Geophysical Research Abstracts
Vol. 14, EGU2012-10694, 2012
EGU General Assembly 2012

The applicability of an $^{87}Sr/^{86}Sr$ river isoscape to fish ecological questions in the Danube catchment

A. Zitek (1), J. Irrgeher (1), K. Sailer (1), C. Trautwein (2), H. Waidbacher (2), and T. Prohaska (1)

(1) University of Natural Resources and Life Sciences Vienna, Department of Chemistry, Division of Analytical Chemistry, VIRIS Laboratory, Konrad-Lorenz-Straße 24, A-3430 Tulln, Austria, (2) University of Natural Resources and Life Sciences Vienna, Department of Water-Atmosphere-Environment, Institute of Hydrobiology and Aquatic Ecosystem Management, Max-Emanuel Straße 17, A-1180 Vienna, Austria

Isoscapes are spatial maps of the distribution of isotopes on Earth. As a basis for ecological studies such as long distance migrations of animals or for determining the origin of food these tools are increasingly being developed, until now - mainly for terrestrial systems. In contrast, in case of aquatic systems only few maps were established up to now.

As far as variation in the isotopic distribution in a studied area exists, the isotopic composition bears the potential to be used as natural tracer e.g. for ecological questions or food authentication. Above all the $^{87}Sr/^{86}Sr$ ratio taken up from the environment by organisms without any significant fractionation is known to provide a direct link to geologically distinct regions.

Within the 'IsoMark' project (www.isomark.at), a database ('Isoscape Austria') containing all available spatially explicit isotope data (terrestrial and aquatic) with a focus on isotope distributions in Austrian rivers is being developed. Water samples from different rivers, mainly along the Danube in Austria, were collected and analyzed for their elemental and Sr isotopic composition.

Analyses of water samples yielded several 'Isozones' along the Austrian part of the Danube, indicating diverse geology in these river catchments. Studying migration phenomena of fish using natural isotopic marks in hard parts is especially possible between these 'Isozones'. In geologically similar regions with little differences, element distributions or artificial marking methods (tagging, spiking) can serve as additional means.

A significant positive relationship between the $^{87}Sr/^{86}Sr$ ratio in river water and the proportion of siliceous geological formations in the catchment was found on a national and European level. These analyses proved the possibility to predict the $^{87}Sr/^{86}Sr$ ratios in river catchments all over Europe. This relationship allows for an estimation of the applicability of the $^{87}Sr/^{86}Sr$ ratio for fish ecological questions on a European scale like migration, homing and dispersal that can hardly be studied with other methods.