A short introduction to aquaphotomics

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Aquaphotomics is a novel interdisciplinary scientific field studying a wide range of phenomena in nature through water and light interaction to deliver an immense source of information on structural and functional properties of aqueous systems. The objective of this workshop presentation is to briefly introduce the fundamentals of aquaphotomics. Discussions emphasize on how to design and perform an experiment, how to approach the collected data and how to execute multivariate data analysis ending with the presentation of water absorbance spectral pattern using aquagrams in the aquaphotomics methodology. Aquaphotomics deals with the large-scale, comprehensive study of water aiming to explore the roles, relationships and functions of water, an exceptionally important biomolecule. Light-water interaction methods such as spectroscopy produce complex multidimensional spectral data which require data processing and analysis methods to extract the hidden information about the structure of water presented by its many water absorbance bands. In aquaphotomics the specific water structures presented as water absorbance patterns aimed to be connected to their functions in the studied aqueous systems, thus building an aquaphotome – a database of water absorbance bands and patterns correlating specific water structures to their specific functions (Tsenkova et al. 2018). As aquaphotomics applies spectroscopy, it is time-efficient, robust, chemical-free and provides non-invasive in vivo assessment. This is an opportunity that has been explored in multidisciplinary fields ranging from water and food quality monitoring, microbiology, to bio measurements, bio diagnostics and biomonitoring and more in both fundamental and applied science fields. The dynamic changing era of science and its value to life makes aquaphotomics increasingly valuable all over the world.

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