P310-WE

QUANTIFICATION AND SOURCE APPORTIONMENT OF THE ANTHROPOGENIC PRESSURE IN THE FENSCH RIVER (FRANCE)

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Industrial expansion has induced changes in the carbon cycle by remobilization of the fossil organic carbon. An important consequence is the increase of the greenhouse effect due to the carbon added in the atmospheric reservoir (5.4 10^{15} g/year). The use of the fossil organic matter (FOM) induces also an additional input of fossil carbon that mixes with natural organic matter in continental hydrosystem. On one hand, this input could have qualitative and quantitative consequences on carbon cycle and on the other hand, it changes the quality of continental water increasing risks for human health.

The impact of the fossil carbon released by urban and industrial activities has been studied in nine sediments sampled along the Fensch River. The anthropogenic pressure has been quantified by analysing the extractable organic matter (EOM) at molecular scale. The EOM has been extracted from the mineral matter – insoluble organic matter matrix and then fractionated by liquid chromatography into aliphatic hydrocarbons, aromatic hydrocarbons and polar compounds. Each fraction has been analysed by gas chromatography – mass spectrometry (GC-MS). The molecules analyzed by GC-MS (169 molecules) have been quantified by the internal standard method and then classified into five categories (natural, petrogenic, pyrogenic, waste water treatment plant and ubiquist). This approach is an extension of the molecular marker approach developed by Takada and Eganhouse (Takada and Eganhouse, 1998). Applied to the sediments of the Fensch River, this method allows the comparison of the natural input and the anthropogenic input, which is useful to quantify the anthropogenic pressure. Then it allows the identification of the different sources of organic micropollutants. Those results could provide useful information in remediation policies.

In the Fensch River, the application of this classification gives several results. First the ratio natural / anthropogenic decreases from the spring to the confluence; which underlines the increase of the anthropogenic pressure. Moreover the source of anthropogenic markers evolves along the river (Figure 1). Near the spring, the major anthropogenic marker is coprostanol that is often used as waste water treatment plant marker (Hatcher and McGillivary, 1979) while near the confluence the major anthropogenic markers are aromatic hydrocarbons inherited from pyrogenic processes. Along the river, the impact of waste water treatment plant decreases while the impact of urban and industrial activities increases characterized by the increase of both petrogenic and pyrogenic markers.

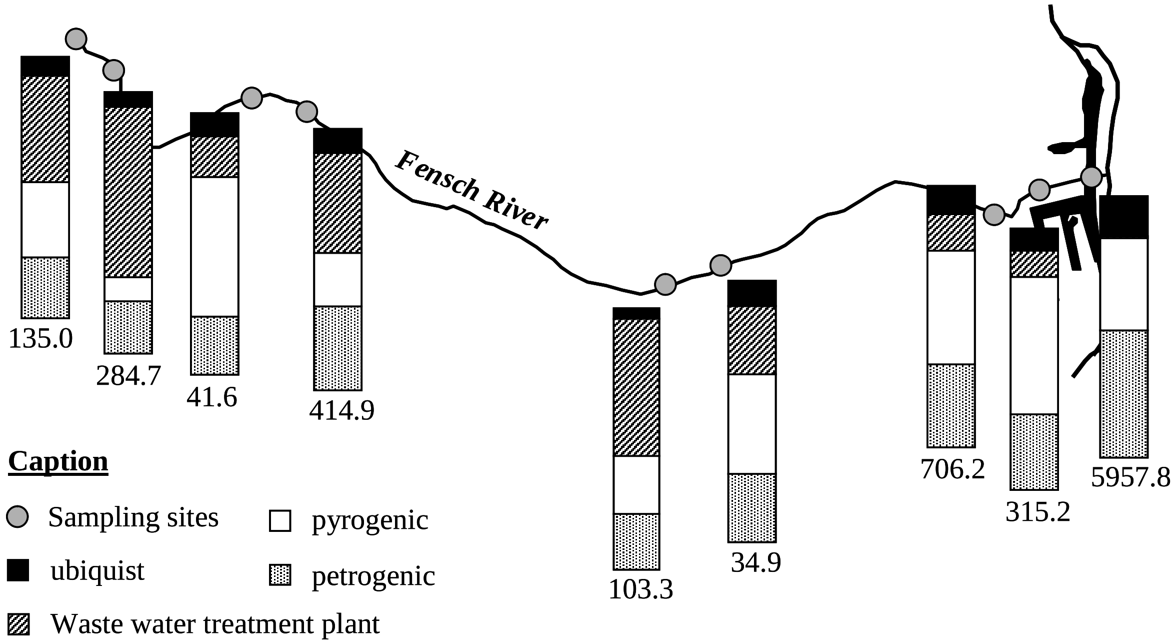

Figure 1. Quantification and source apportionment of the anthropogenic molecular markers along the Fensch River. The numbers given below the graphics are the amounts of anthropogenic markers in µg per gram of freeze dried sediment.

REFERENCES

Takada H., Eganhouse R.P. (1998) In Encyclopedia of environmental analysis and remediation; Meyers, R. A., Ed.; John Wiley & Sons, Inc., pp 2883-2940.

Hatcher P.G., McGillivary P.A. (1979) Sewage contamination in the New York Bight. Coprostanol as an indicator. *Environmental Science and Technology* **13**, 1225-1229.