Beitrag ID: **23** Typ: **Talk**

AqQua - The Aquatic Life Foundation Project: Quantifying Life at Scale in a Changing World

Aquatic life plays a crucial role in human well-being by supporting biodiversity, regulating climate, and contributing to food security. Plankton, in particular, drive the biological carbon pump, which sequesters large amounts of atmospheric carbon in the ocean. However, climate change threatens this system by altering plankton diversity and reducing food web efficiency, impacting both marine and freshwater ecosystems. Pollution further stresses freshwater systems, while declining fish stocks affect global nutrition.

To address these challenges, accurate monitoring of aquatic life is essential. Distributed pelagic imaging now allows continuous observation of marine and freshwater organisms, capturing millions of images daily from the ocean surface to its deepest parts. These images, along with their metadata, hold valuable information about biodiversity, food web dynamics, ecosystem health, and carbon sequestration.

The Aquatic Life Foundation Project aims to unify and analyze billions of such images collected worldwide using various imaging systems. By training a foundational pelagic imaging model on this global dataset, the project will enable precise classification of species, extraction of biological traits, and estimation of particulate organic carbon. This model will support the creation of detailed global maps showing biodiversity, ecosystem status, and carbon flux.

Ultimately, AqQua (www.aqqua.life/) will enable critical insights into aquatic ecosystems, enhancing our ability to monitor, understand, and protect marine and freshwater environments amid accelerating global change.

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