

## O4-7

### **Evaluating the impact of a tidal power plant operation on sedimentary organic matter characteristics in Lake Shihwa**

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Stable carbon isotope compositions of specific organic compounds such as *n*-alkanes are widely used for deciphering diverse organic matter sources. The artificial Lake Shihwa located near to the west coast of South Korea is typically under the strong anthropogenic pressure due to the continuous terrestrial inputs from industrial, urban, rural and marsh areas. Hence, in this study, we aimed to trace organic matter inputs from diverse surrounding areas and to evaluate the impacts of the Shihwa tidal power plant built in 2011 on sedimentary organic matter characteristics. For this purpose, we investigated reverbed sediments collected from four streams flowing into Lake Shihwa in 2016 and surface sediments collected at three sites in Lake Shihwa in 2009 and 2016, respectively, using bulk ( $\delta^{13}\text{C}_{\text{TOC}}$  and  $\delta^{15}\text{N}_{\text{TN}}$ ) and molecular (concentrations and  $\delta^{13}\text{C}$  of *n*-alkanes) parameters. The  $\delta^{13}\text{C}_{\text{TOC}}$  values of four streams showed no significant difference, but  $\delta^{15}\text{N}_{\text{TN}}$  values of sediments from the industrial area was depleted with the value of ca. 0 ‰. All the samples from the streams and the lake showed the presence of unresolved complex mixtures (UCM), varying between 150 and 77000  $\mu\text{g/g}$  TOC. The resolved *n*-alkanes ranged from *n*-C<sub>15</sub> to *n*-C<sub>35</sub> in all investigated samples with the concentrations of 180 to 1800  $\mu\text{g/g}$  TOC. Interestingly, before the operation of the tidal power plant in 2009, even-numbered short chain *n*-alkanes were pre-dominated in lake surface sediments, while odd-numbered *n*-C<sub>27</sub>, *n*-C<sub>29</sub>, and *n*-C<sub>31</sub> were abundant in 2016. The  $\delta^{13}\text{C}$  values of *n*-C<sub>27</sub>, *n*-C<sub>29</sub>, and *n*-C<sub>31</sub> were more depleted in 2016 than in 2009. Taken together, our data suggest that the construction and operation of the Shihwa tidal power plant influenced the sedimentary organic matter characteristics. Accordingly, this study shows that the multiple tracer analyses are useful to characterize the sedimentary organic matter in Lake Shihwa which undergoes a strong anthropogenic pressure. This type of study will be helpful to monitor the impacts of the tidal power plant operation and thus to improve a strategy for an effective water quality management in Lake Shihwa.