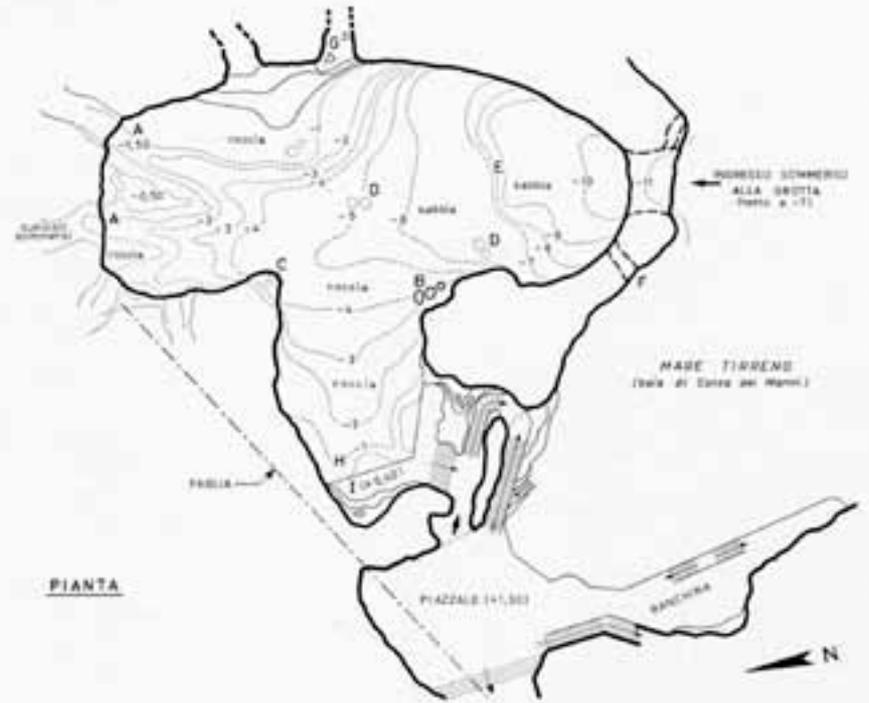
Ferri Ricchi nel 1964

“Speleosub” 1963-70

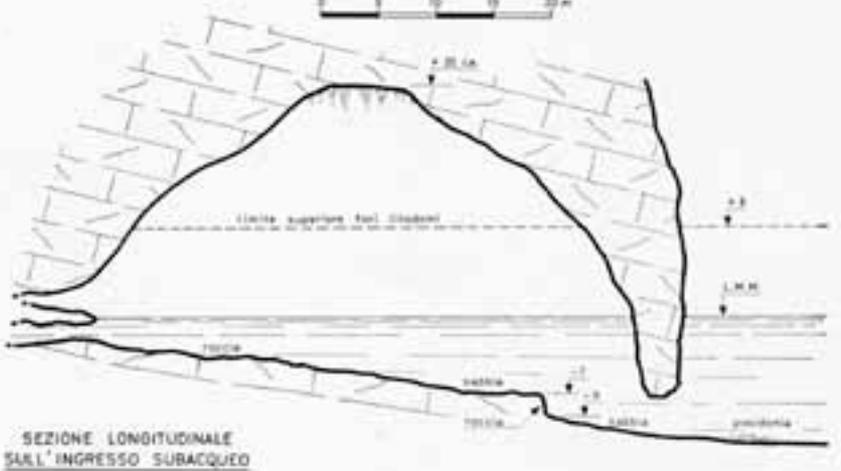


Sezione della
grotta di Cala
Luna - Sardegna
(m 470)

Primi rilevamenti



AMALFI
- GROTTA DELLO SMERALDO -



Grotta dello Smeraldo. Amalfi, 1970

Delta del Po, 1965 – distribuzione dei sedimenti



Legenda:

- 1 = sabbia costiera
- 2 = sabbia siltosa e silt sabbioso
- 3 = silt argilloso e argilla siltosa (limi)
- 4 = sabbia, silt e argilla (*loam*)
- 5 = sabbia argillosa
- 6 = sabbia costiera e di piattaforma
- 7 = sabbia di piattaforma (*"relitta"*)

(dai dati dell'IGM di Bologna)

Sabbie del prisma costiero



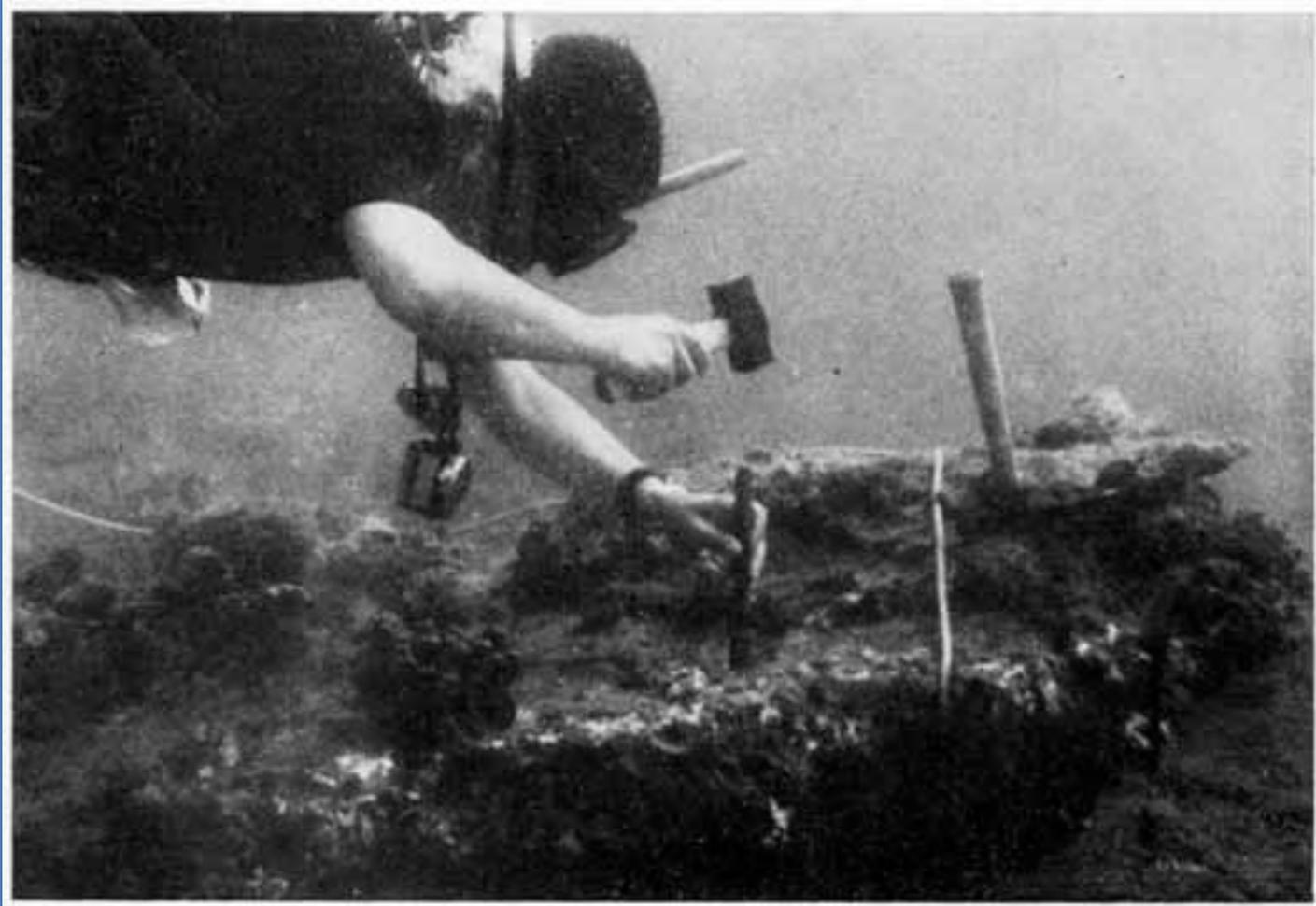
Fascia limosa



Sabbie relitte



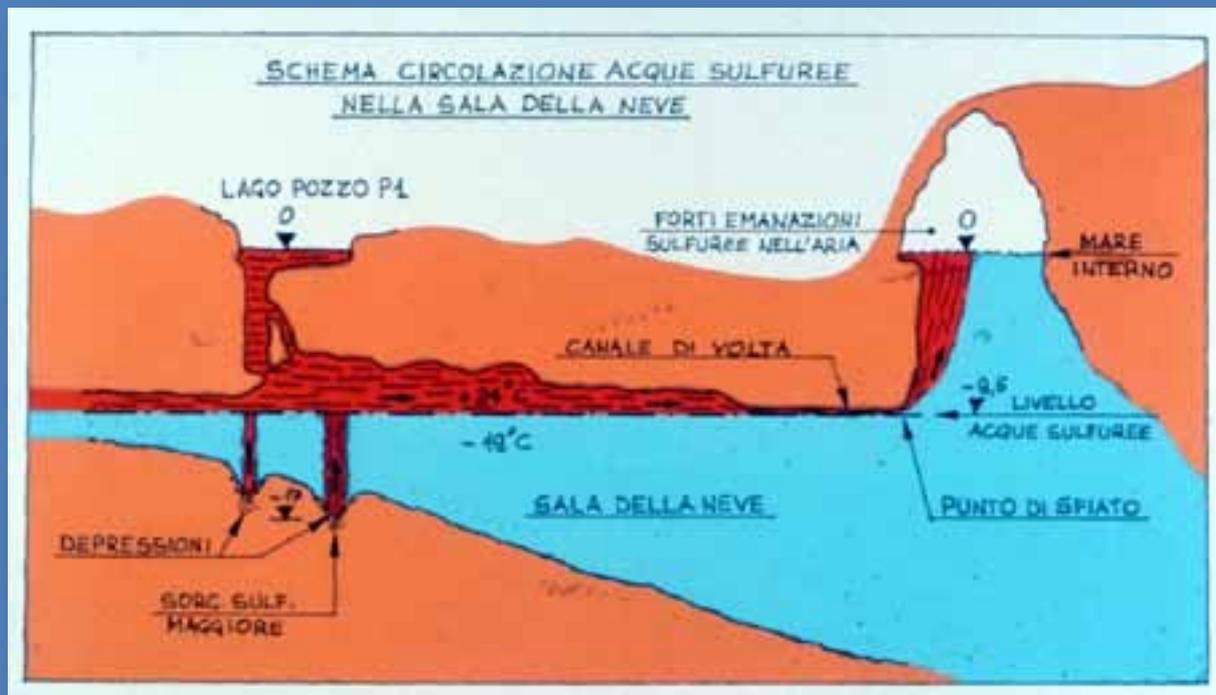
“Tenue” al largo di Lignano



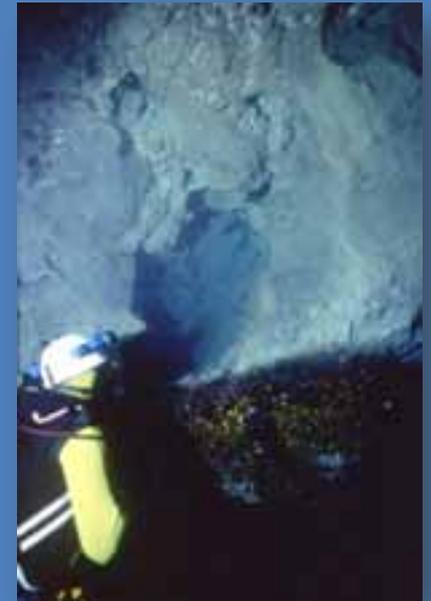
A. Stefanon, 1967



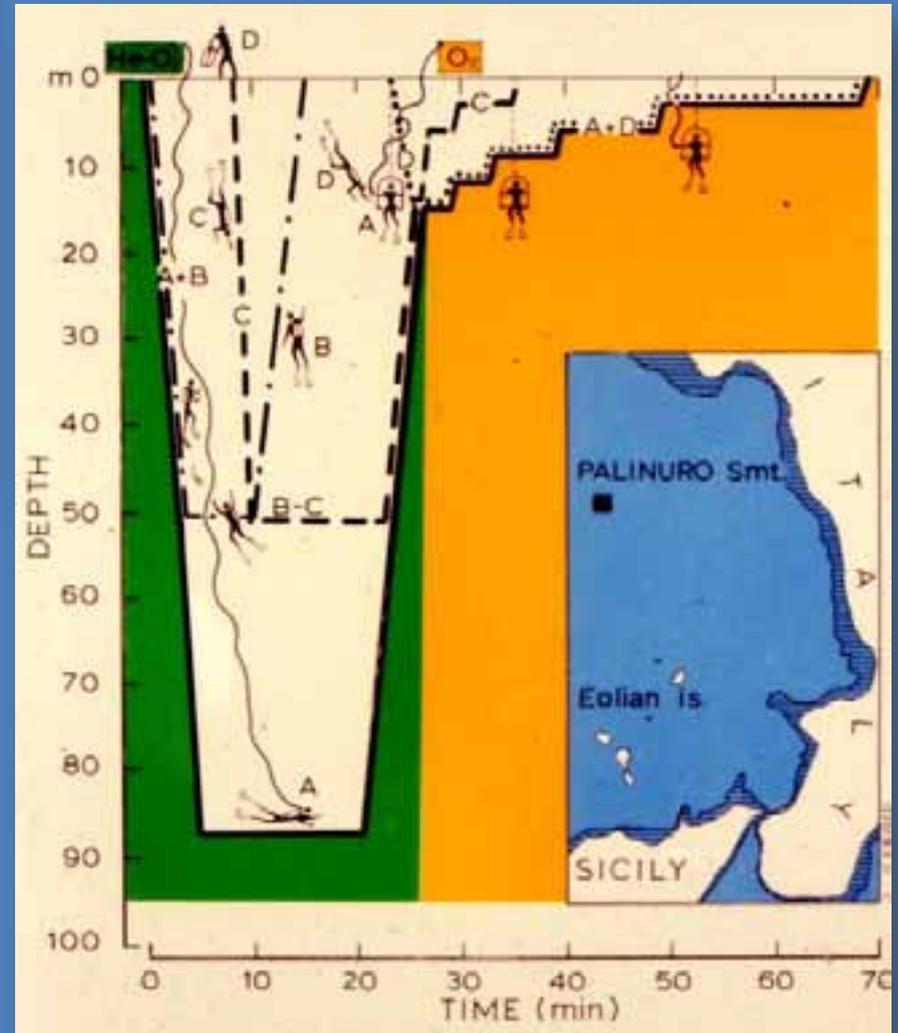
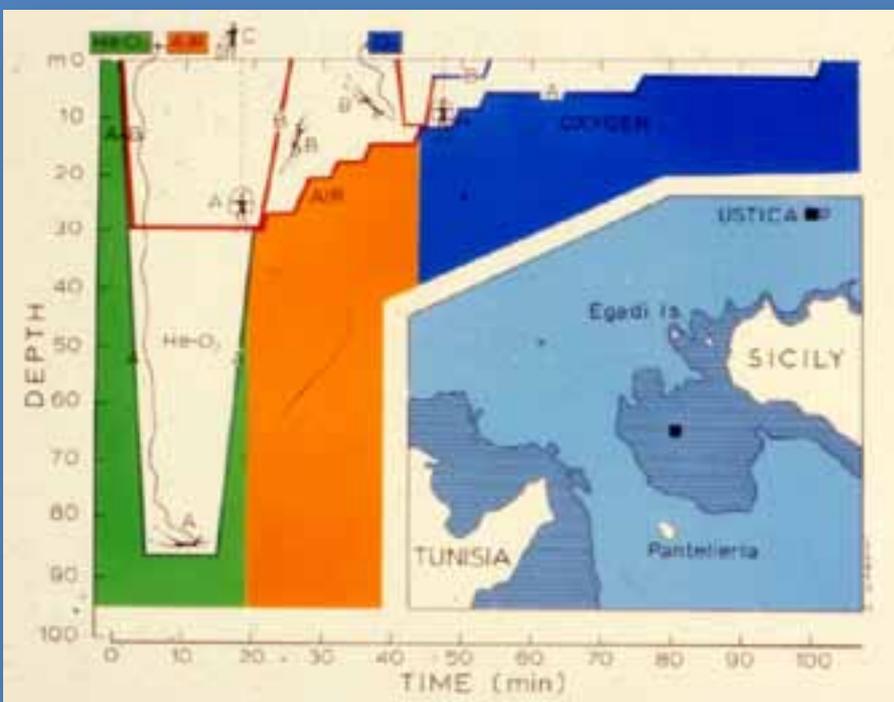
**Fumarole subacquee,
Pozzuoli 1972**



**Acquee sulfuree nelle
grotte di Capo Palinuro**

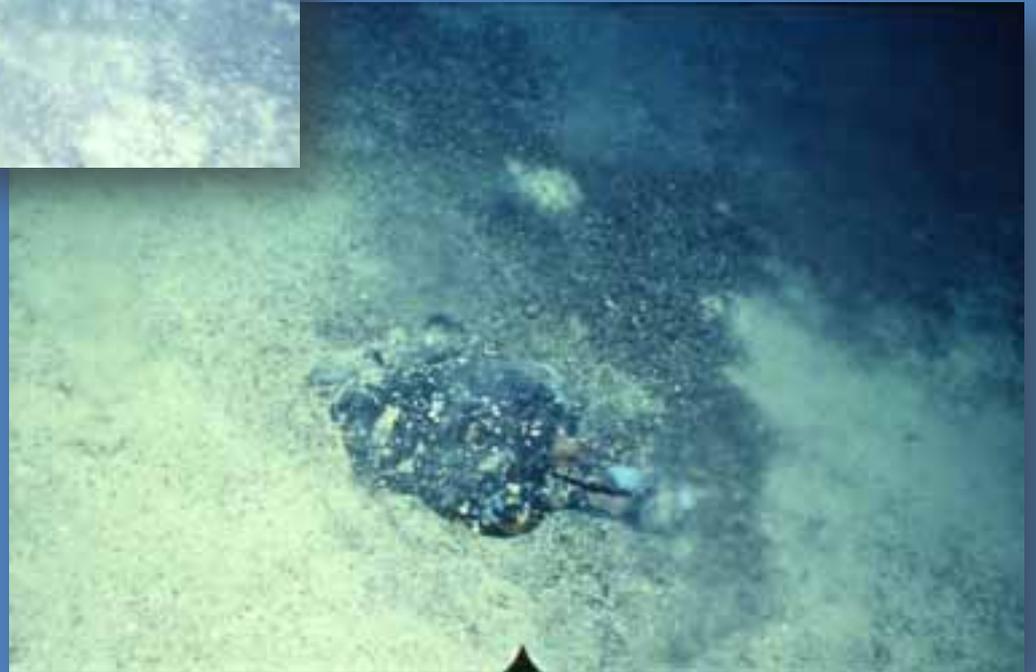


Immersioni con miscela

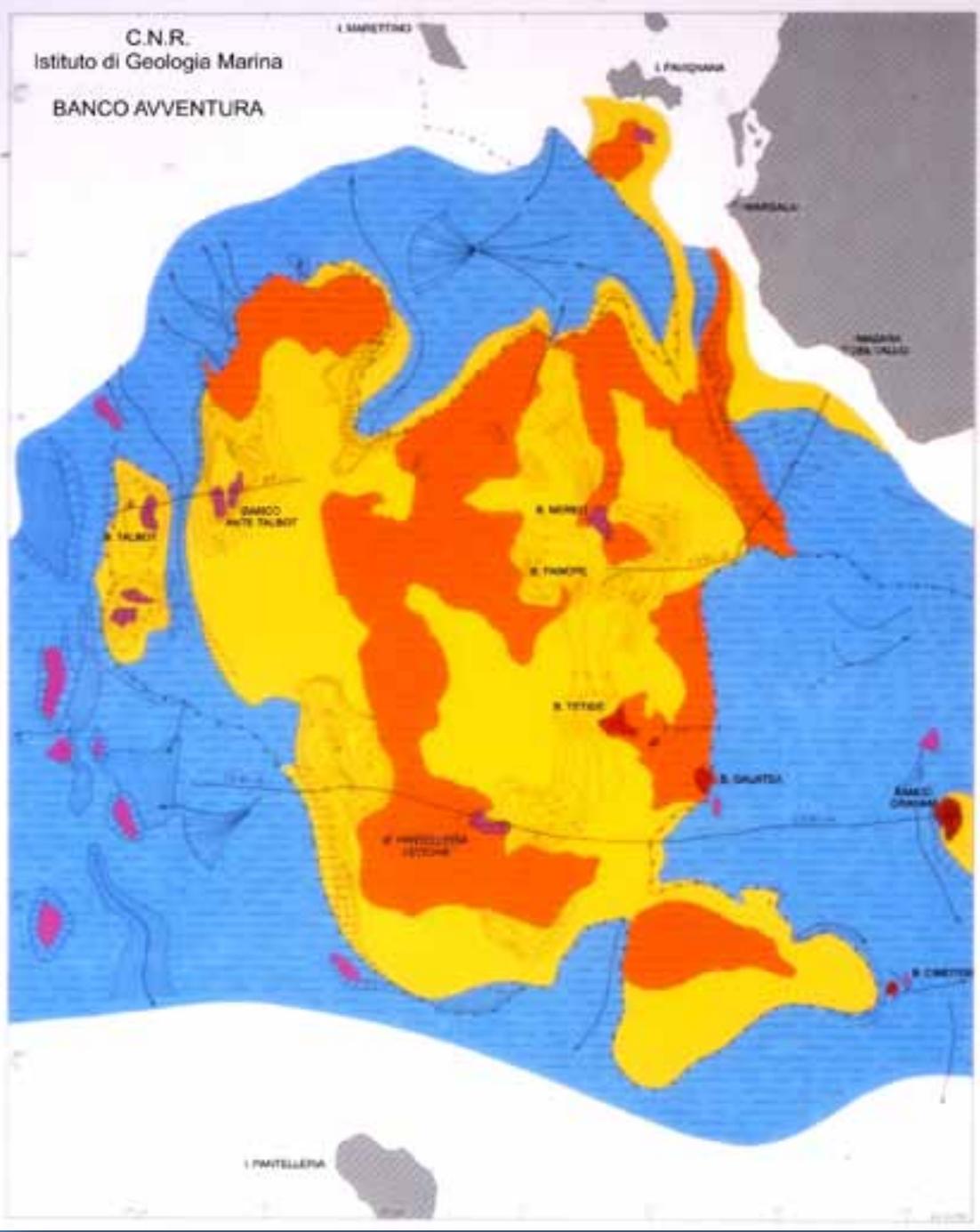




Monte Palinuro

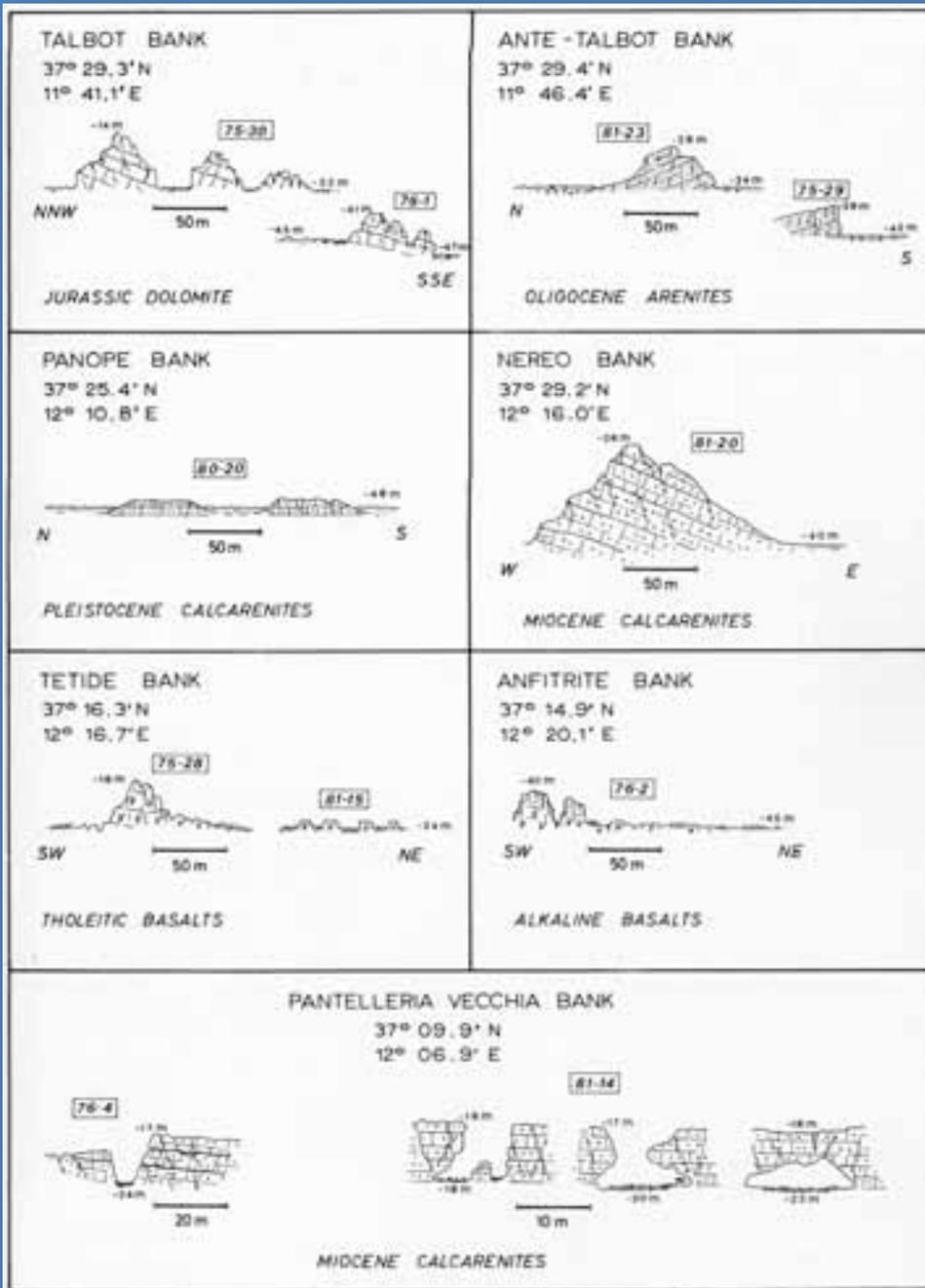


Formazione di depositi di manganese

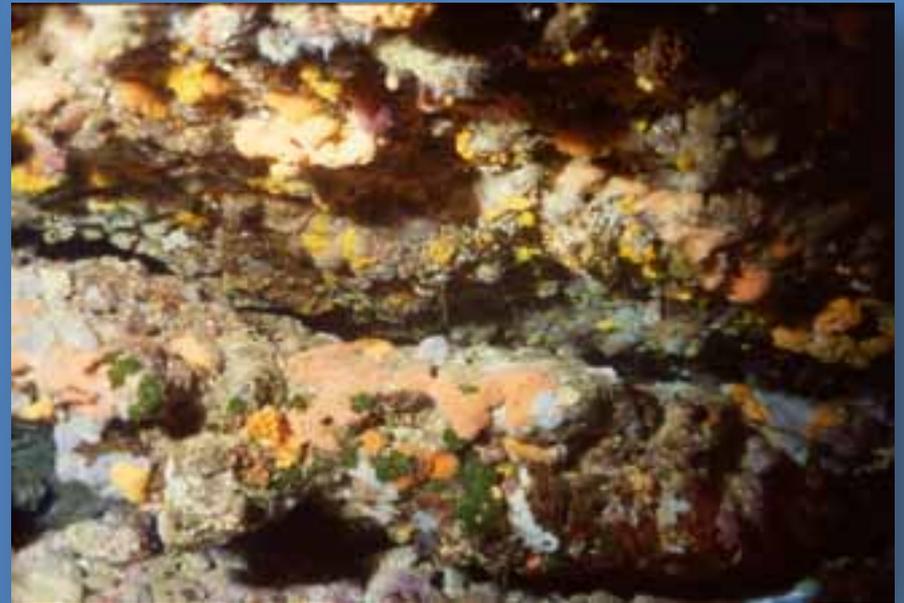


**Carta bati-litologica
del Banco Avventura
(1972-83)**

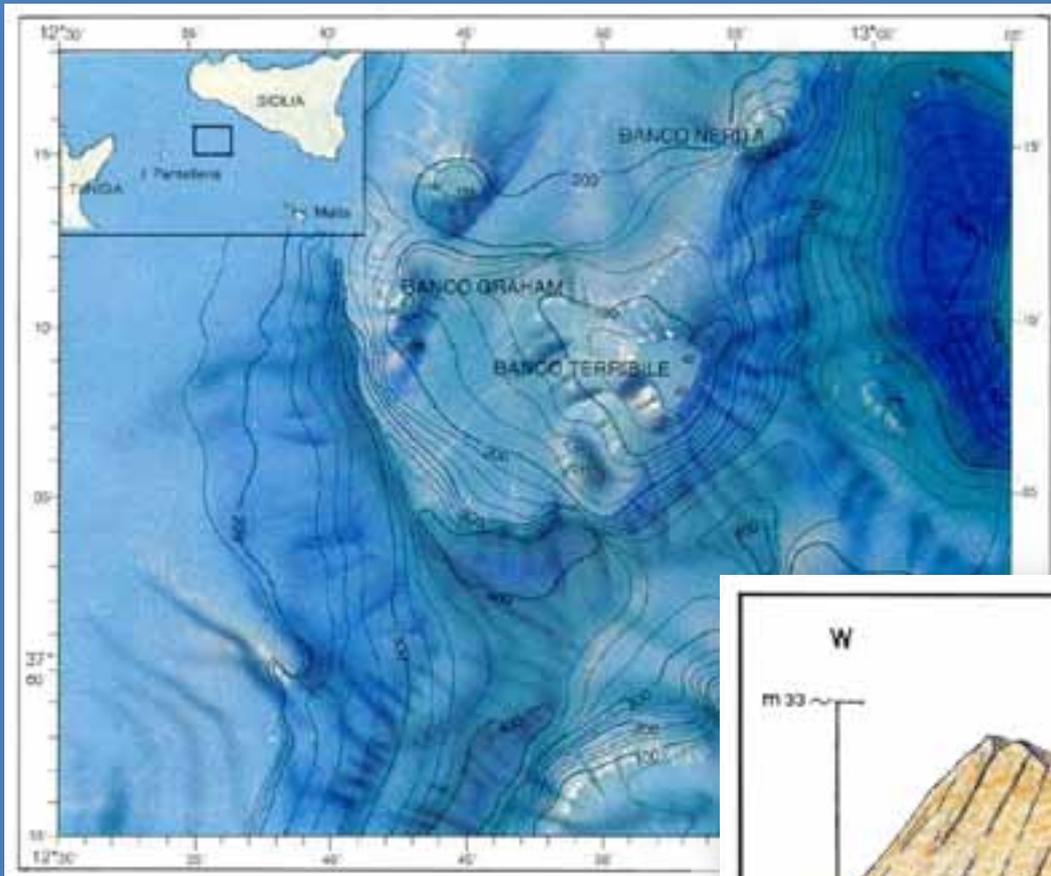
Rilevamenti sul Banco Avventura



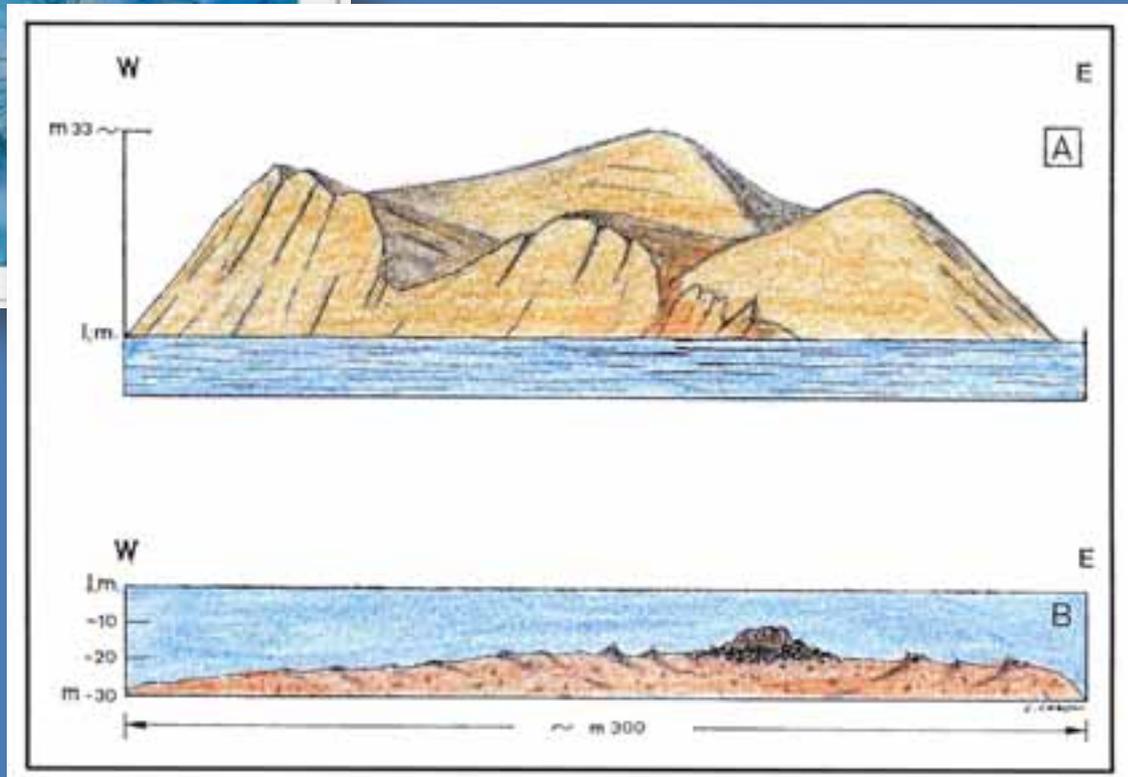
Affioramenti sul Banco Avventura



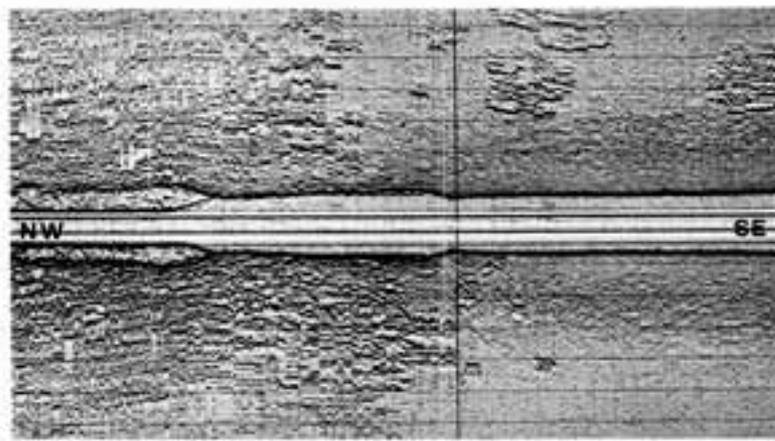
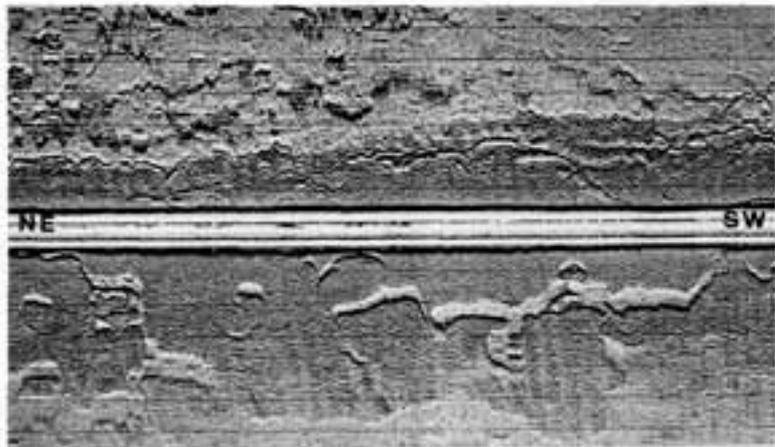
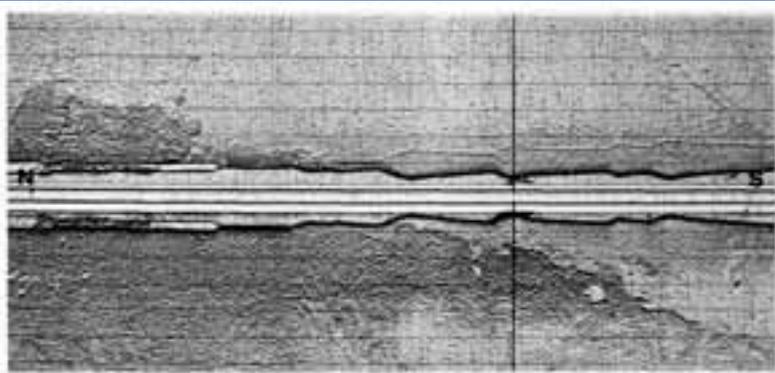
Banco Graham



**Isola Ferdinandea
(Gemellaro-1831) e
Banco Graham
(Colantoni-1975)**



Rilevamento SSS Posidonia, Isola D'Ischia (1982)



Rilevamento subacqueo

RILEVAMENTO GEOLOGICO SUBACQUEO

Osservazione diretta

Attrezzature

Localizzazione

Annotazioni di dettaglio

Campionatura di rocce e sedimenti

Litologia di rocce e sedimenti

Caratteri tessiturali

Strutture sedimentarie

Geometria degli strati

Prove *in situ*

Scavi subacquei

Presentazione dei risultati



Osservazione diretta



**La semplice
attrezzatura da
rilevamento**

Localizzazione



AREA P.I.C. ORGANE OBSERVER LONG. LAT. SITE YR / JD TIME(24) DEPTH

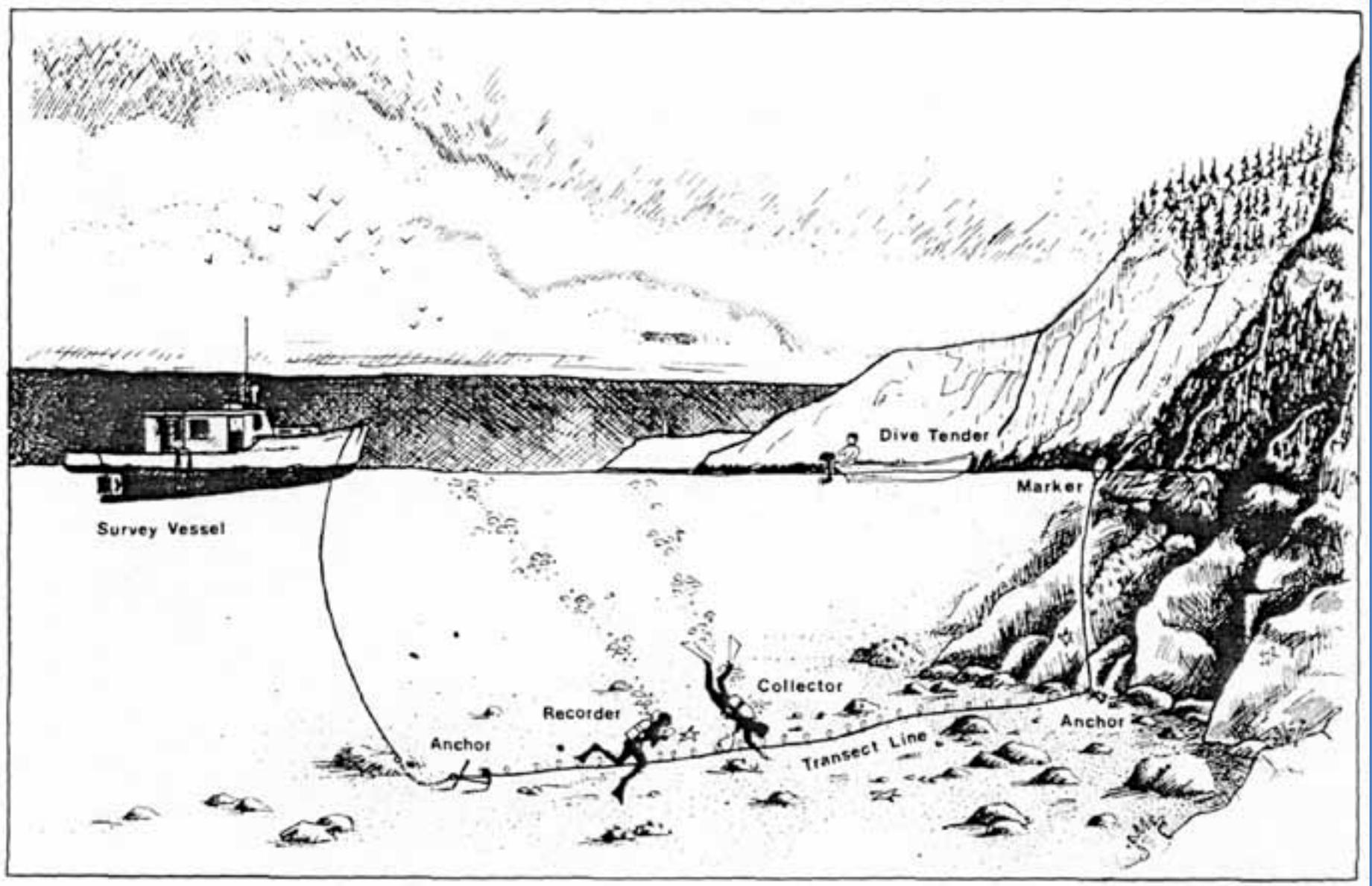
SEDIMENT		RIPPLES		ROCK BOTTOM		COLOR	
<input type="checkbox"/> SH <input type="checkbox"/> GRAVEL <input type="checkbox"/> SAND <input type="checkbox"/> MUD <input type="checkbox"/> SAMPLE <input type="checkbox"/> GAS	<input type="checkbox"/> PRIMARY <input type="checkbox"/> SECONDARY	<input type="checkbox"/> RIBBONS <input type="checkbox"/> PATCHES <input type="checkbox"/> RIPPLES	<input type="checkbox"/> PRIMARY <input type="checkbox"/> SECONDARY <input type="checkbox"/> CRESTS	<input type="checkbox"/> S/M <input type="checkbox"/> A/M	<input type="checkbox"/> S/M <input type="checkbox"/> A/M	<input type="checkbox"/> 100/90 <input type="checkbox"/> 80/5 <input type="checkbox"/> 30/1 <input type="checkbox"/> 10/0	<input type="checkbox"/> NATURAL LIGHT <input type="checkbox"/> ARTIFICIAL LIGHT
<input type="checkbox"/> SLOPE <input type="checkbox"/> FLAT <input type="checkbox"/> UNCLLATING	TESTS <input type="checkbox"/> PENETRATOR <input type="checkbox"/> SHEAR TEST		<input type="checkbox"/> TREND <input type="checkbox"/> STEEP FACE	<input type="checkbox"/> RELIEF <input type="checkbox"/> DIPPING	<input type="checkbox"/> SMOOTH <input type="checkbox"/> UNCLLATING <input type="checkbox"/> ROUGH <input type="checkbox"/> RIDGED	<input type="checkbox"/> STRONG <input type="checkbox"/> WEAR	<input type="checkbox"/> SURFACE <input type="checkbox"/> WHITE <input type="checkbox"/> BROWN <input type="checkbox"/> GREY <input type="checkbox"/> BLACK <input type="checkbox"/> TAN <input type="checkbox"/> SURFACE LAYER THICKNESS <input type="checkbox"/> SUB SURFACE
<input type="checkbox"/> DIPPING	<input type="checkbox"/> GAS <input type="checkbox"/> CORE <input type="checkbox"/> PHOTO <input type="checkbox"/> VIDEO	<input type="checkbox"/> SAND <input type="checkbox"/> MUD <input type="checkbox"/> SAMPLE	<input type="checkbox"/> MAIN TROUGHS <input type="checkbox"/> SAND <input type="checkbox"/> MUD <input type="checkbox"/> SAMPLE	<input type="checkbox"/> SEAWEED/ALGAE <input type="checkbox"/> SURFACE WEATHERING <input type="checkbox"/> CRUST <input type="checkbox"/> CRACKING C R	<input type="checkbox"/> 100/90 <input type="checkbox"/> 80/5 <input type="checkbox"/> 30/1 <input type="checkbox"/> 10/0	<input type="checkbox"/> WHITE <input type="checkbox"/> BROWN <input type="checkbox"/> GREY <input type="checkbox"/> BLACK <input type="checkbox"/> TAN	<input type="checkbox"/> SURFACE WEATHERING <input type="checkbox"/> CRUST <input type="checkbox"/> CRACKING C R

13
11
9
7
5
3
1

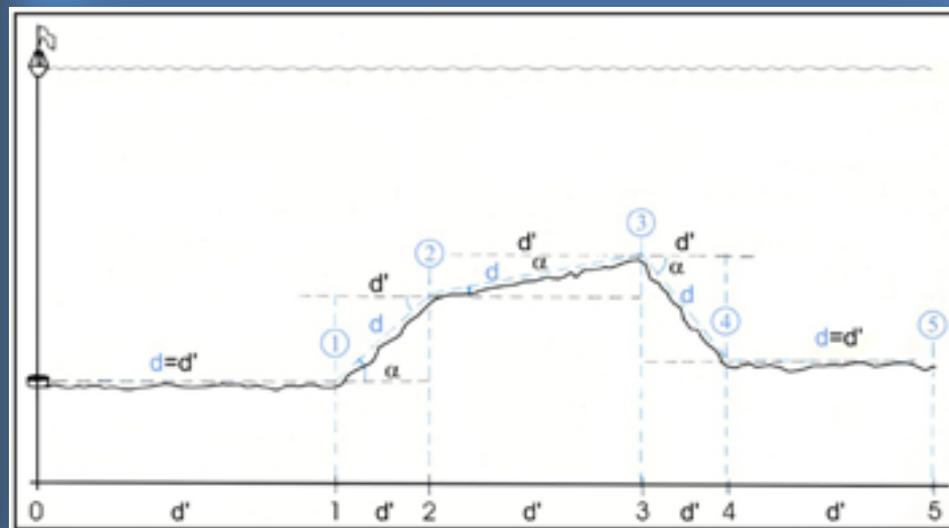
1 5 10 15 20 25

Annotazioni di dettaglio

Rilevamento lungo transetto



Rilevamento topografico



ELEMENTI DI BASE DEL RILEVAMENTO

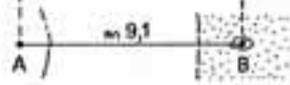


TRATTA O SEGMENTO DI POLIGONALE (SVILUPPO SPAZIALE)

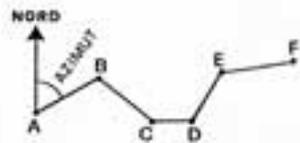
SONO INDICATE LUNGHEZZA, ORIENTAMENTO E PROFONDITÀ DEI DUE CAPOSALDI



TRATTA IN SEZIONE

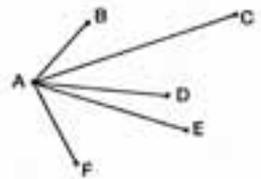


TRATTA RIPORTATA IN PIANTA (SVILUPPO PLANIMETRICO)

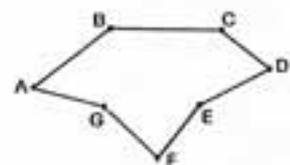


P. APERTA

POLIGONALI SEMPLICI

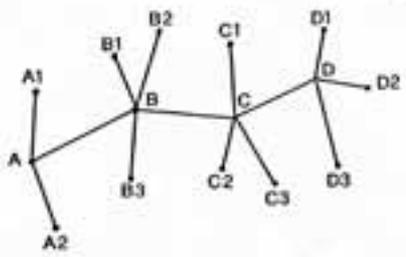


P. AD IRRAGGIAMENTO

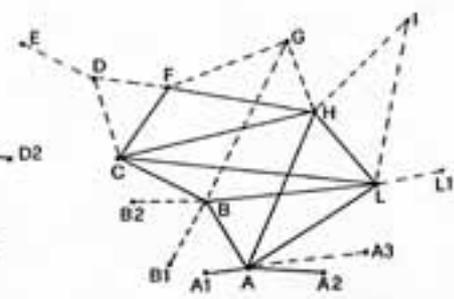


P. CHIUSA

ESEMPI DI POLIGONALI COMPOSTE



P. A LISCA DI PESCE



P. A RAGNETELA

— TRATTE A FELD D'ACQUA — — T. SUBACQUEE

Dettagli del rilevamento



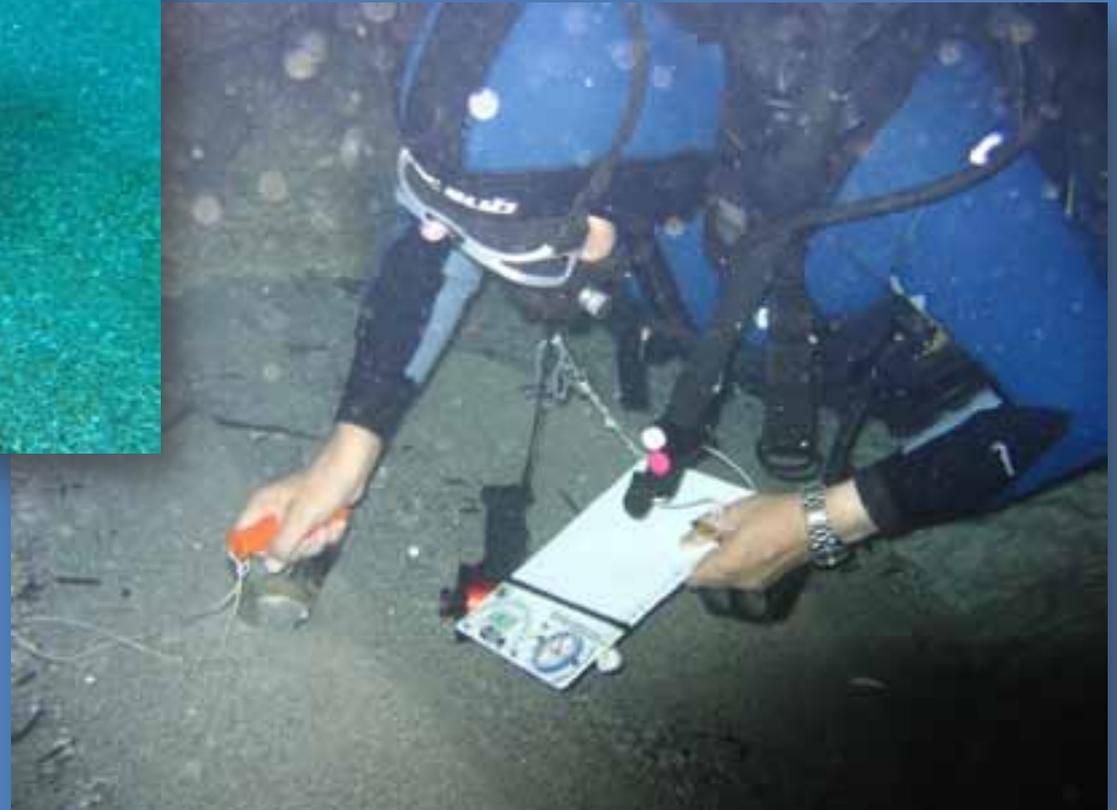
Rilevamento in grotta



Campionatura di affioramenti rocciosi



Campionatura di sedimenti sciolti



Valutazione caratteri tessiturali



Misura giaciture



Impregnazione con resine



Bioturbazioni



Misura dei *ripples*



Prova in situ



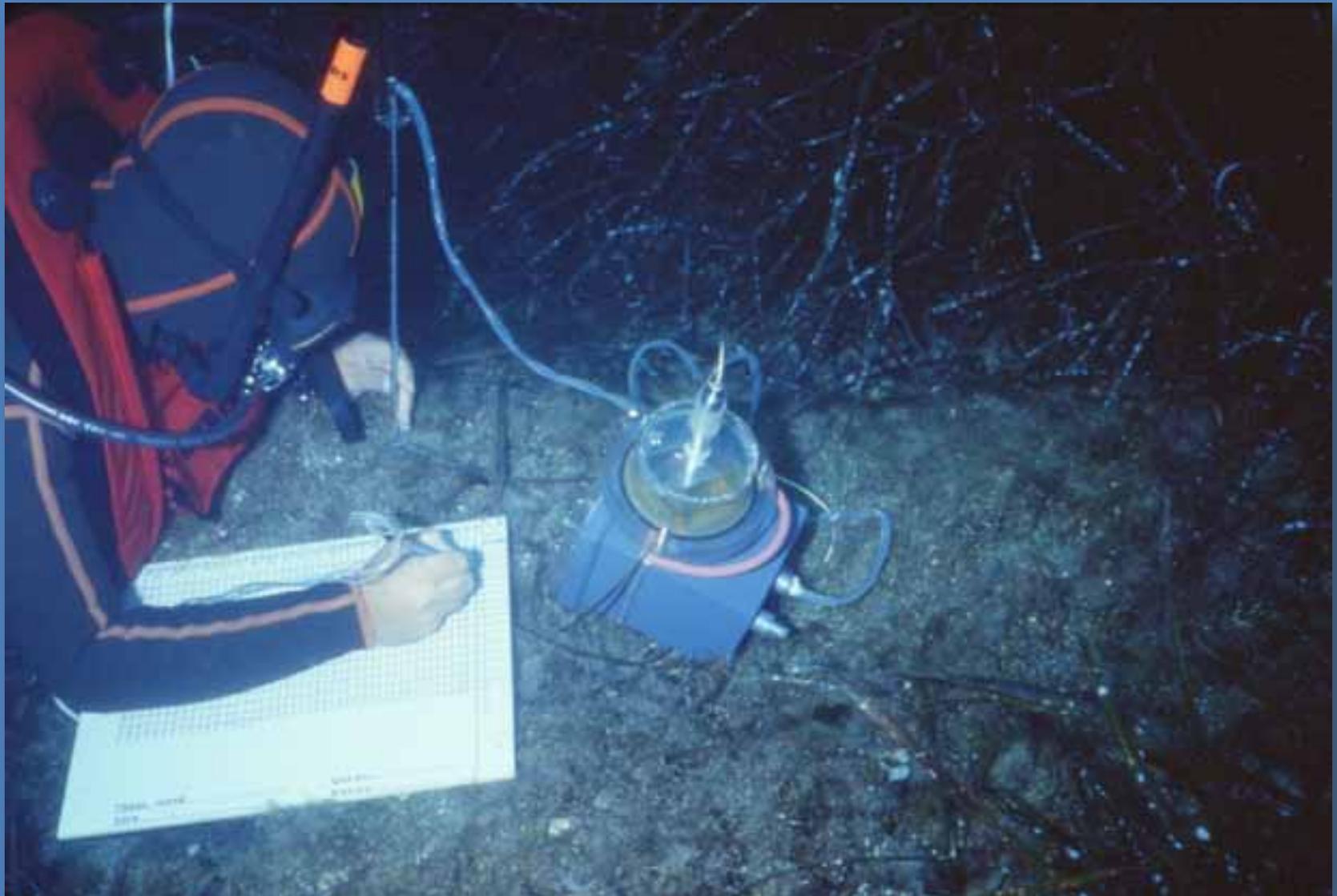
Penetrometro



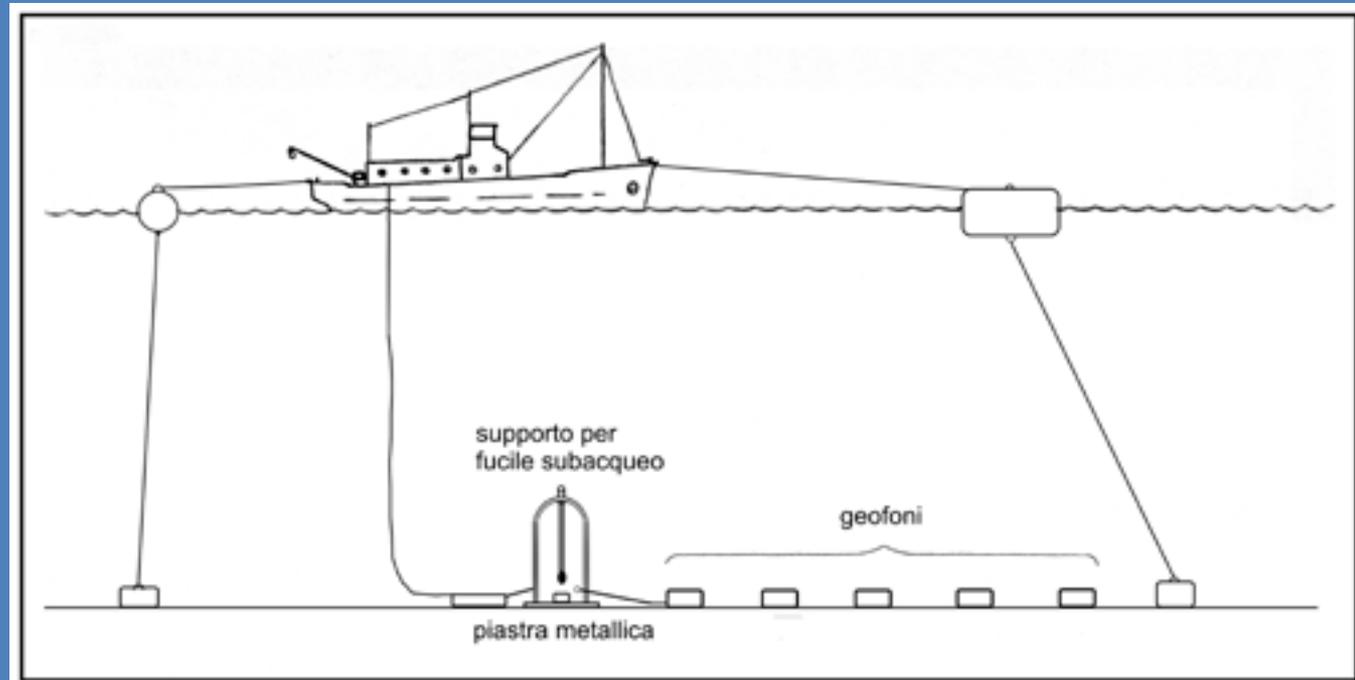
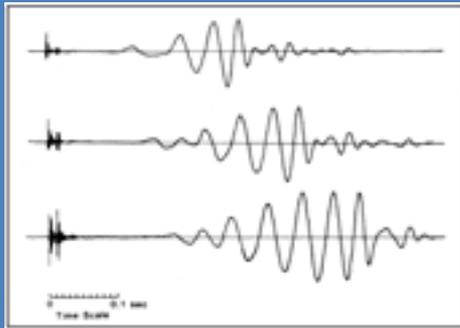
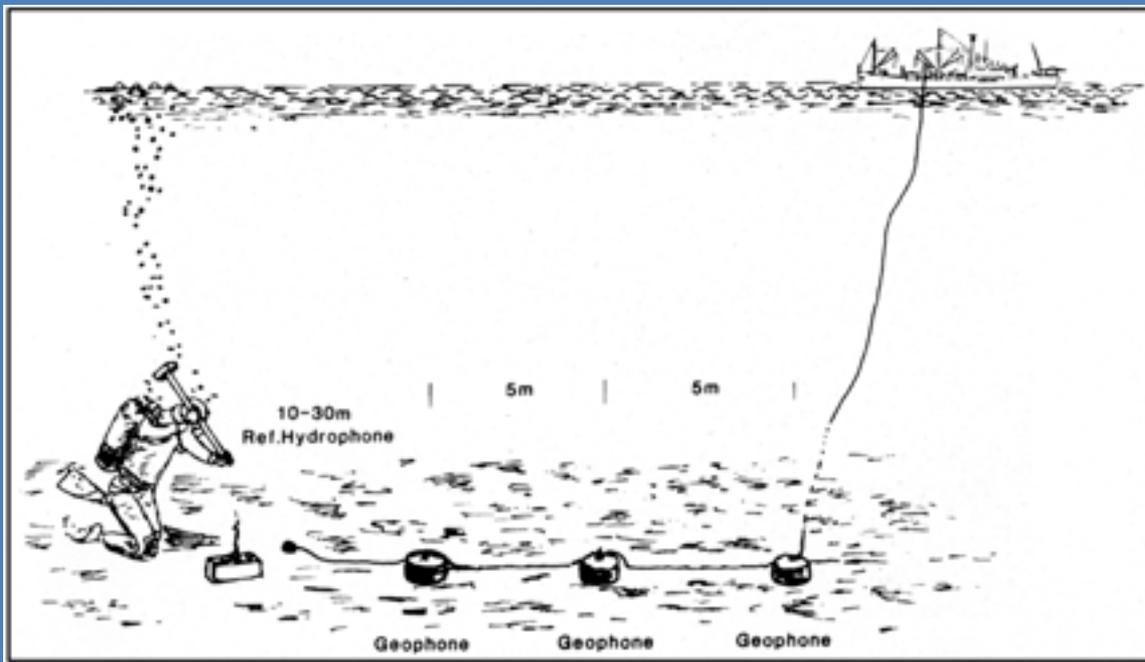
**Scissometro e
penetrometro
per prove *in situ***



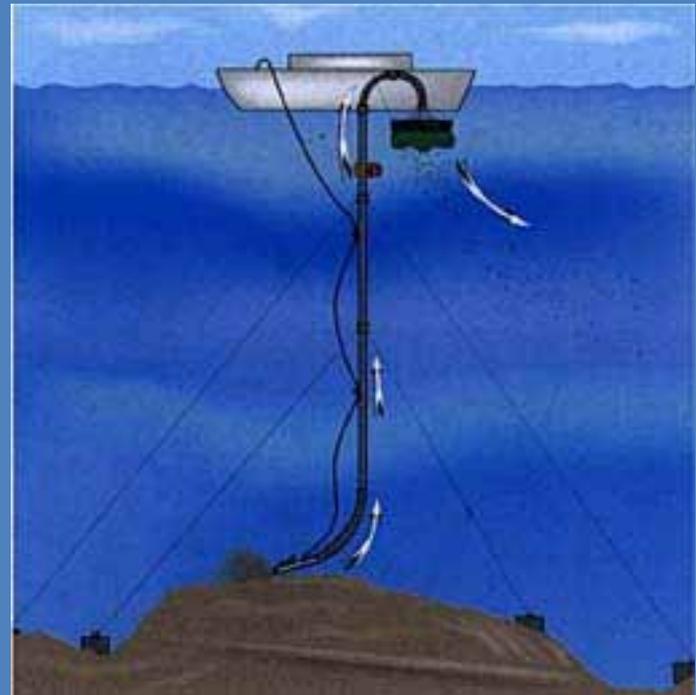
Misure pH Eh



Misure di acustica



Scavi subacquei





Elaborazione e presentazione dei risultati





grazie per
l'attenzione

Schmitz