[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-P27]Estimation of erosion rate and deposition process of a small pond in an agricultural catchment, subtropical small island

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In tropical and subtropical region, the rainfall intensity is strong and soil erosion in an agricultural land is one of big environmental issues. Especially, the impact of large sediment discharge on the coral reef is serious around small islands, such as Okinawa and Philippines. In case of Okinawa Prefecture, to reduce the sediment discharge and conserve corals, many sediment trap ponds are constructed in a downstream area of agricultural lands. However, sediment deposition rate, variation of trap effect, and component of sediment in a pond have not been confirmed.

To estimate of erosion rate and deposition process of a small pond in an agricultural catchment of a subtropical small island, we examine to observe the sediment deposition in a small pond and monitor water level and chlorophyll a in a pond and runoff and turbidity of an inflow stream in a small catchment with the area of 300m2 in Ishigaki Island, Okinawa Prefecture, Subtropical region. Our monitoring was started from February 2017 after removing all sediment in a pond in January, and up to April 2018. Observation of sediment deposition was conducted with collecting the samples at 5 sites in June 2017 and January 2018.

Inflow and outflow water samples were collected every one month.

The sediment deposition was extremely large from January to May 2017, the average erosion rate in all catchment area was estimated to be 6mm. On the other hand, the sediment deposition was nothing from June 2017 to January 2018. Based on the monitoring of stream runoff and turbidity, one big storm event in April with strong intensity mainly contributes to sediment discharge and overflow of the pond occurred. On the other hand, the later period had also big events. This difference is suggested to be the difference of land cover by crops and availability of sediment trap in this pond. In addition, the sediment component mainly was composed of surface soft layer, subsurface sandy layer, and bottom gravel layer. The average thickness was 2cm in surface layer, 100cm in mid sandy layer, and 10cm in gravel layer, respectively. Especially, the surface soft layer had high nutrient content. The dissolved nutrient of inflow stream water and pond water were high concentration. But the 10% of nutrient in the inflow decreased in pond. This means the plankton was produced, using this nutrient and that was deposited later. The soft layer is suggested to be effect of organic fertilizer, it is expected to apply to agricultural lands.