Autonomous Vehicles as an innovative monitoring strategy in environmental studies

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Water quality monitoring constitutes a challenge for authorities, due to the vulnerability of current strategies attributed to unpredictable and hazardous incidents, such as sewage discharge and agricultural runoff. Autonomous equipment such as Unmanned Surface Vehicles (USVs) and Aerial Unmanned Vehicles (AUVs) offer multiple advantages regarding real time monitoring and approach of geographical zones not easily accessible. The principal characteristics of such vehicles comprise remote control systems and customized sensors. Unmanned Surface Vehicles (USVs) can greatly enhance the speed, easiness and effectiveness of sampling, as demonstrated in the study of the sea Surface Microlayer (SML), a thin layer (1-1000 μm) representing the boundary between the atmosphere and ocean. SML is distinct from subsurface water due to its unique biological, chemical, and physical properties and tends to accumulate chemical pollutants such as metals and polycyclic aromatic hydrocarbons (PAHs). Despite its significance, SML still remains a generally understudied environmental compartment, due to difficulties so far characterizing its laboring and time consuming sampling. In this context, a new autonomous Unmanned Surface Vehicle (USV) was designed and constructed in the present work, in order to be applied in the study of SML and generally in the elaboration of environmental monitoring strategies, simultaneously allowing for samples collection. The vessel is remotely controlled via laptop, tablet, or smartphone and is equipped with four rotating glass disks for SML sampling, a peristaltic pump for subsurface water sampling, Teflon and amber containers, irradiance sensors and an anemometer.

References:

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