

# Study on water environment and atmospheric environment

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In my laboratory, I focus on various substances contained in both water and atmosphere and on their dynamics.

Regarding the water environment, we are targeting macro and micro plastics contained in river water those flow into the Seto Inland Sea by using AI (Artificial Intelligence) and data science techniques. We are also conducting researches on water disaster and water resource, which simulate river water runoff and inundation after rain, by using GIS (Geographic Information System) and runoff models.

Regarding the atmospheric environment, we are targeting airborne substances such as Asian dust (KOSA) and PM<sub>2.5</sub> generated from the Gobi Desert in Mongolia, and bioaerosol such as mushroom spores and radioactive cesium contained in spores released from forests. Since these substances affect public health, ecosystems, climate, and human health, it is important to clarify how much and when and how they are emitted and transported.

Substances those move in water and atmosphere are not only naturally occurring but human-caused. Precipitation, wind, and soil are nature but they are affected by human and social activities and cause changes in the global environment due to global climate changes. Therefore, researches on water and atmospheric environment have both natural and social scientific aspects.

Environmental research is not easy to get a single answer and it cannot be solved by equations. The phenomenon occurring at this moment cannot be reproduced. That is why, measuring observation data is important. In addition, it is also important to see phenomena from multiple angles by using big data. It is difficult to think about why this is happening in nature, but it is also fun and real pleasure to face unknown phenomena.

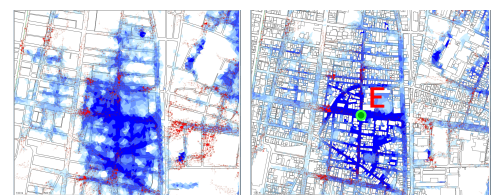
In many cases, measures to deal with environmental and disaster problems are usually delayed. However, even if it doesn't happen, we understand what is happening now and consider the risks and sustainability that may occur in the future. I do research together with students and citizens about what to do now.



Microplastic survey in river

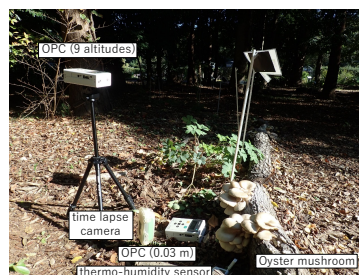


Automatic detection of PET bottles flowing in rivers using AI



(a) No building (b) With building

Comparison of simulated inundation depth with and without buildings



Field measurements of mushroom spores at the Tsukuba Botanical Garden



Observations of Arian dust and meteorology in the Mongolian Gobi Desert