Occurrence and distribution of hydroxylated isoprenoid glycerol dialkyl glycerol tetraethers (OH-GDGTs) in the Han River system, South Korea

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Introduction:

We investigated the occurrence and distribution of terrestrial-derived hydroxylated isoprenoid glycerol dialkyl glycerol tetraethers (OH-GDGTs) in the Han River system and their potential impact on the application of the ring index of OH-GDGTs (RI-OH) as a sea surface temperature (SST) proxy in the eastern Yellow Sea. Thereby, we analyzed various samples collected along the Han River and from its surrounding areas (South Korea).

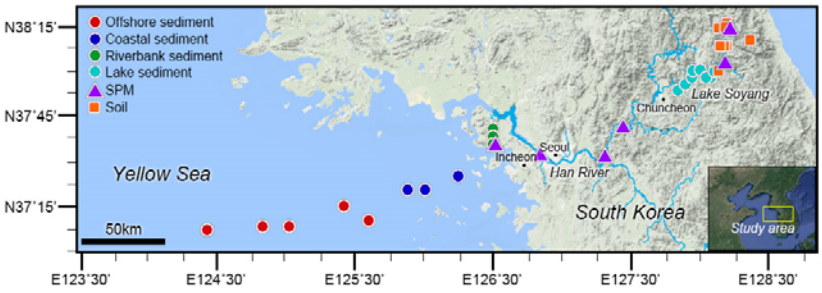

Fig. 1. A map showing the sampling sites investigated in this study: mountain/farm soils (n=9), river/estuary suspended particulate matter (SPM, n=6), surface sediments from Lake Soyang (n=8), riverbank sediments (n=3), coastal marine sediments (n=3), and offshore sediments (n=5).

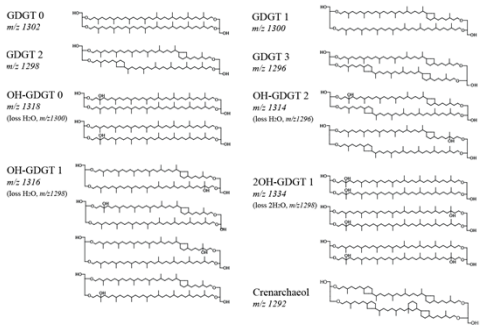

Fig. 2. Glycerol dialkyl glycerol tetraethers (GDGTs) structures and the ring index of OH-GDGTs (RI-OH).

$$RI-OH = \frac{[OH-GDGT-1] + 2 \times [OH-GDGT-2]}{[OH-GDGT-1] + [OH-GDGT-2]}$$

$$RI-OH = 0.057 \times SSTsummer + 0.005; R^2 = 0.87,\ n = 54,\ p < 0.01$$

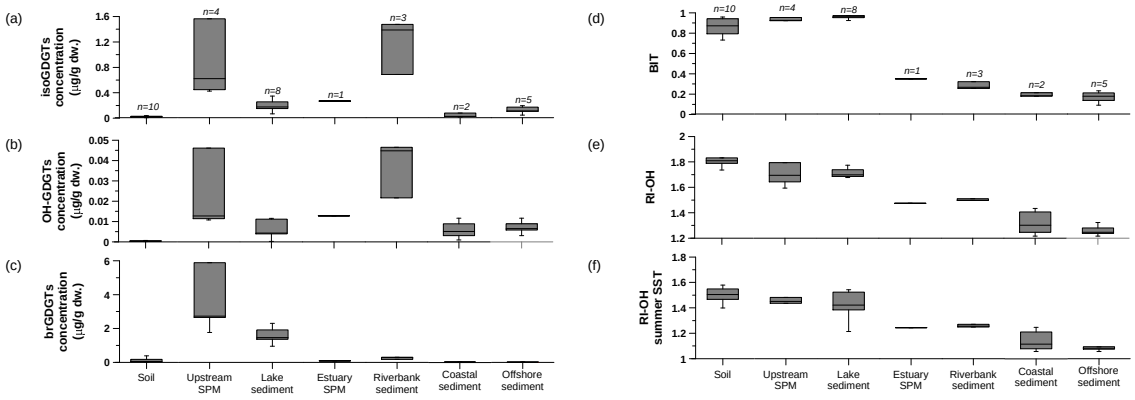

Fig. 3. Variations in GDGTs concentrations and related indices. OH-GDGTs were found in all samples while they were below the detection limit in some SPM samples. The river basin samples with higher OH-GDGT-2 resulted in higher RI-OH values and accordingly higher RI-OH-derived summer SSTs than those of the marine samples.

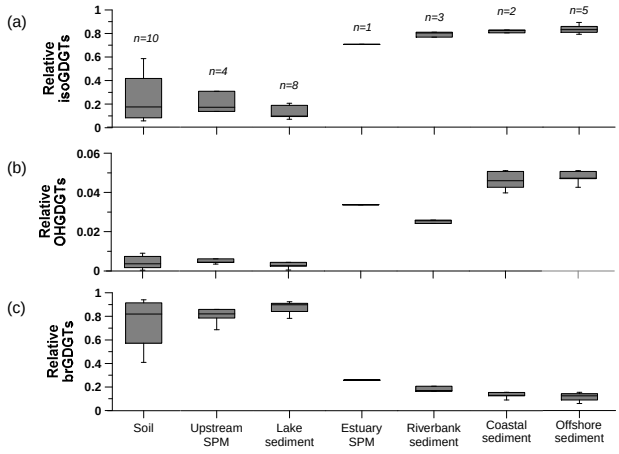

Fig. 4. Variations in relative abundances of GDGTs. Relative abundances of OH-GDGTs to total GDGTs were higher in estuary and marine samples.

Conclusions:

- ❑ Our results revealed a distinctive distribution pattern of OH-GDGTs between the river basin (i.e. soils, lake sediments, and river SPM) and marine samples.
- ❑ RI-OH-derived summer SSTs were higher in the coastal sediments (25±0.5°C) than in the offshore sediments (22±0.7°C).
- ❑ This implies that terrestrial-derived OH-GDGTs might have influenced the RI-OH values in the coastal zone, biasing towards warmer summer SSTs.

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