

Organic matter sources and paleoenvironment of the Tertiary lignite deposits: Insights from molecular markers of Neyveli Formation, Southern India

By

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Ph.D. Scholar

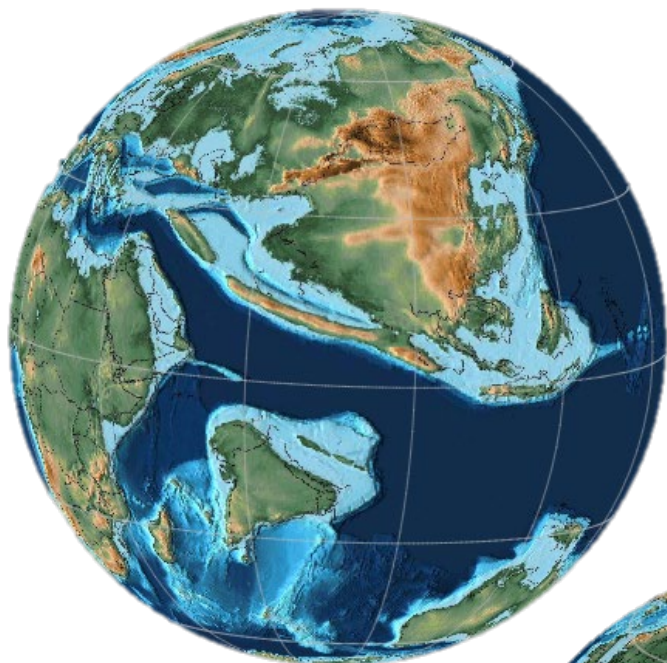
Department of Earth and Environmental Sciences

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India



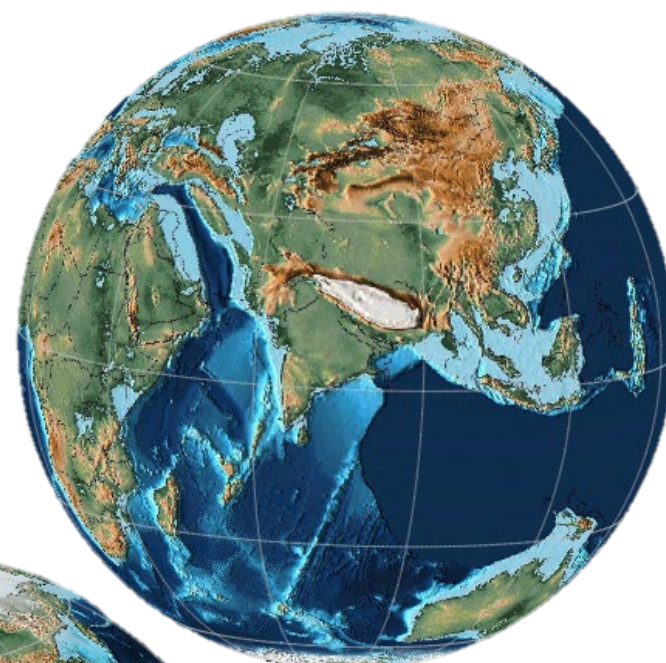
Introduction



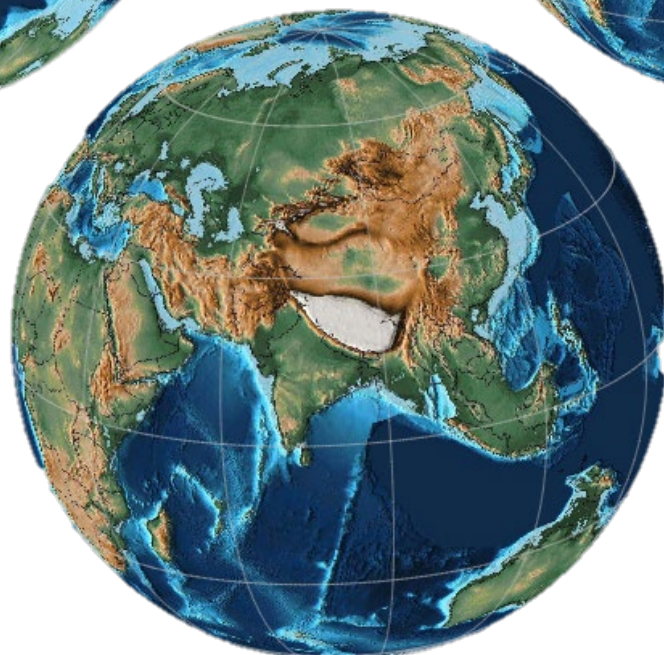
66.4 Ma



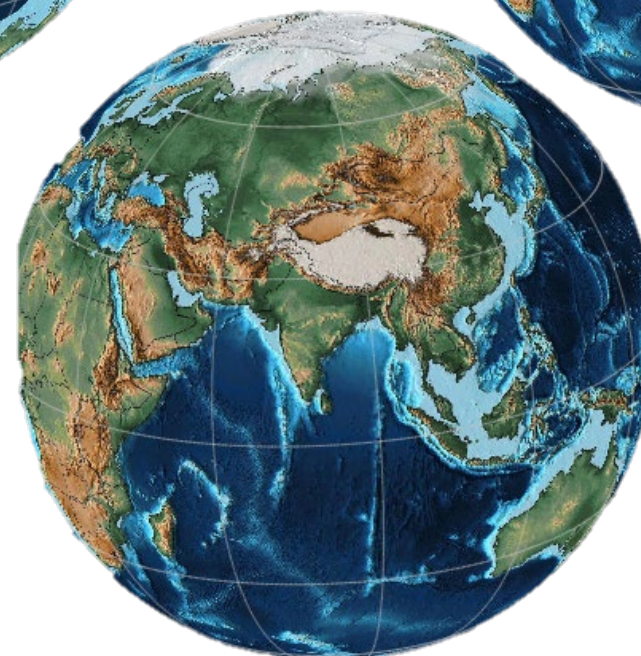
51.2 Ma



41.4 Ma

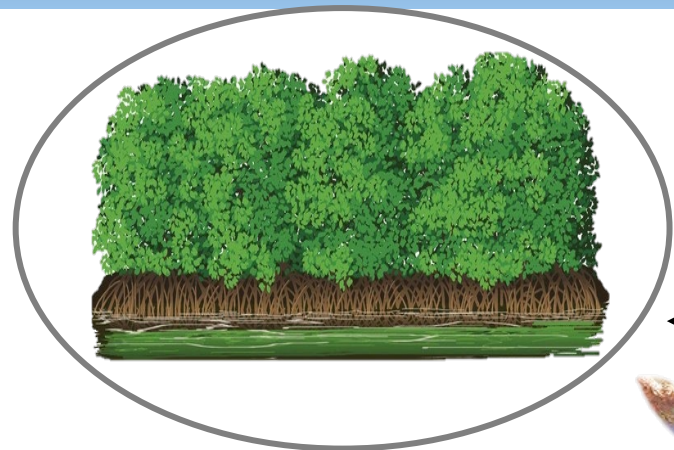


26.8 Ma

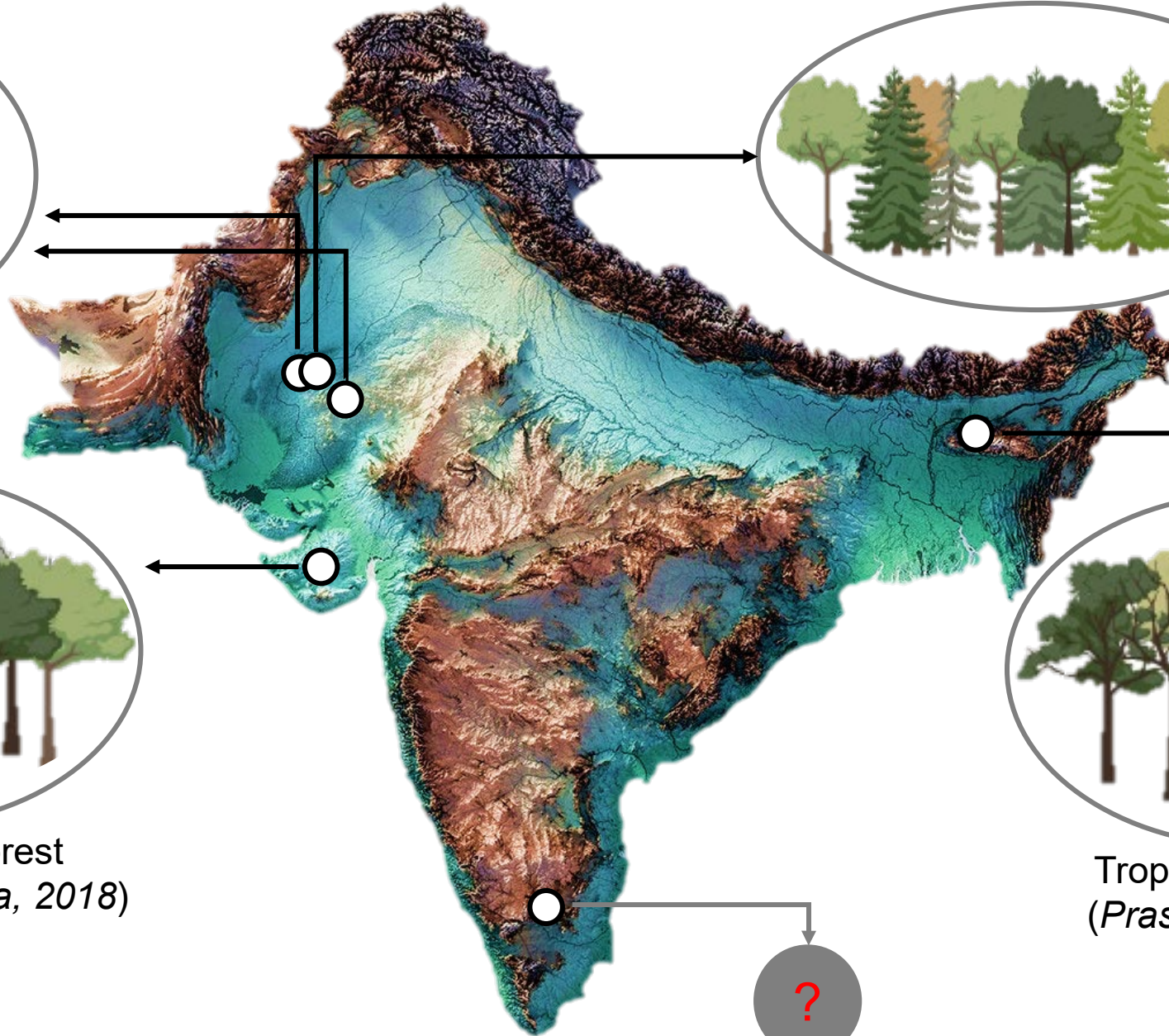


Present

State of Art



Mangrove Forest
(Prasad et al., 2019)



Conifer-mixed
Tropical Forest
(Chetia et al., 2022)



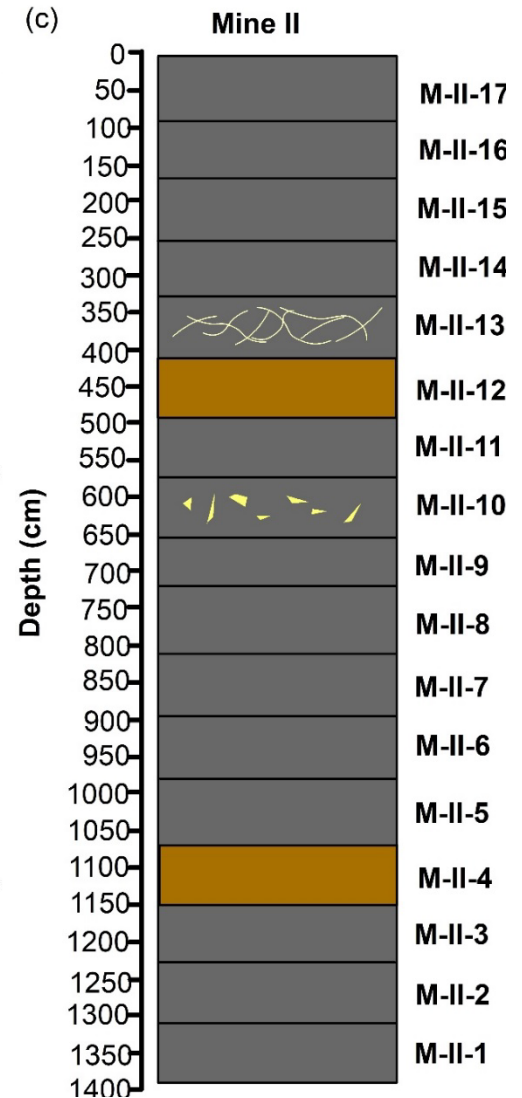
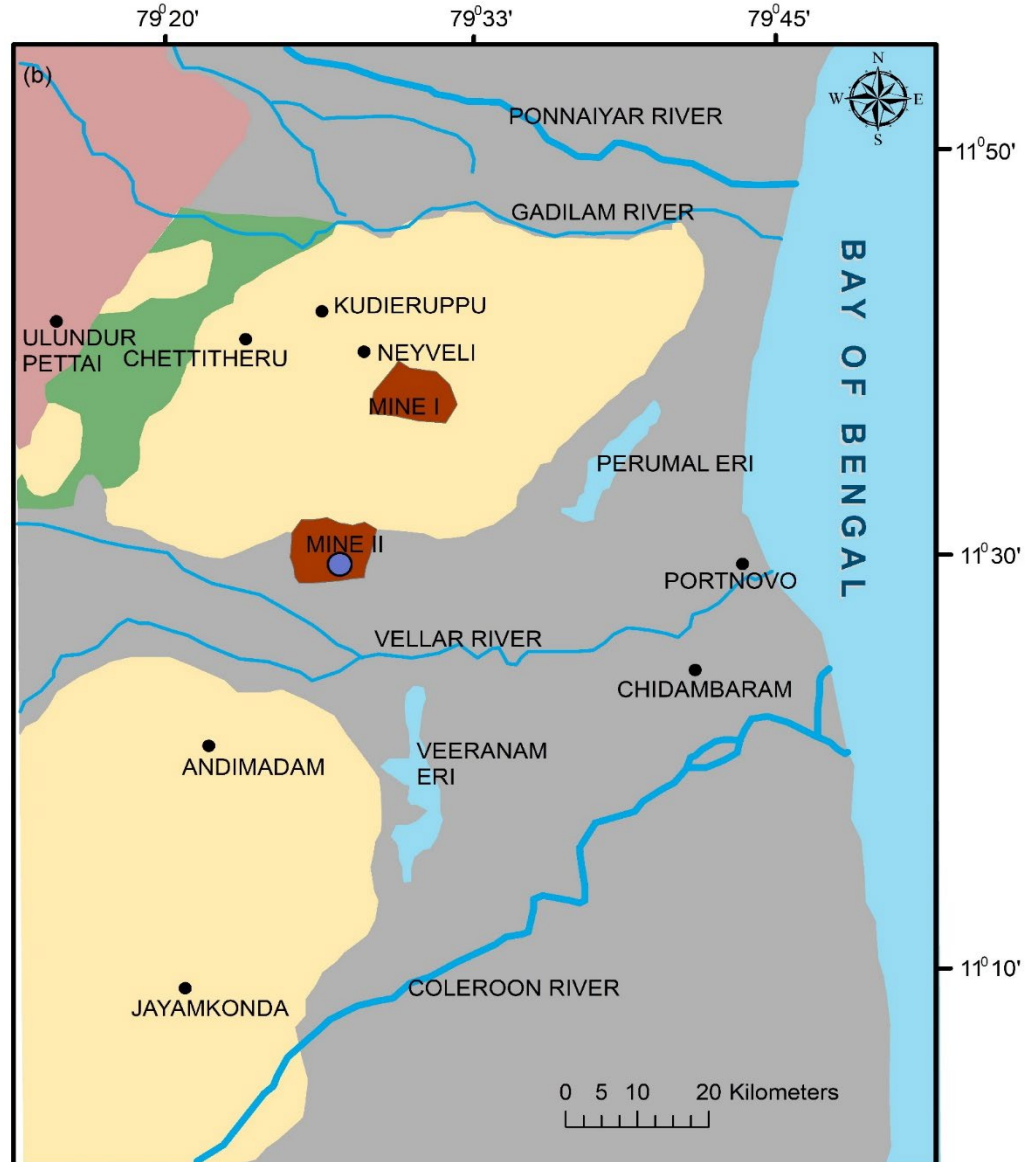
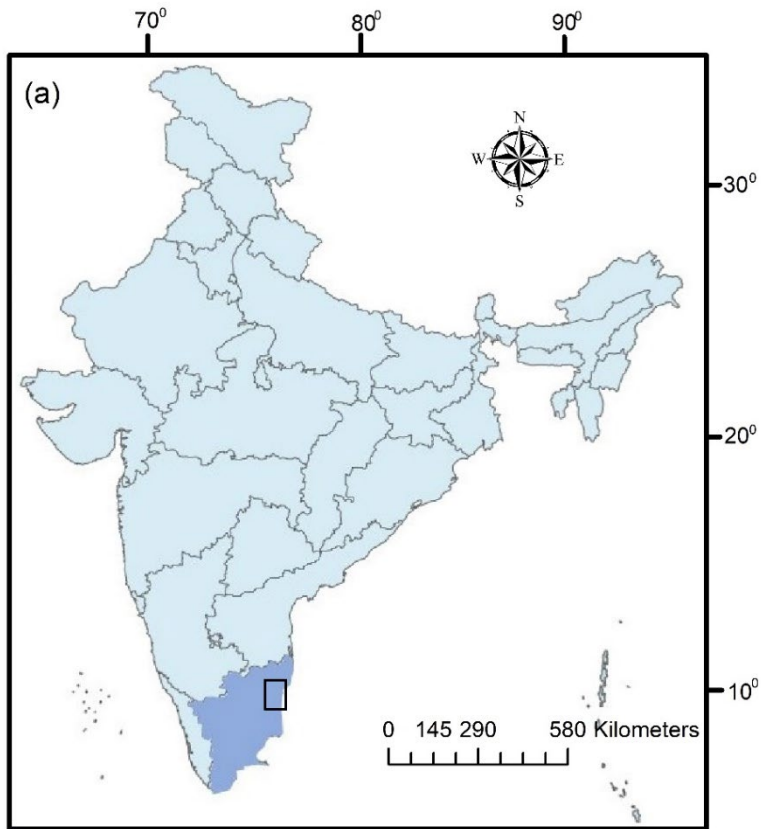
Tropical Rain Forest
(Shukla and Mehrotra, 2018)



Tropical Rain Forest
(Prasad et al., 2018)



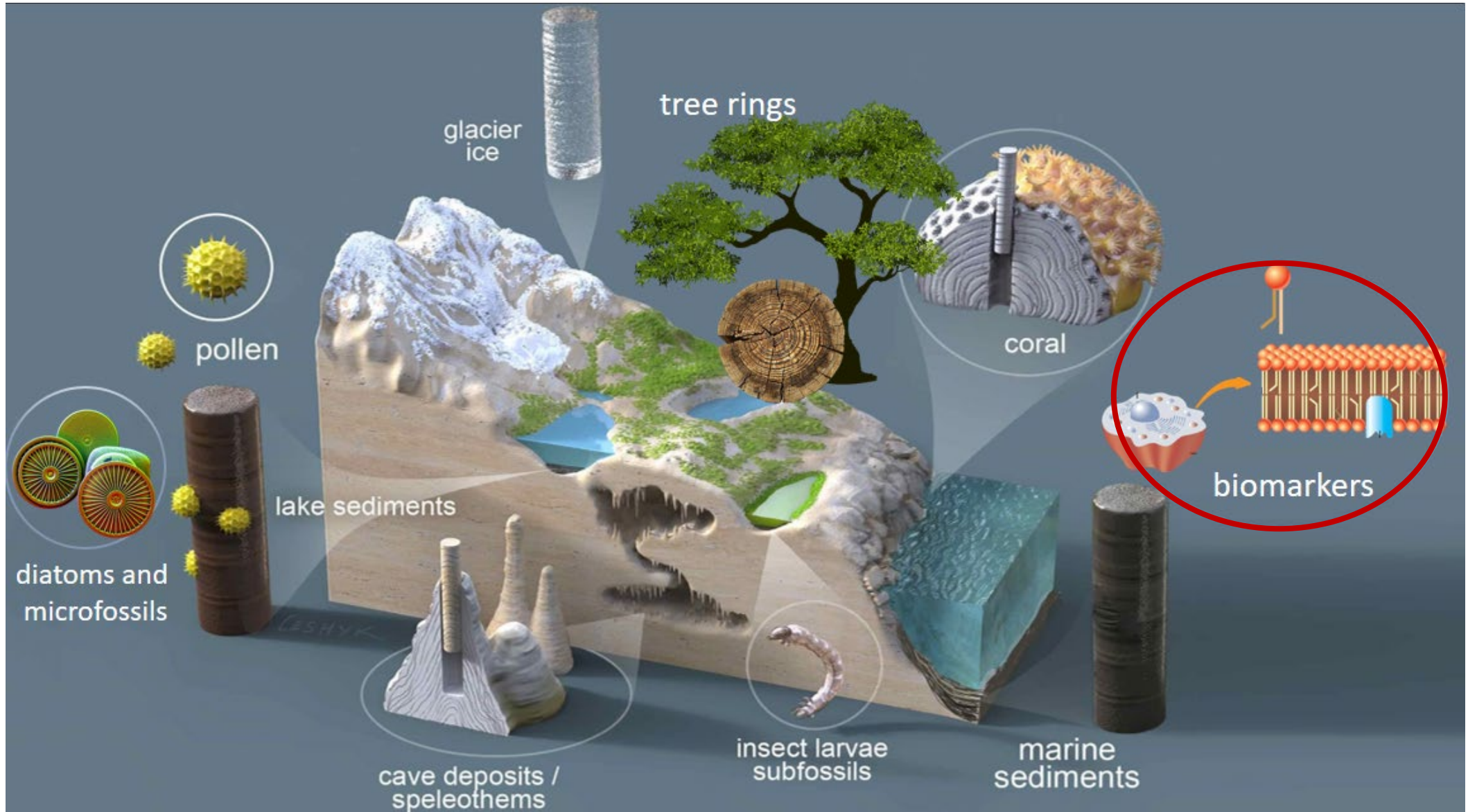
Study Area



Legends

- | | | |
|--|--------------|-------------------|
| Stratified, matrix rich, brown with resin | Alluvium | Tertiary |
| Stratified, matrix rich, brown with specks of pyrite and resin | Archean | Water bodies |
| Xylite rich, black with resin | Cretaceous | River |
| Stratified, matrix rich, black with resin | Lignite Mine | Investigated site |
| | Location | |

Proxies

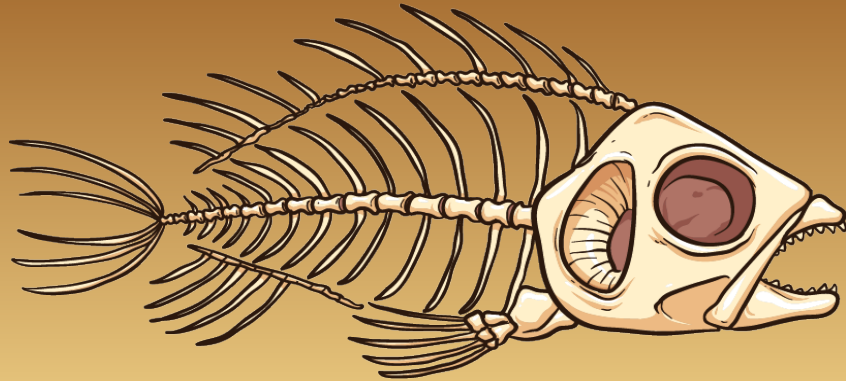


Source: Victor O. Leshyk/Ecoss (University of Arizona)

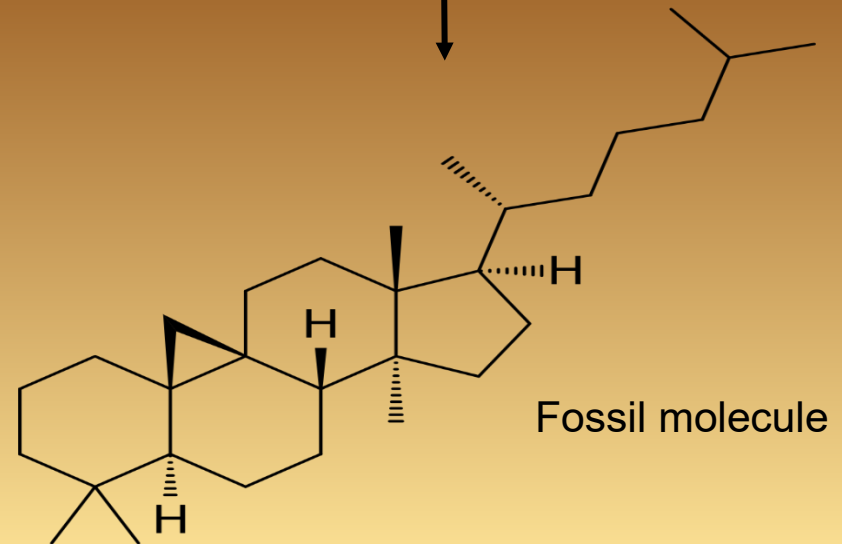
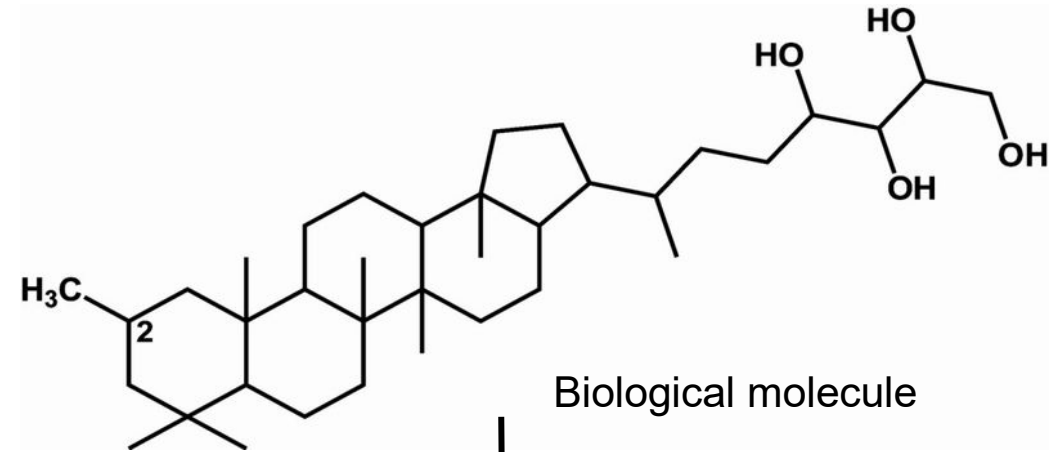
What are Biomarkers?



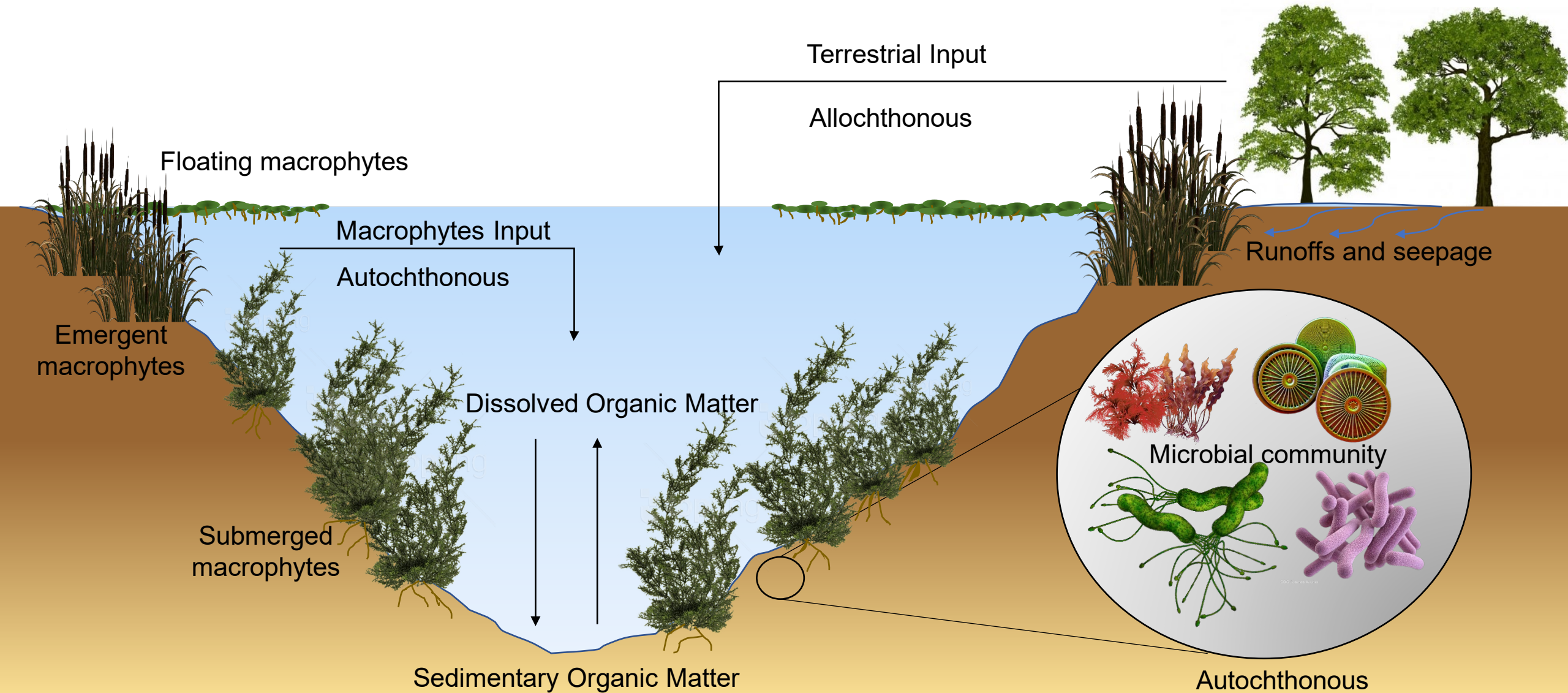
Organism



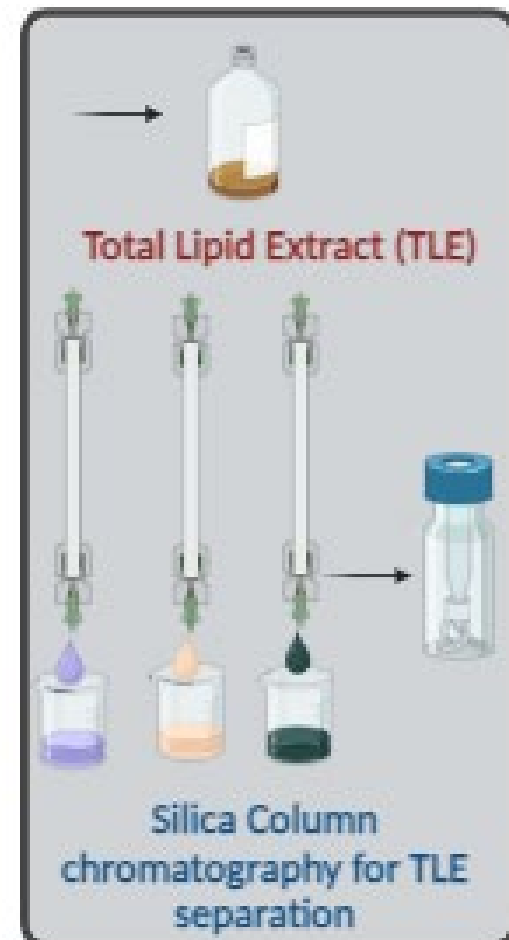
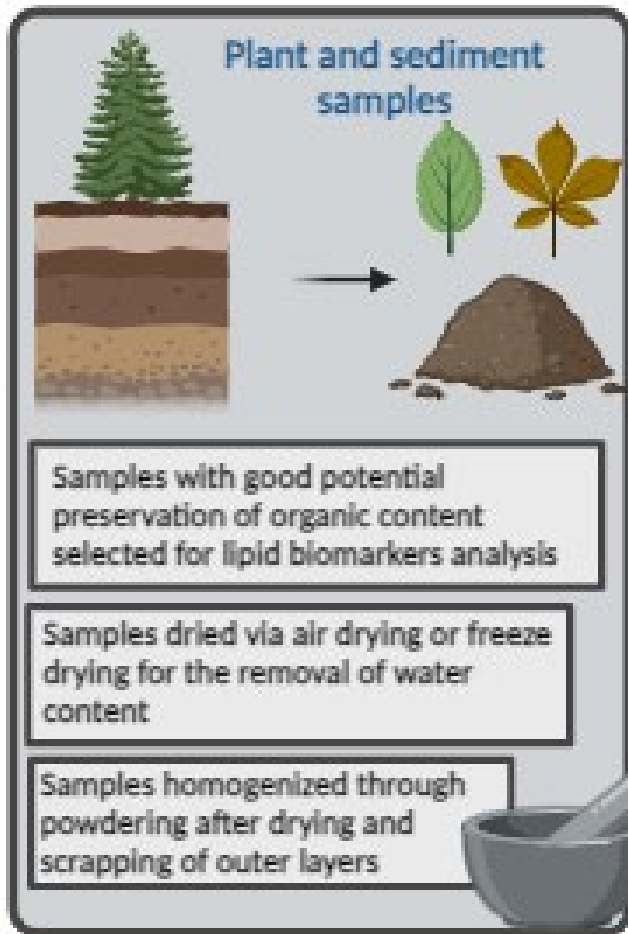
Fossil



Sedimentary Organic Matter



Methodology



GC-MS

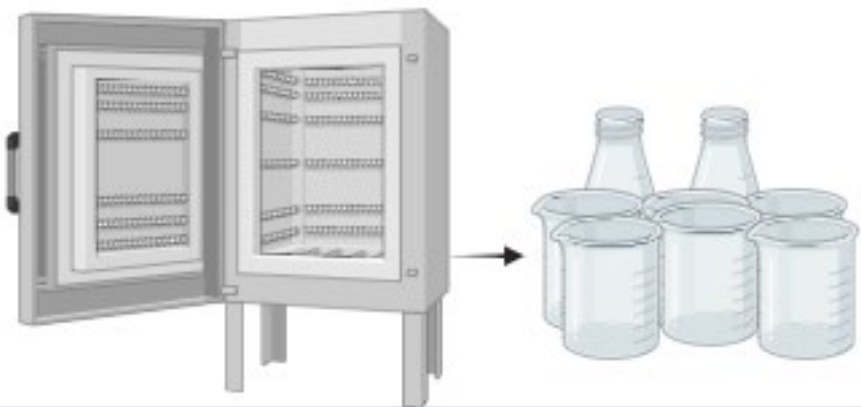
SAMPLE PRE-TREATMENT

**EXTRACTION OF TLE
AND COLUMN CHROMATOGRAPHY**

DATA ACQUISITION

Quality control/ Quality assurance

Baked for 8-12 hrs at temperature $>300^{\circ}\text{C}$



Pre-Processing QC

Regular Auto-tune and maintenance

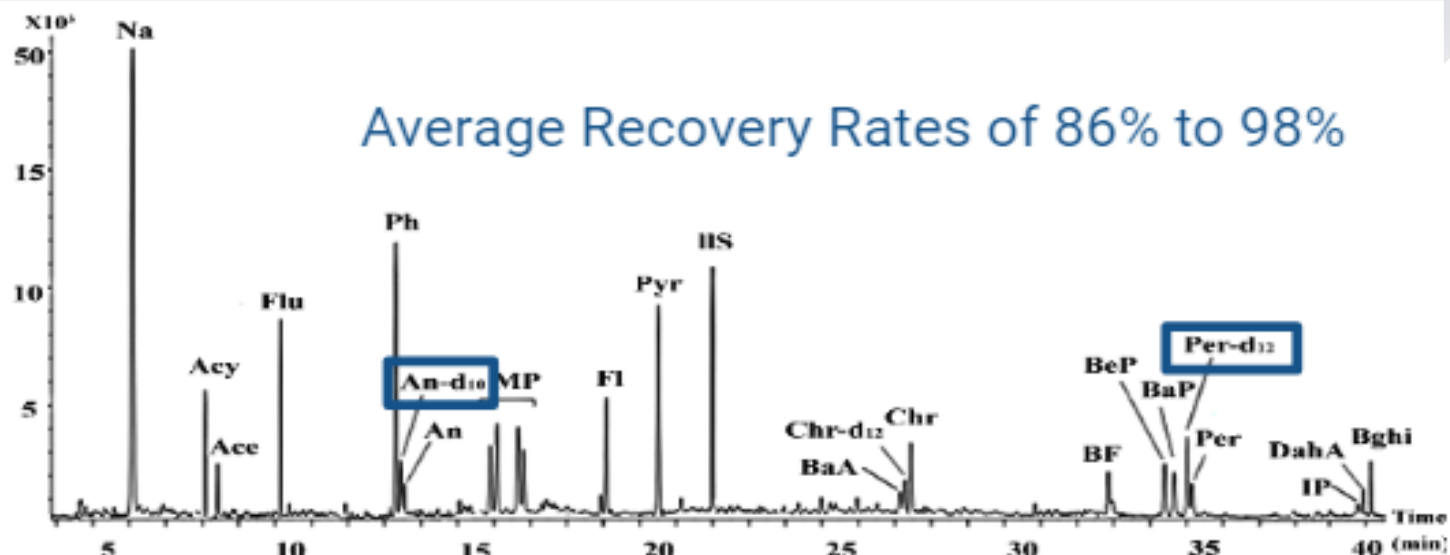


Sample analysis QC

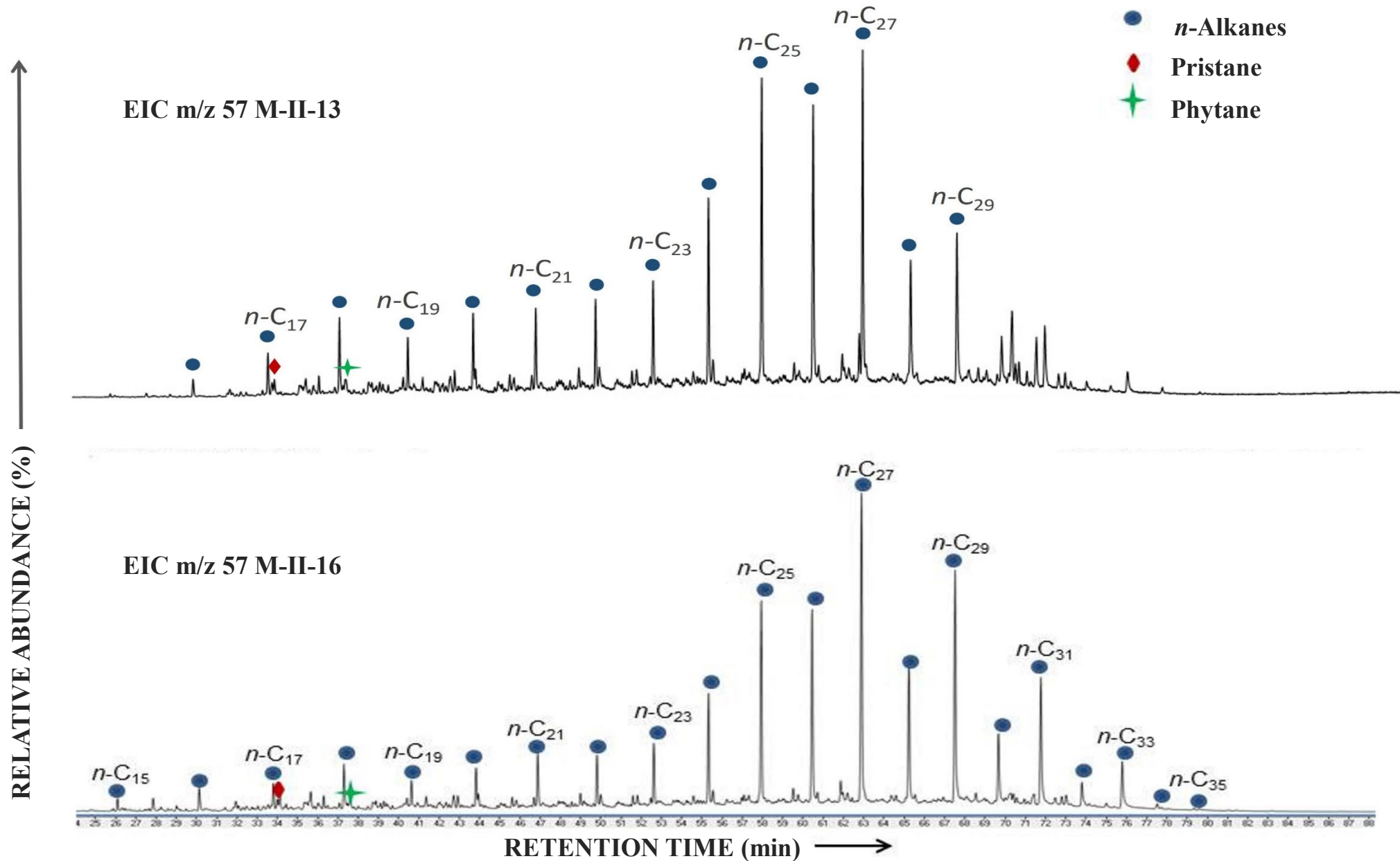
Post-Data Acquisition QC



Temperature $<40^{\circ}\text{C}$



Results: Chromatographs

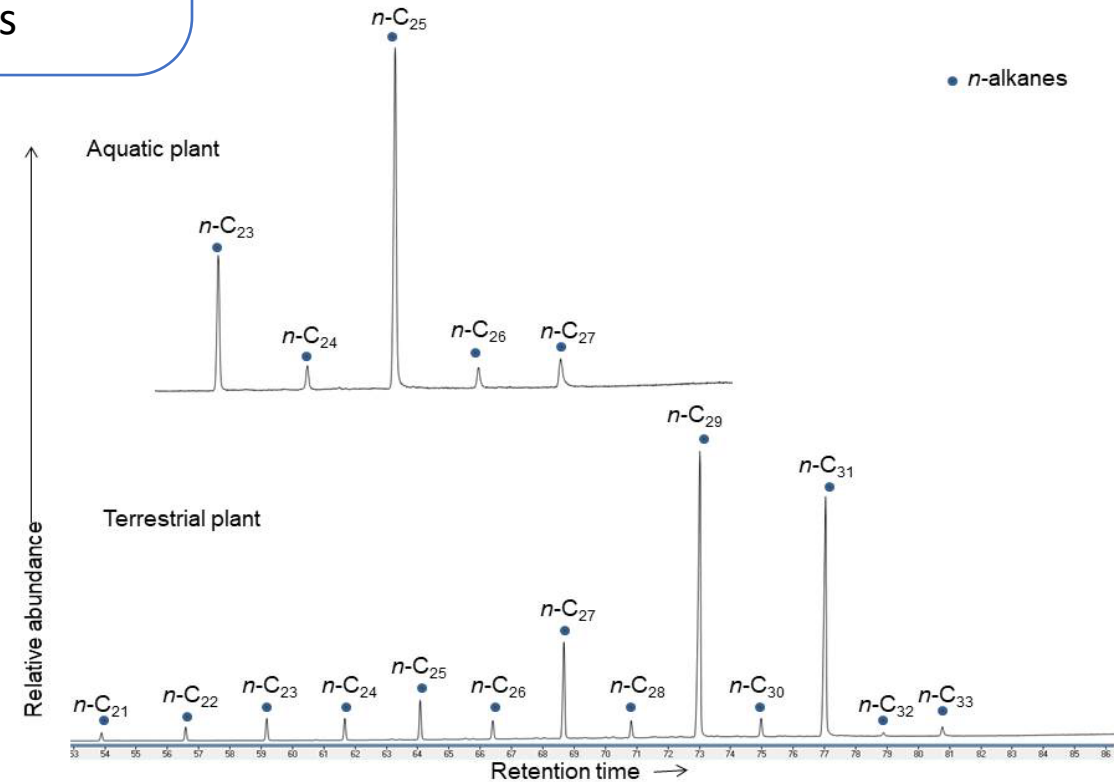
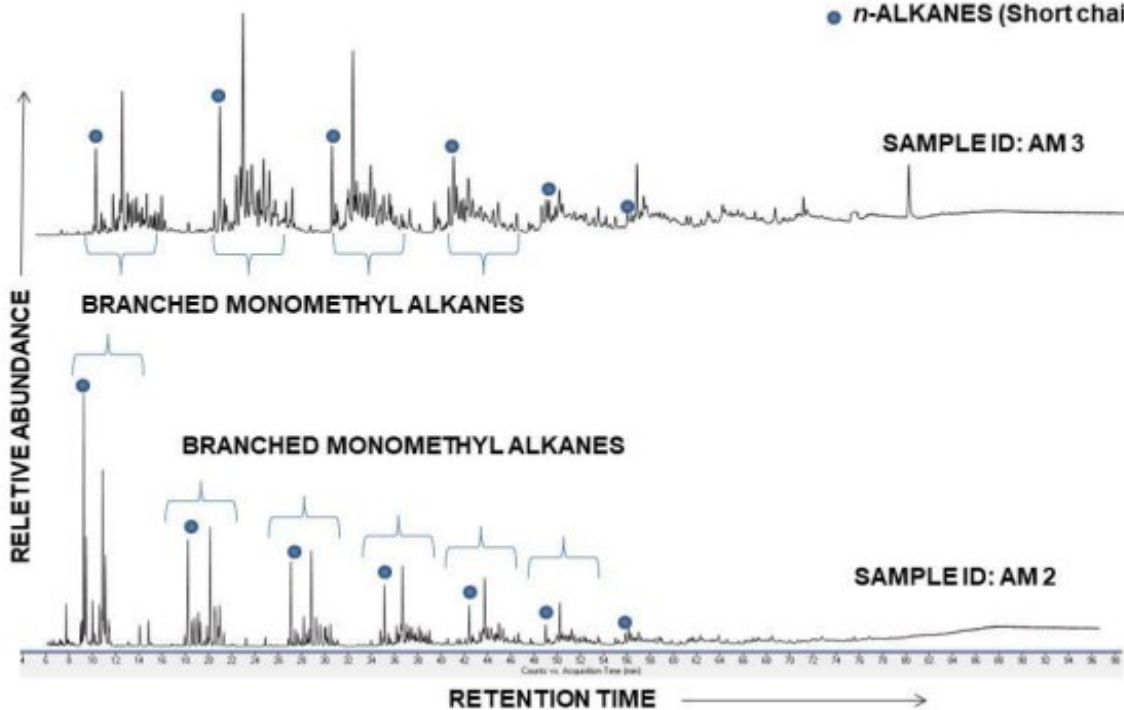


n-Alkanes

Short-chain *n*-alkanes
(e.g., *n*-C15, *n*-C17, and *n*-C19) - algae and photosynthetic bacteria

Mid-chains *n*-alkanes
(e.g., *n*-C21, *n*-C23, and *n*-C25) - submerged and floating aquatic macrophytes

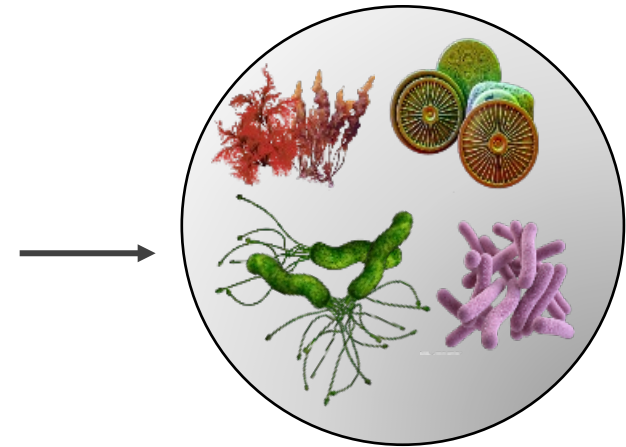
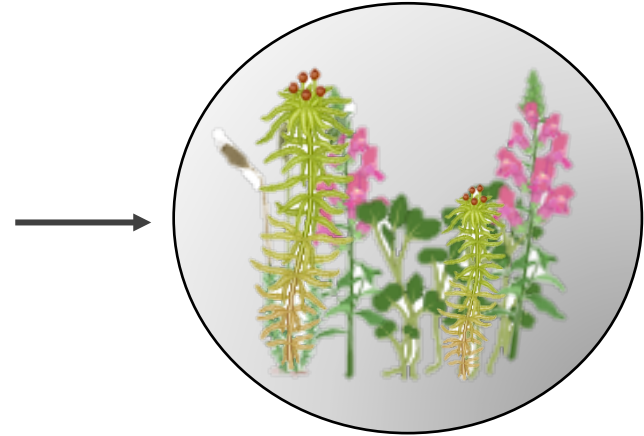
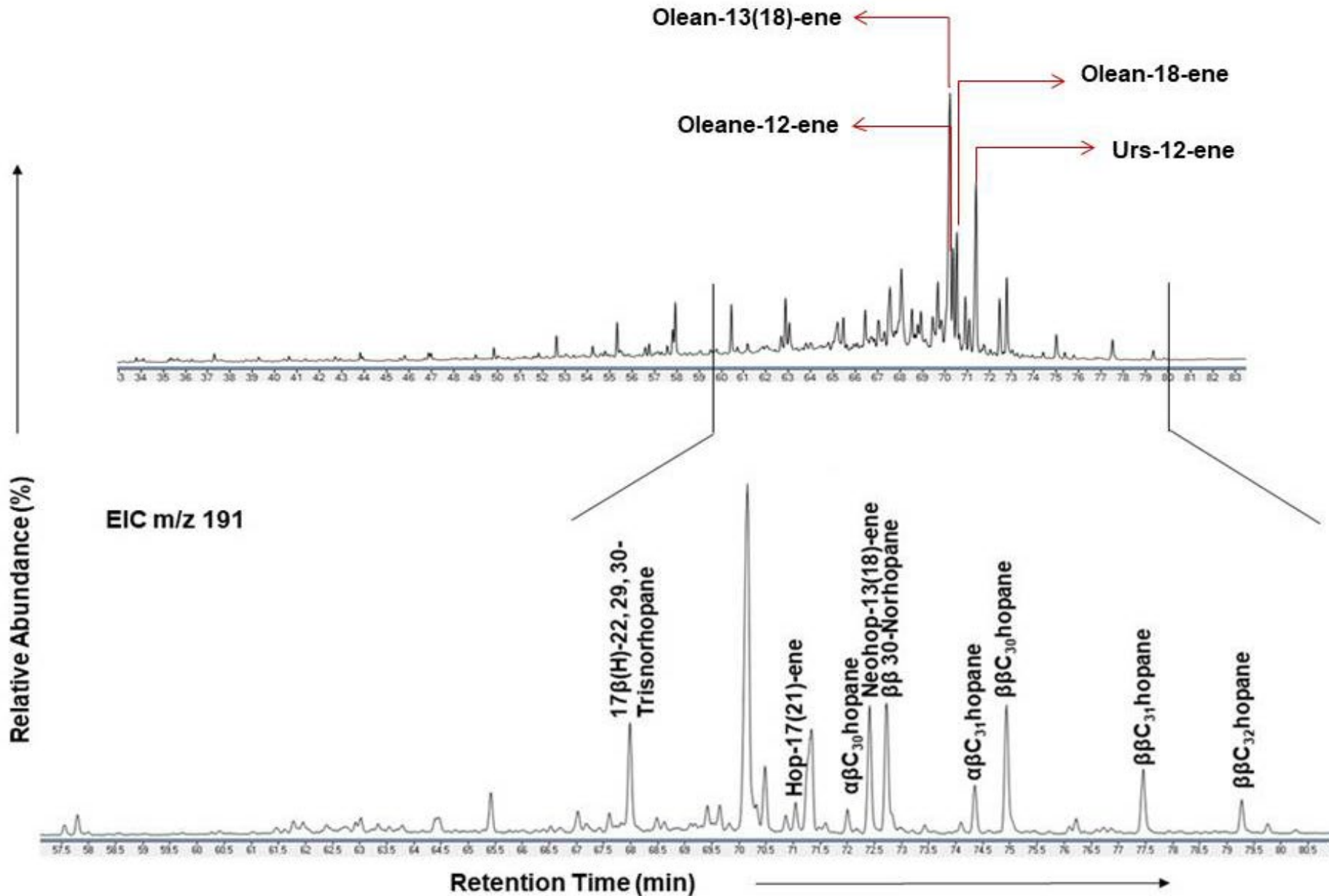
Long-chain *n*-alkanes (e.g., *n*-C27, *n*-C29, *n*-C31, and *n*-C33) - terrestrial higher plants and emergent macrophytes



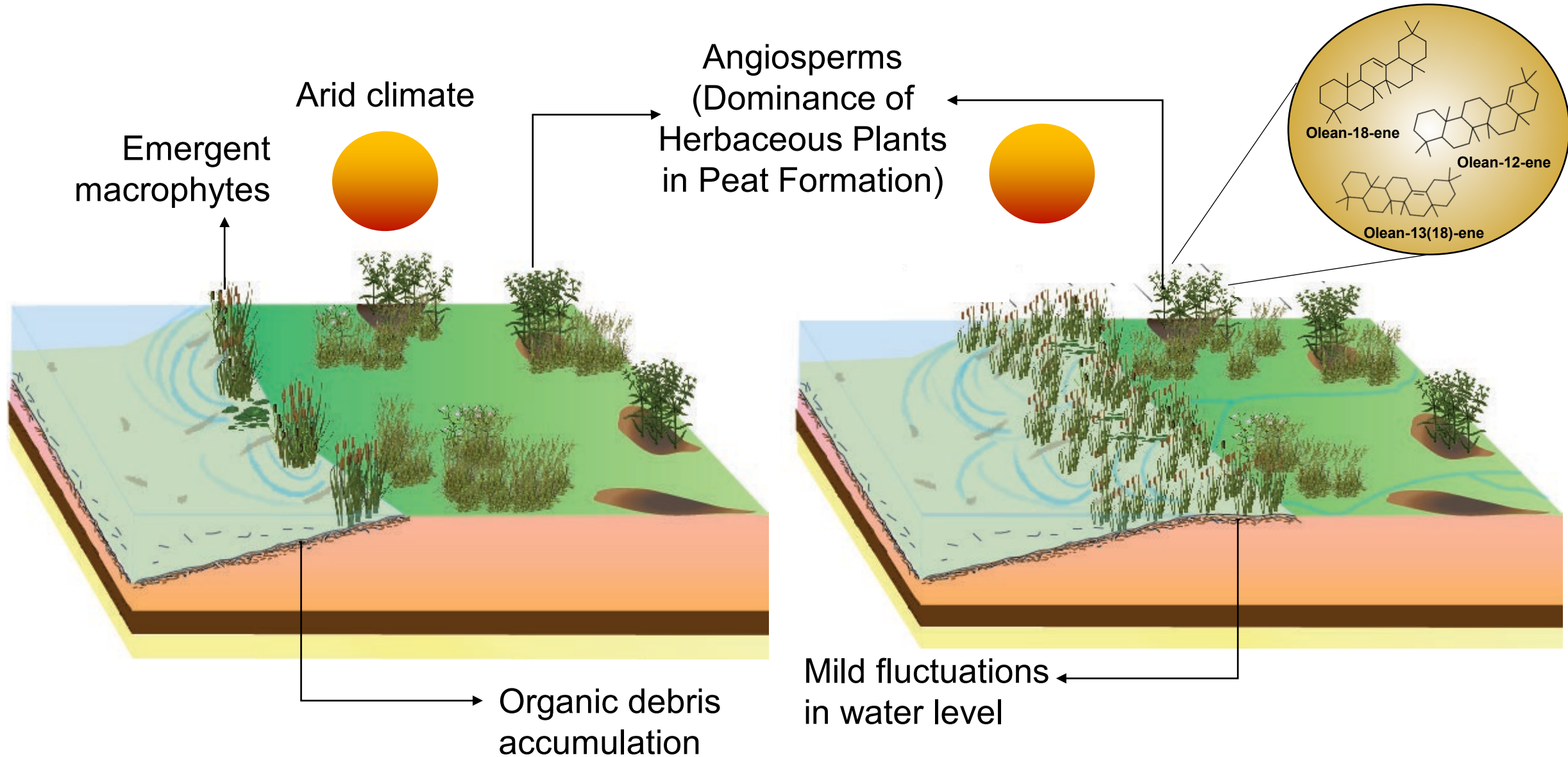
n-Alkane Indices and Isoprenoids ratio

Indices	Interpretation	Value	Reference
Carbon Preference Index (CPI)	>1 : Fresh organic influx <1 : Degraded/ Digenetic product	1.2 to 2.4 (average of 1.7)	Bray and Evans, 1961
Average Chain Length (ACL)	28 to 30 : High Terrestrial contribution <28: Low Terrestrial contribution	25.9 to 30.9 (average of 28.9)	Poynter et al., 1989
Terrestrial to Aquatic Ratio (TAR)	>1 : High terrestrial contribution <1 : High microbial contribution	1.3 to 5.1 (average = 2.6)	Cranwell, 1973
Aqueous Parameter (P_{aq})	0.6 to 1: Floating/submerged macrophytes 0.4 to 0.6: Emergent macrophytes <0.4: Terrestrial contribution	0.3 to 0.7 (average of 0.4)	Ficken et al., 2000
Pristane/Phytane (Pr/Ph)	<0.8 Anoxic environment >0.8 Sub-oxic/ Oxic environment	0.5 to 1.4 (average = 0.9)	Powell and Mckirdy, 1973

Results: Terpenoids



Conclusions





**Looking for postdoc positions
and collaborations**

THANK YOU



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