Dipartimento di Scienze della Terra
Sapienza, Università di Roma

Piazzale
A. Moro, 5
Roma

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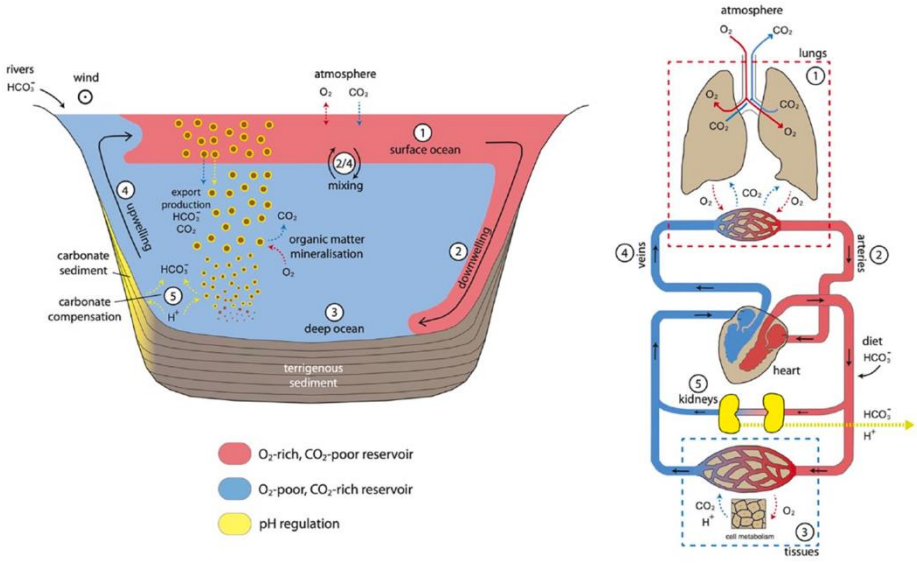
Ore 15:30-16:15

Aula Lucchesi (Ingresso Mineralogia – CU005)

Stable isotope tracers from Earth System Science to human physiology

Giovanni Aloisi

Institut de Physique du Globe de Paris - Université Paris Cité - CNRS
1, rue Jussieu, 75005 Paris, France



Abstract: Stable isotopes are used as tracers of geo(bio)logical processes and are an effective tool for deciphering the evolution of the Earth System over time. Key concepts in this approach include isotopic mass balance, isotope mixing, and thermodynamic and kinetic isotope fractionation. Recently, stable isotopes have been applied in human physiology—the study of functions and processes in the human body—to investigate a wide range of pathologies, such as osteoporosis, cancer, and kidney diseases. I will present examples from both the earth and medical sciences to demonstrate how these fundamental isotope concepts bridge the gap between these seemingly disparate disciplines. In the earth sciences, I will address the processes that led to the late-Miocene emplacement of the Mediterranean Salt Giant, one of Earth's largest and most recent giant salt deposits. Chloride isotopes ($^{37}Cl/^{35}Cl$) in halite support the hypothesis that an exceptional sea-level drawdown event (~2 km) was associated with the accumulation of the Mediterranean salt layer, while multiple sulfur isotopes ($^{34}S/^{32}S$ and $^{33}S/^{32}S$) suggest microbial processes may have contributed to the formation of marginal gypsum deposits in the Vena del Gesso (central Apennines, Italy). In the medical sciences, I will show how calcium isotopes ($^{44}Ca/^{42}Ca$) are used to deduce whole-body bone mineral balance, an elusive quantity crucial for the early diagnosis of osteoporosis, and how dissolved chloride isotopes are used in exploratory studies to investigate the nature of certain kidney diseases. These examples illustrate that the modern separation between earth and medical sciences stems not from differences in underlying physical and chemical laws but from the complexity of the studied systems, which require a highly specialized training to be fully apprehended.