



# Geoscienze e cambiamenti globali: rischi, risorse, sostenibilità



**Antonello Provenzale**  
**Istituto di Geoscienze e Georisorse del CNR**



Geodinamica

Geomateriali

Geocronologia  
e ricostruzioni  
paleoambientali

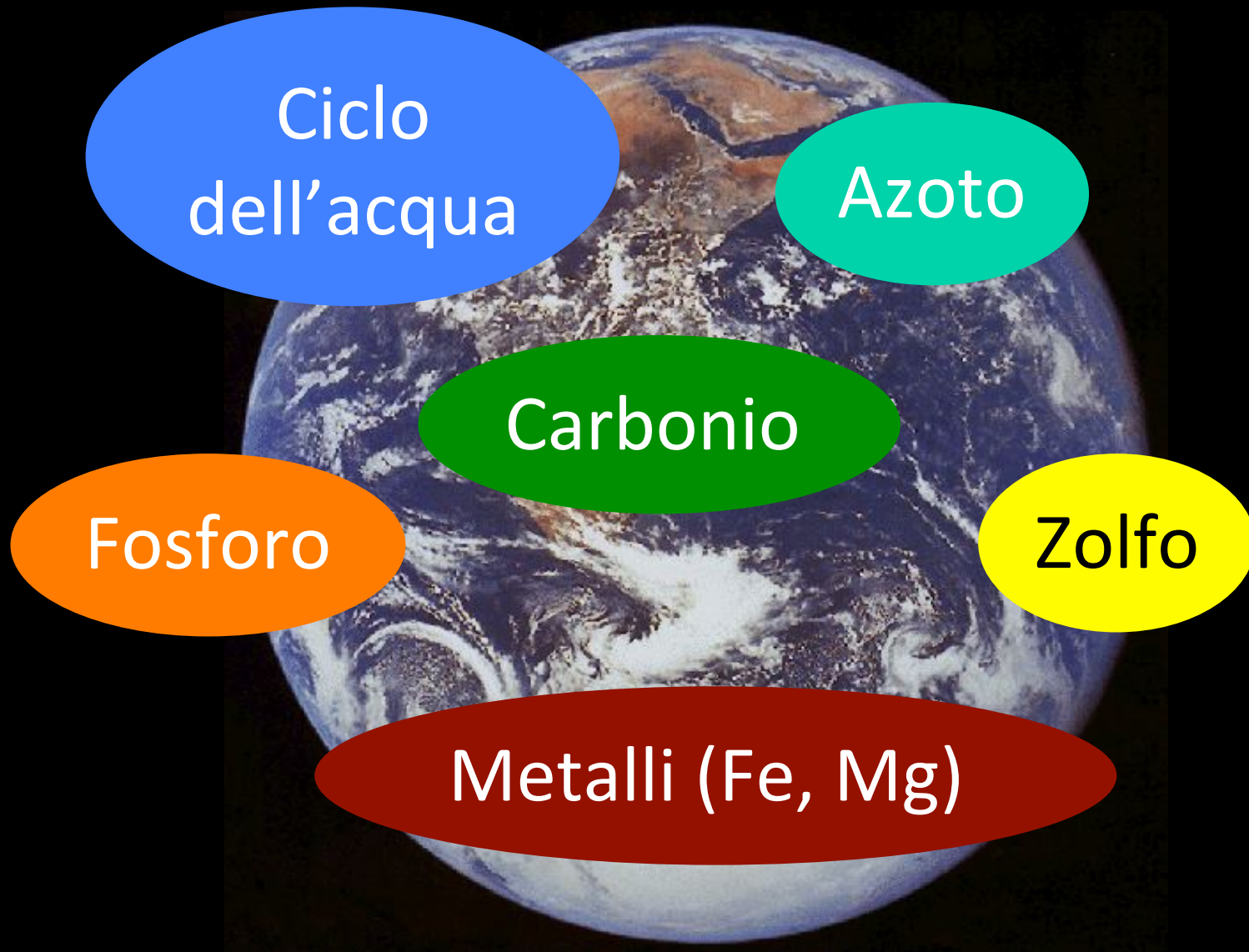
Ciclo del carbonio  
e interazioni  
geosfera-biosfera

Geotermia

Pericolosità geologica  
e ambientale

Acquiferi

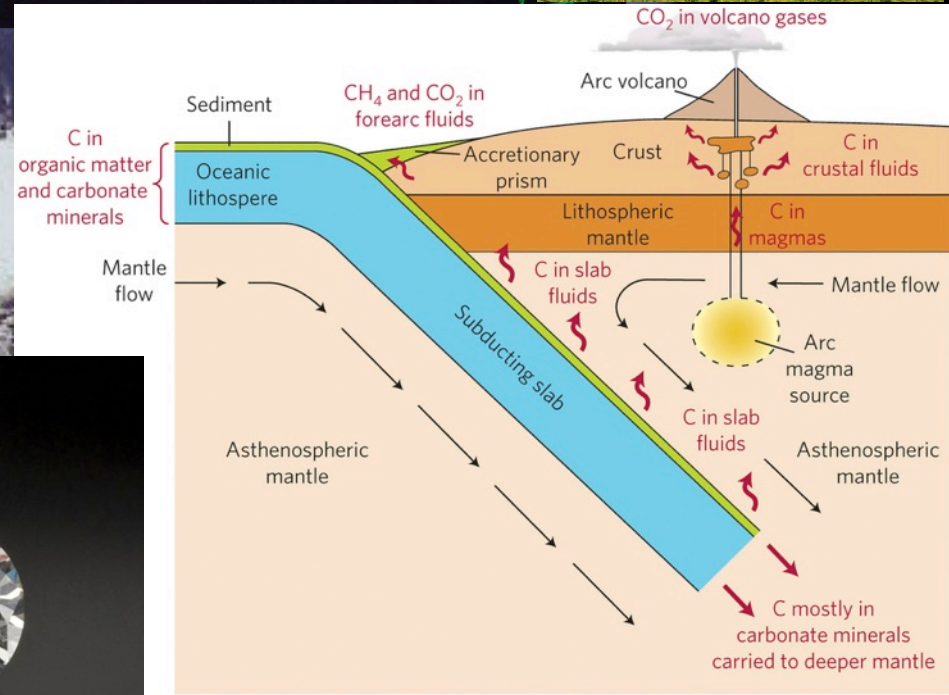
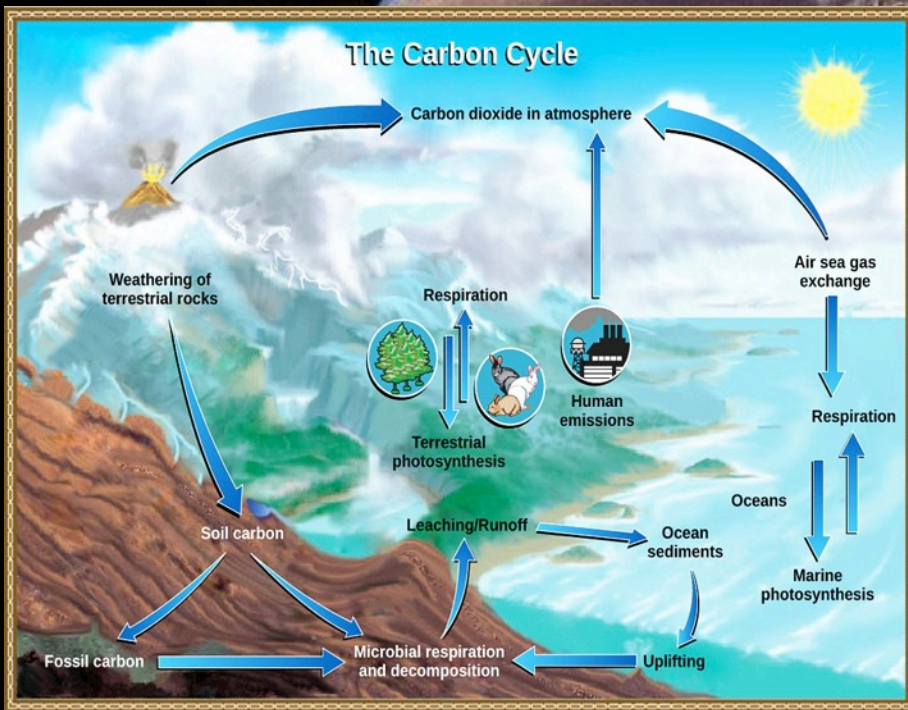
**Attività dell'Istituto di Geoscienze e Georisorse**



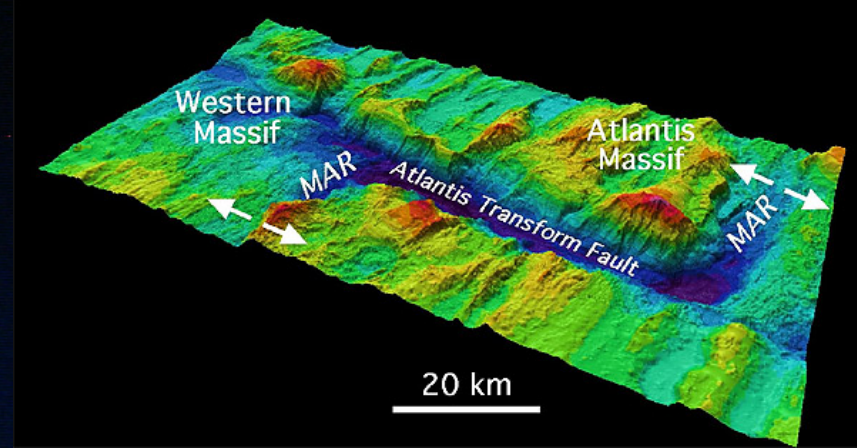
**Il Sistema Terra è caratterizzato da un insieme di cicli biogeochimici interconnessi**

# Il ciclo globale del carbonio

## fra geosfera, biosfera e riscaldamento globale



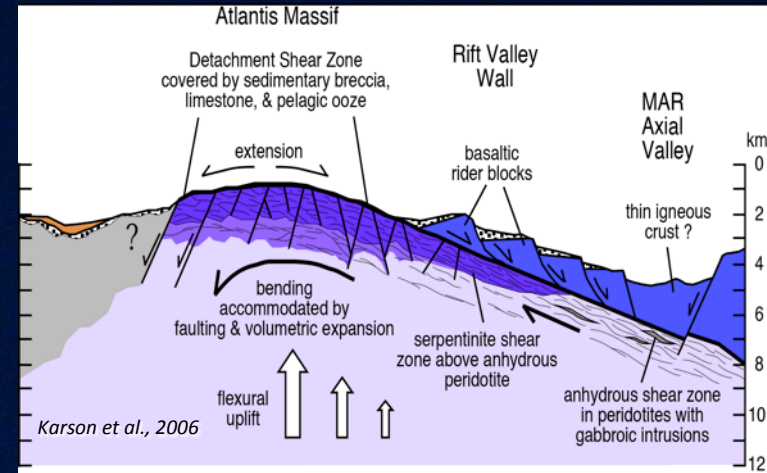
# ***Serpentinizzazione in ambiente oceanico: motore biogeochimico dei processi oceanici?***

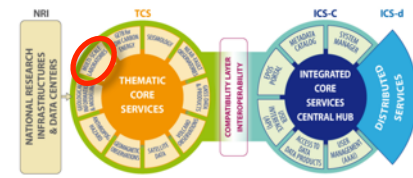


**La presenza di serpentiniti sui fondali oceanici: quali conseguenze per la biosfera, per l'attività idrotermale, per il sequestro mineralogico di carbonio, per i cicli biogeochimici, per i processi tettonici di espansione dei fondali oceanici?**

**IGG proponente e partecipante alla spedizione IODP 357:**

**ATLANTIS MASSIF SEAFLOOR PROCESSES: SERPENTINIZATION AND LIFE**





# Laboratori IGG nella ESFRI EPOS

LAB chimica gas; LAB geocronologia e geochemica isotopica; LAB microanalisi geochemica e cristallochimica; LAB modellizzazione tettonica



# Tracciabilità isotopica: ICP-MS multicollettore

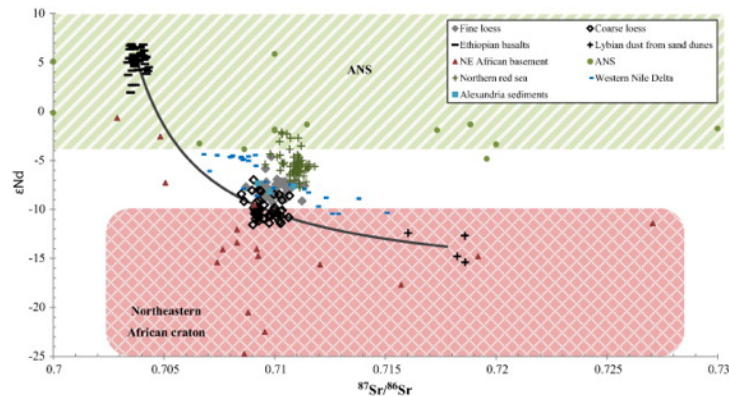
<div> <div></div> Analisi isotopiche in IGG (Sp. Gas)                 <div></div> Analisi isotopiche in IGG (Sp. Gas Rari)                 <div></div> Analisi isotopiche in IGG (TIMS)                 <div></div> <b>Analisi isotopiche con MC-ICP-MS</b> </div>															
1 H 1.0079	2 He 4.0026														
3 Li 6.941	4 Be 9.0122	5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180								
11 Na 22.990	12 Mg 24.305	13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.06	17 Cl 35.453	18 Ar 39.948	19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.88	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc 98.906	44 Ru 101.07	45 Rh 102.91	46 Pd 106.90	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.6
55 Cs 132.91	56 Ba 137.33	57-70 Lanthanide series	71 Lu 174.97	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98
87 Fr [223]	88 Ra [226]	89-102 Actinide series	103 Lr [260]	104 Rf [261]	105 Db [262]	106 Sg [266]	107 Bh [264]	108 Hs [269]	109 Mt [268]	110 Uun [271]	111 Uuu [272]	112 Uub [273]	113 Uut [284]	114 Uuq [289]	115 Uuq [289]



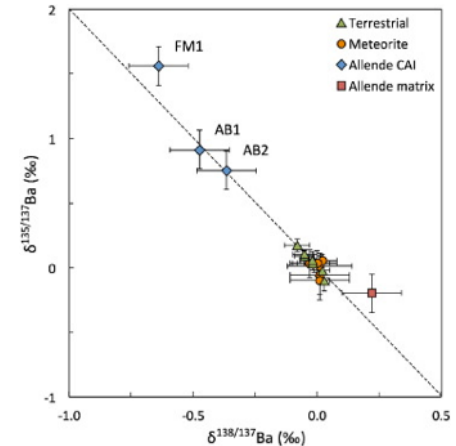
\* Lanthanide series

57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm [145]	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04
89 Ac [227]	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np [237]	94 Pu [244]	95 Am [243]	96 Cm [247]	97 Bk [247]	98 Cf [251]	99 Es [252]	100 Fm [257]	101 Md [258]	102 No [259]

\* Actinide series

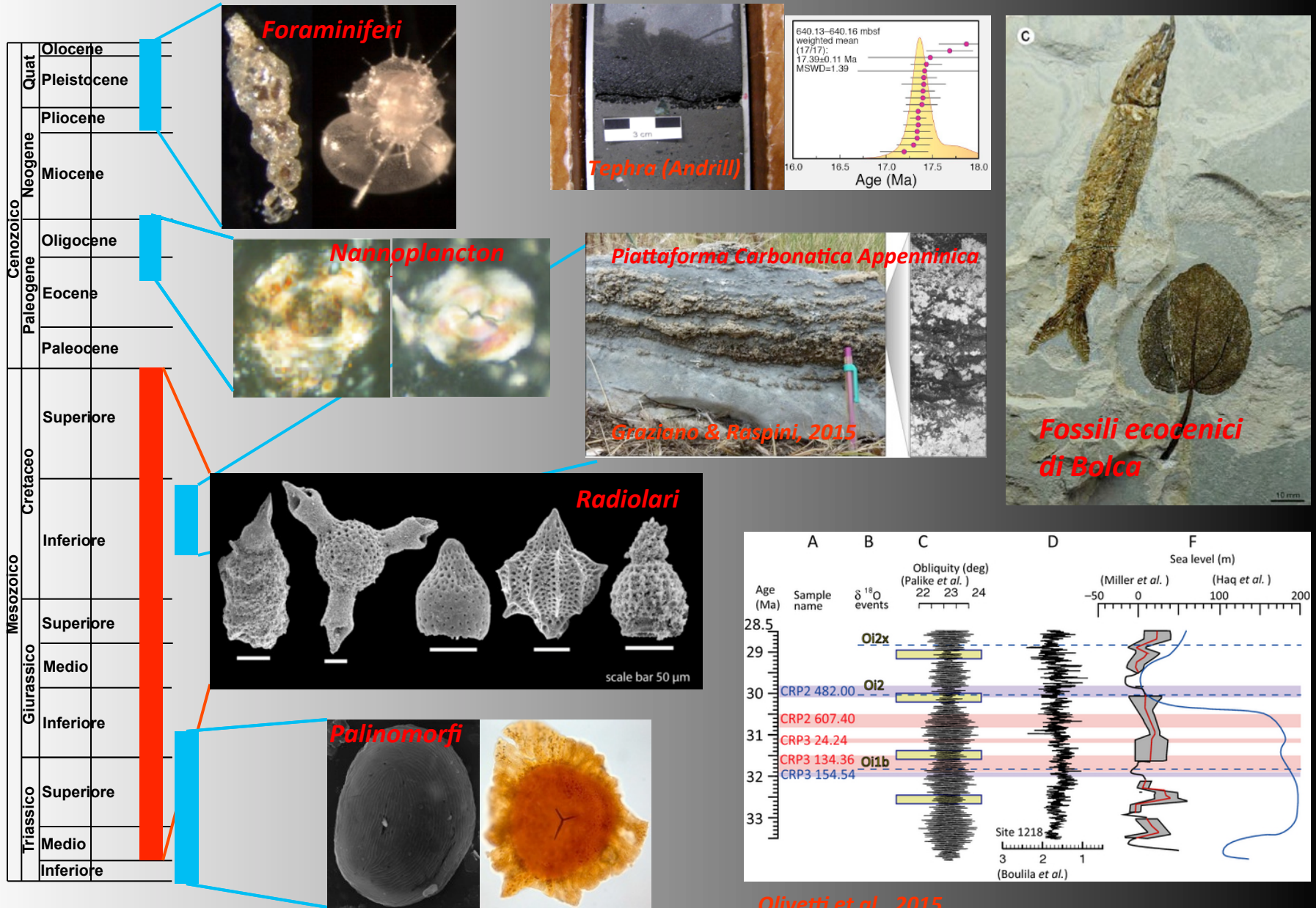


Isotopi di Sr-Nd sul Negev Loess  
(Ben Israel et al., 2015, Quaternary Research)




Isotopi di Ba in meteoriti  
(Moynier et al., 2015, Chemical Geology)

# Geocronologia ed evoluzione paleoambientale



# Progetto di Interesse NEXTDATA



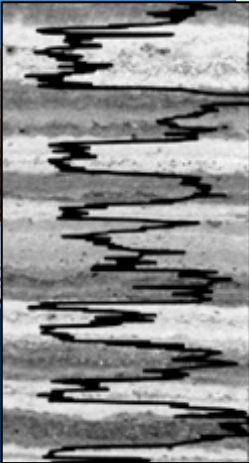
Passato: Italy-2k  
Ricostruzioni  
climatiche per gli  
ultimi 2000 anni

Responsabile del Progetto:  
**Antonello Provenzale, IGG-CNR**

Coordinamento amministrativo :  
**Enrico Brugnoli, Direttore DTA-CNR**



un sistema nazionale per  
la raccolta, conservazione,  
accessibilità e diffusione  
dei dati ambientali  
e climatici in aree  
montane e  
marine



Presente:  
monitoraggio  
in regioni  
d'alta quota

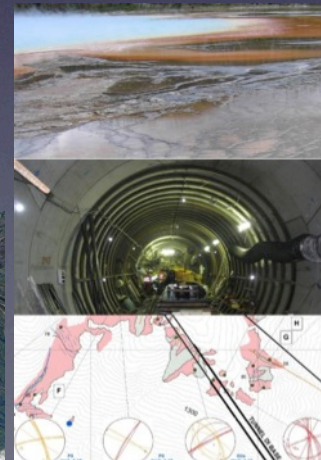


Futuro:  
Proiezioni  
climatiche in  
regioni  
montane

A map of the study area in the northern part of the Iberian Peninsula. The map shows the coastline of Galicia, Spain, with several sampling locations marked by colored dots (red, yellow, blue, and black). A legend in the bottom right corner identifies the symbols: a red dot for 'Sampling location', a yellow dot for 'Sampling location', a blue dot for 'Sampling location', and a black dot for 'Sampling location'. A scale bar in the bottom right corner indicates distances in kilometers (0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100). A north arrow is located in the top right corner. The map also shows major roads and rivers.

A bulldozer with a large metal blade is pushing a massive pile of garbage. The trash is a mix of various materials, including plastic bottles, paper, and other debris, creating a colorful and chaotic landscape. The bulldozer is orange and black, and its blade is a dull, metallic grey. The background shows a clear blue sky with some light clouds.

A photograph of a rugged mountain peak, likely Mount Vesuvius, under a clear blue sky. The foreground shows rocky terrain with sparse vegetation and some bare trees on the right.



# Cooperazione internazionale MAECI su geotermia e pericolosità geologica

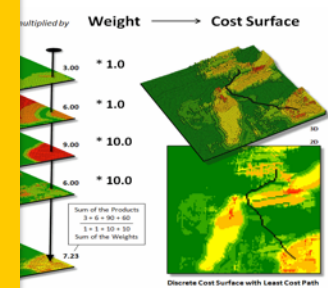
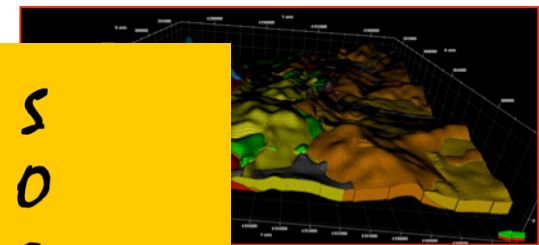
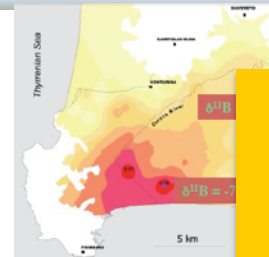
Dal 2010, Especializado en Geotermia a El Salvador

Dal 2014, monitoraggio vulcanico in Corea del Nord (DPRK)  
e stime per la geotermia a bassa entalpia

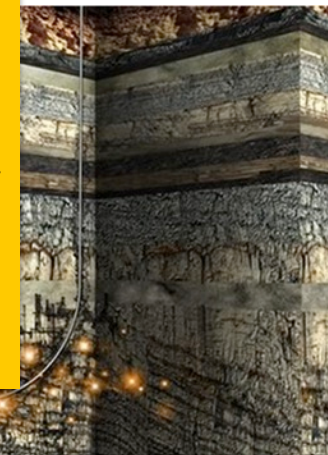
Dal 2015, SAPEVO: Mitigar Peligros Volcanicos  
(monitoraggio e formazione in Salvador)



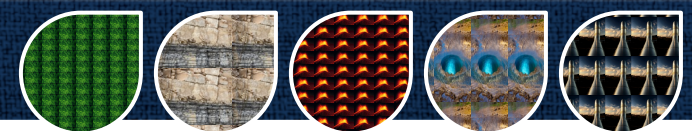
# RISORSE: ENERGIA GEOTERMICA



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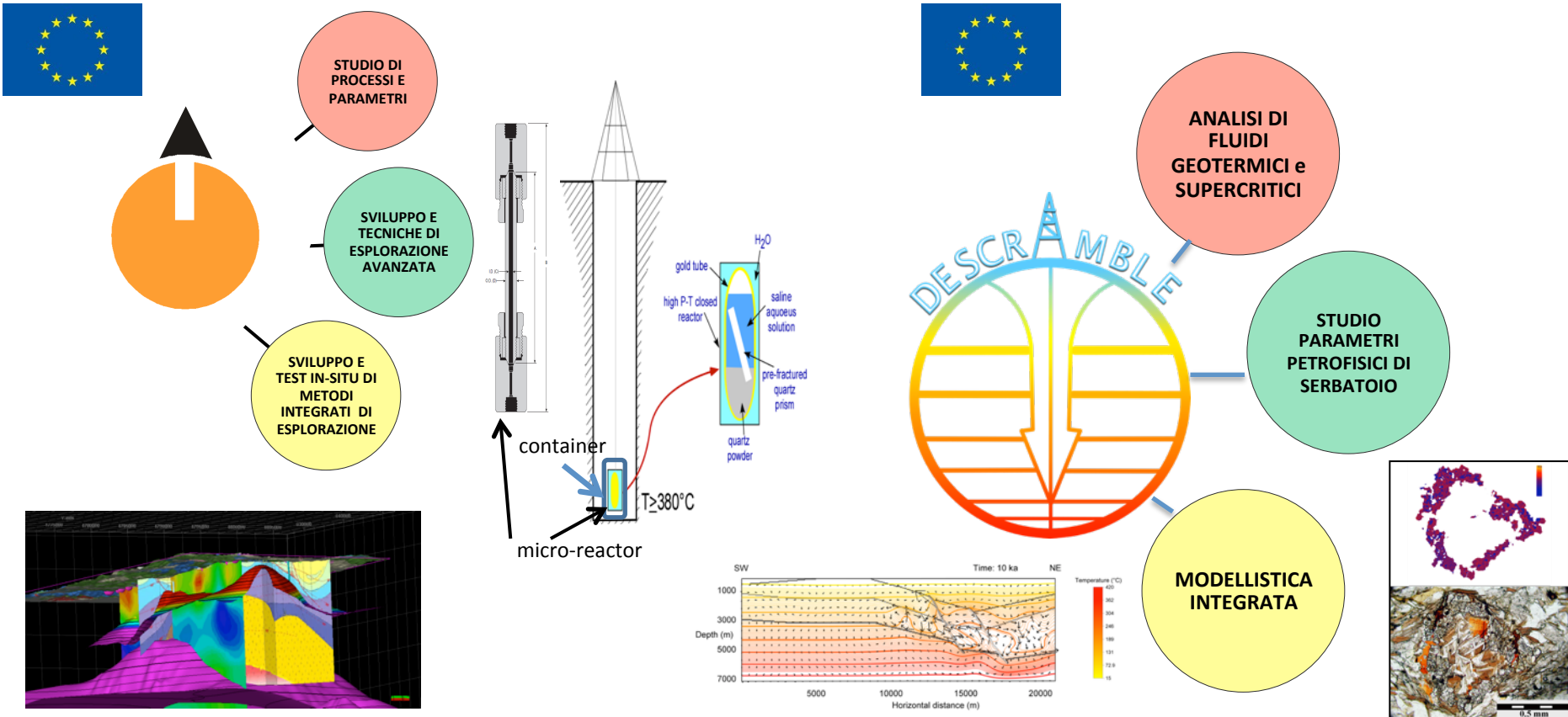


IGG – Istituto di Geoscienze e Georisorse  
Consiglio Nazionale delle Ricerche



# IMAGE - Integrated Methods for Advanced Geothermal Exploration FP7 2013 - 2017

## Sviluppo di Metodi Affidabili di Esplorazione dei Sistemi Geotermici

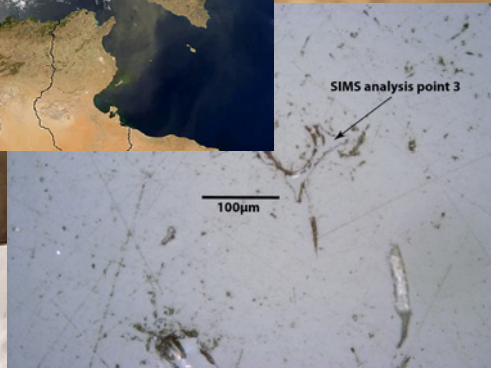
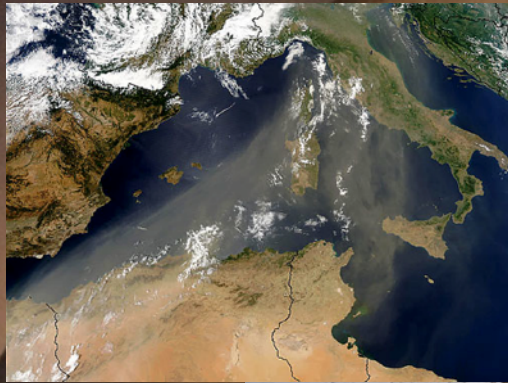


## Drilling in dEep, Super-Critical AMBient of continental Europe H2020 2015 - 2018

Migliorare le conoscenze geologiche, geofisiche e geochemiche in zone crostali di alta temperatura e pressione per predire e controllare l'avanzamento della perforazione

# RISORSE: Geomateriali per la società e la salute

Analisi di biomateriali  
sintetici e naturali

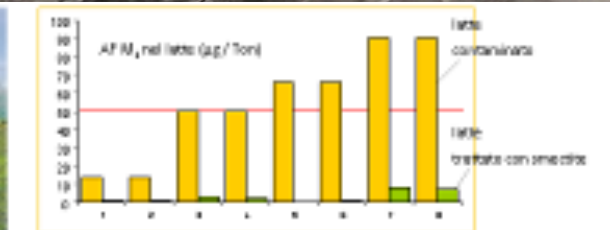


Caratterizzazione mineralogica  
e provenienza dei materiali



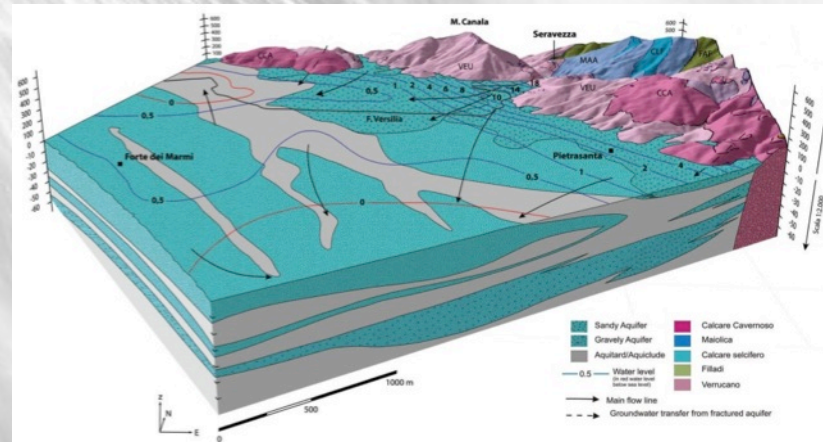
Geomateriali: caratterizzazione  
mineralogica, chimica e isotopica e  
tracciabilità di polveri atmosferiche

Qualità e tracciabilità  
di prodotti alimentari e agricoli

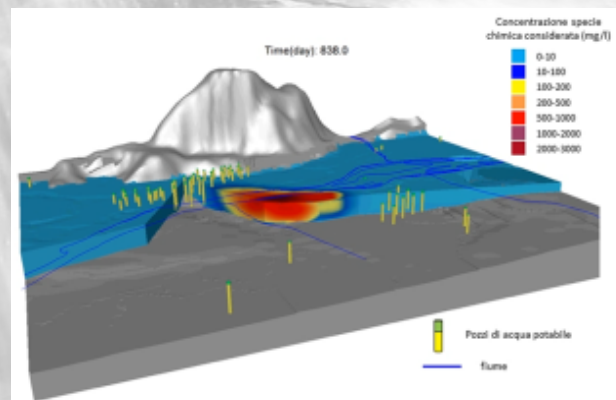


# **GEOLOGIA IDROSTRATIGRAFIA**

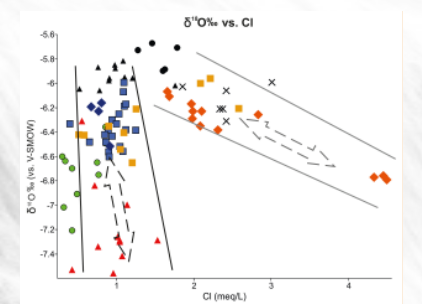
## concettuale



**numerica**

**IDROGEOLOGIA**

## ***GEOCHIMICA E GEOCHIMICA ISOTOPICA***

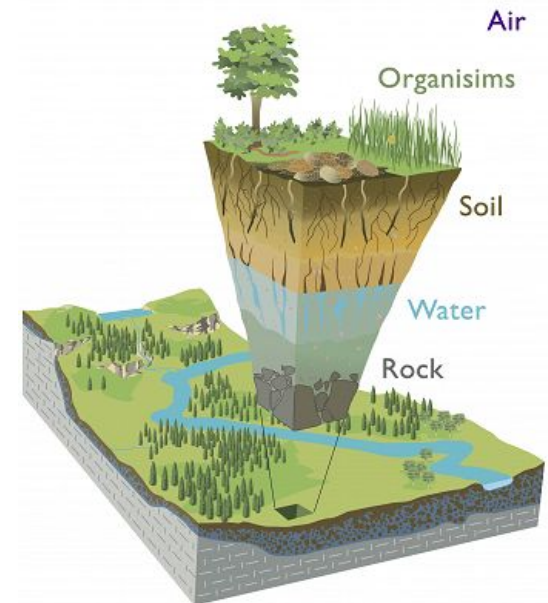
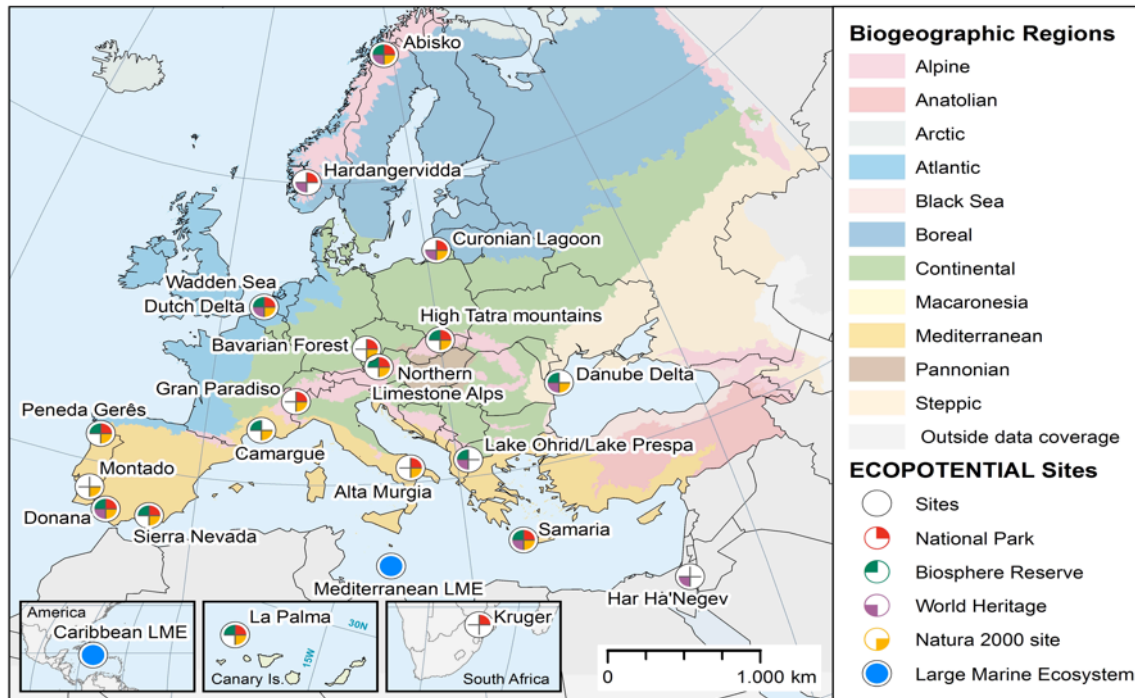




# ***H2020 Project ECOPOTENTIAL: Improving future ecosystem benefits through Earth Observations***

**Starting date: 1<sup>st</sup> June 2015, Duration: 4 years, 47 partners**

**Coordinator: Antonello Provenziale, IGG-CNR**



***Earth Critical Zone***



**GROUP ON  
EARTH OBSERVATIONS**



*Grazie per l'attenzione*