

Environmental Geochemistry

Prof. Sara Marinari

UNITUS

Dr. Gabriele Guidolotti

Institute of Research on Terrestrial Ecosystems- CNR

Outline

- **Course's requirements and description**
- **Proposed upgrade of the course**
- **Possible Integrating Activities**
- **Materials**

Environmental Geochemistry course requirement & description

Requirements

Fundamentals of chemistry, biology and geography, geology and computer skills

Description

*One of the essential characters of the environmental quality is its chemical composition and geochemical peculiarities. Cycling of chemical elements is fundamental process that control life on our planet. **Environmental geochemistry is a science about history, origin, fate and behavior of chemical elements which are interconnected, affect humans and the human environment.** It is deeply involved in environmental quality investigations and monitoring, and thus is essential for cost effective management of environmental quality, special planning. **This course will familiarize students with fundamentals of geochemical processes, main research methods and peculiarities,** will give necessary basic knowledge and practical skills for assessment of pollution levels, scale and risk assessment different medium, and risk mitigation measures.*

What will learn the student

- 1) To interpret and process geochemical data*
- 2) To reveal natural and anthropogenic geochemical anomalies, their formation, structure and dynamics*
- 3) To reveal peculiarities of spatial distribution of pollutants, zoning of territories by pollution, hazard and risk levels.*
- 4) To reveal risk groups in the population and assess environmental and health risk.*

Proposed upgrade to BioGeochemistry

Requirements

Fundamentals of chemistry, biology and geography, geology and computer skills

Description

*One of the essential characters of the environmental quality is its chemical composition and geochemical peculiarities. Cycling of chemical elements is fundamental process that control life on our planet. **Environmental geochemistry is a science about history, origin, fate and behavior of chemical elements which are interconnected, affect humans and the human environment.** It is deeply involved in environmental quality investigations and monitoring, and thus is essential for cost effective management of environmental quality, special planning. **This course will familiarize students with fundamentals of **bio**geochemical processes, main research methods and peculiarities,** will give necessary basic knowledge and practical skills for assessment of pollution levels, scale and risk assessment different medium, and risk mitigation measures.*

What will learn the student

- 1) To interpret and process **bio**geochemical data*
- 2) To reveal natural and anthropogenic geochemical anomalies, their formation, structure and dynamics*
- 3) To reveal peculiarities of spatial distribution of pollutants, zoning of territories by pollution, hazard and risk levels.*
- 4) To reveal risk groups in the population and assess environmental and health risk.*

BioGeochemistry

*“We study **biogeochemistry** with the recognition that many of the characteristics of the **Earth's surface are determined by life**. Earth is very different from its nearest neighbors, Mars and Venus, where pure geochemistry prevails. On Earth, rock weathering and the fluvial transport of materials to the sea are driven by **plant-root and microbial activity in soils**. The composition of seawater is determined by biotic processes that remove materials from the surface waters and deposit them in marine sediments. **Many of the trace gases in the atmosphere are derived from the biosphere; they have short residence times in the atmosphere and must be restored to it by biotic activity**. The constancy of Earth's atmospheric composition for the past 10,000 years is rather surprising, reflecting a close balance between biotic activities that produce and consume its gaseous constituents”*

William H. Schlesinger, Emily S. Bernhardt, in [Biogeochemistry](#) 2013

Possible Integrating activities

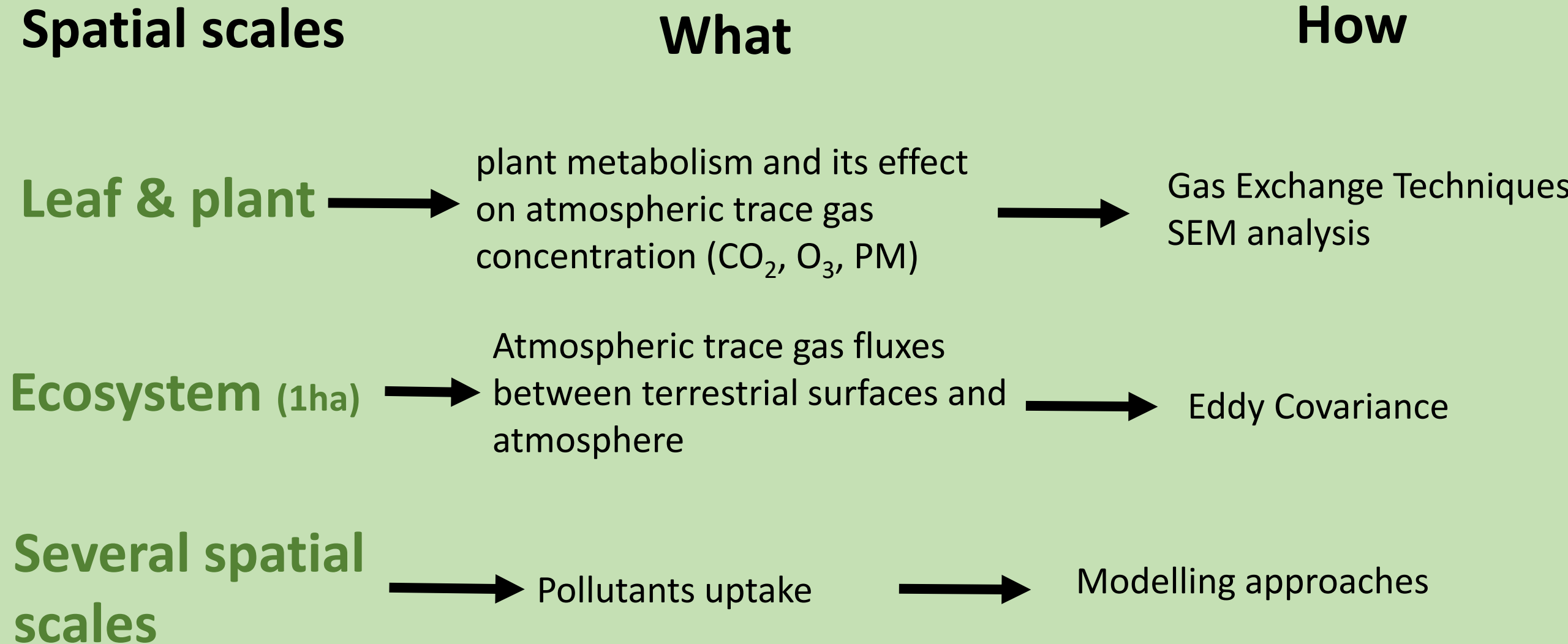
**INTEGRATING THE BIOTA ON GEOCHEMICAL PROCESSES AT VARIOUS SPATIAL SCALES IN
SOIL-PLANT-ATMOSPHERE CONTINUUM AS THE PATHWAY TO MOVE ELEMENTS FROM
SOIL THROUGH PLANTS TO THE ATMOSPHERE AND VICEVERSA**

- **UNITUS** will contribute to this curriculum with its expertise on soil processes
- **CNR** will contribute to this curriculum with its expertise on plant-atmosphere interactions

Possible Integrating activities (Soil processes)

- Soil properties and processes. Description of the polyphasic system and notes on the main physical, chemical and biological properties affecting nutrients cycle.
- The soil as a source or sink of carbon and nitrogen with respect to atmosphere
- The functions of the soil in the biogeochemical cycles of element in the environment .
- Vulnerability of the soil system. Main factors responsible for soil degradation affecting biogeochemical cycle of element.

Possible Integrating activities (Plant-atmosphere interactions)



Materials

- Selected Scientific publications
- Slides
- Books:

WH. Schlesinger, ES. Bernhardt, **Biogeochemistry** (3th edition, 2013)