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Spatial Dynamics of Mercury and Phytoplankton in Lake Maggiore: An Integrated Monitoring Approach

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Mercury contamination in freshwater ecosystems is of major concern due to its persistence, toxicity, and bioaccumulation potential. This preliminary study investigates mercury dynamics in Lake Maggiore by integrating surface water mercury analyses with high-resolution assessments of phytoplankton structure and chlorophyll concentrations along the water column and surface water. Monitoring activities were conducted using FluoroProbe probe (BBE Moldaenke GmbH) to characterize algal groups with particular focus on the horizontal spatial distribution of both chlorophyll and mercury in proximity to tributaries and lake outlets. Surface water samples were analyzed for mercury concentrations using a Lumex RA□915+ portable atomic absorption spectrometer, equipped with the dedicated attachment for dissolved and total mercury determination in water, while FluoroProbe profiles were used to quantify algal group composition and chlorophyll distribution. Results reveal marked spatial heterogeneity in mercury concentrations, closely associated with tributary zones and changes in chlorophyll patterns, suggesting coupling between hydrological inputs, phytoplankton dynamics, and mercury behavior. This integrated monitoring approach improves understanding of mercury–ecosystem interactions in large lake systems and supports the development of effective monitoring and management strategies for freshwater environments.