[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-HW Hydrology & Water Environment

# [A-HW20]Materials transport and nutrient cycles in watersheds; Human and climate impacts

convener:Mitsuyo Saito(Graduate School of Environmental and Life Science, Okayama University), Shin-ichi Onodera(Graduate School of Integrated and Arts Sciences, Hiroshima University), Takahiro Hosono(熊本大学大学院先導機構, 共同), Adina Paytan(University of California Santa Cruz)

Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

This session aims to synthetize watershed sciences in order to understand dynamical processes of materials transport and nutrient cycles in watersheds from headwaters to coastal seas focusing on human and climate impacts. The session will be integrating a variety of research disciplines including limnology, ground water hydrology, coastal oceanography, meteorology, pedology, sedimentology, forestry, agriculture, fishery, social science and more. The watershed sciences also challenge us to solve environmental issues emerged in the watersheds through our profound understanding of relations between humanity and nature. For instance, on one hand, human land uses alter water resources, dynamics of sediments, nutrients and pollutants in waters and soils on watershed scales, while changing climates may alter water cycle, the frequency and intensity of materials transport and natural disaster, sometimes having catastrophic effects on the watershed systems. This session also calls for ideas on new methods for the watershed sciences, such as tracer and molecular technique, hydrological modeling, paleontological approaches, laboratory and field experiments, social-scientific evaluation of ecosystem services and social-ecological systems, and so on, in order to elucidate physical, chemical and biological mechanisms for shedding light on natural phenomena and their changes over time in complex and dynamic watershed systems. Through this session, we would like to facilitate interdisciplinary collaboration among participants to create new knowledge on watershed sciences.

# [AHW20-P23]Migration history of pelagic crucian carp " *Carassius auratus* grandoculis" endemic to Lake biwa: Reconstructed from otolith strontium stable isotope.

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Migration is a biological phenomenon in which animals routinely move their habitats depending on their developmental stages and environmental changes in their life history, and is found in many taxonomic group including to fish species. Some migratory fish have homing behavior to their nursery to spawn. This behavior supplies nutrient such as phosphorus that flow out from coastal land (Kaeriyama, 2005).

Lake Biwa is the biggest lake in Japan. In this lake, many endemic species evolved from their fluvial ancestors to adapt to pelagic environment. All of them migrate from pelagic to coastal area for reproduction. Some of these fish are threatened with extinction due to decline in their spawning habitat such as paddy field and lagoon, and the disconnection of the lake from network their nursery. Crucian carp “*Carassius auratus* grandoculis” is one of the endemic pelagic fish in Lake Biwa, and uses paddy field and lagoon for spawning. However, little known about migration history according to their developmental stage, although these knowledges are indispensable to restore their population.

In recent study, analysis of otolith micro-chemical composition and stable isotope are often using to

reconstruct fish migration history. Strontium stable isotopic ratio ($^{87}Sr/^{86}Sr$) of otolith is known to powerful tracer of fresh water habitats of fish (Kennedy et al. 2002, Jen C. Hegg et al. 2015), and it changes to reflect in ambient water condition or physiological conditions of fish. Elements deposited to otolith are not metabolized. Therefore, otolith have the function as time recode. On the other hand, chemical composition and $^{87}Sr/^{86}Sr$ for inland water reflects the geological characteristics of watershed, and shows significant spatial variation. Therefore, it is possible to distinguish individual rivers flowing into Lake Biwa (Nakano et al. 2008).

In this study, we analyzed trace elements and $^{87}Sr/^{86}Sr$ of otolith micro samples for ALC marked fish which returned to the natal rice paddy for spawning and wild population. Micro core samples collected time-series along growth curve from otolith core to edge by using micro-milling device. Here, we examined to be able to reconstructed migration history for crucian carps and their natal place by otolith (lapillus).

As a result, $^{87}Sr/^{86}Sr$ signature of otolith core for marked fish showed similar to those of irrigated waters in the rice paddy where the fish were stocked, demonstrating that our isotope approach is powerful tool to identify the natal sites. The otolith core 87Sr/86Sr signature for wild adult fish where came to paddy and lagoons, some of them shows similar to those of paddies and lagoons value. On the other hand, $^{87}Sr/^{86}Sr$ of otolith edge signature for wild fish shows pelagic of the Lake Biwa or their ambient water where they caught. It is suggested that wild adult fish returned to their natal area after migration from the pelagic habitat, or some of them have inhabited same place in where they were born. It revealed individual variation in the migration pattern and the homing ability.