論 文 題 目 ： Evidence for paddy-field derived nutrients and their horizontal transport in Lake Biwa, Japan

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論文の要旨

Lake Biwa is Japan's largest and one of the world's oldest freshwater lakes. It is an invaluable habitat for endemic species and of utmost importance as a water resource for the country. Although rice, produced by wet cultivation, is the main crop in the lake's watershed, it is still unclear how agriculture affects this lake ecosystem. This dissertation examines the transport and distribution of paddy-field derived nutrients entering the lake. An integrated approach based on analysis of water samples and in situ measurements conducted in the North Basin of Lake Biwa is presented. Results reveal the formation of a widespread ammonium maximum layer at 10-25 m depth in the period following the application of fertilizers in paddy fields. Spectral analysis shows that dissolved substances can be transported in the lake by physical processes related to internal waves. This is supported by the observation of rice herbicides on the lake's surface and at 20 m depth in offshore waters. In conclusion, this study demonstrates that agricultural non-point sources in Lake Biwa can not be neglected because they are transported offshore and directly affect the water quality and primary productivity of the lake.