



From Nets to Imaging: Towards Next-Generation Zooplankton Monitoring in ITINERIS

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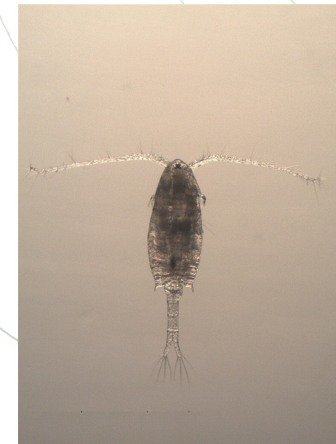


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Why Zooplankton?

- 🌐 Key role in **marine food webs** and **biogeochemical cycles**
- 🌐 Indicators of ecosystem health and climate change
- 🌐 High **taxonomic complexity** and **spatio-temporal variability**
- 🌐 Monitoring is **essential but challenging**



Zooplankton studies inform **biodiversity** monitoring and support EU policies on invasive **alien species** (Dir. 1143/2014/EU).

Why & How (PNRR ITINERIS – Gaia Blu)

Challenges

- High taxonomic complexity
- Strong spatial & temporal variability
- Nets + microscopy → slow, expertise-heavy, fragile taxa underrepresented

Innovative approach

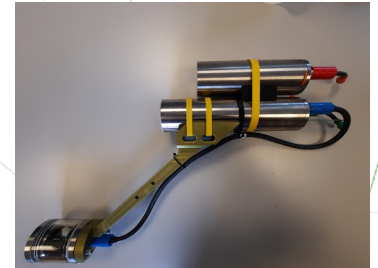
- In situ imaging (UVP6) → vertical profiles, fluxes
- Lab imaging (ZooScan, FlowCam) → WP2 net samples
- Standardization, Automation, Large datasets
- AI / ML → semi-automated classification, improved efficiency & consistency

Integration & Networks

- Embedded in PNRR ITINERIS
- Linked to LTER & DiSSCo
- Goal: Combining taxonomy + imaging enhances biodiversity assessment



UVP6



ZooScan



FlowCam



ITINERIS Test Case



ITINERIS EYES (Gaia Blu, July 2025)

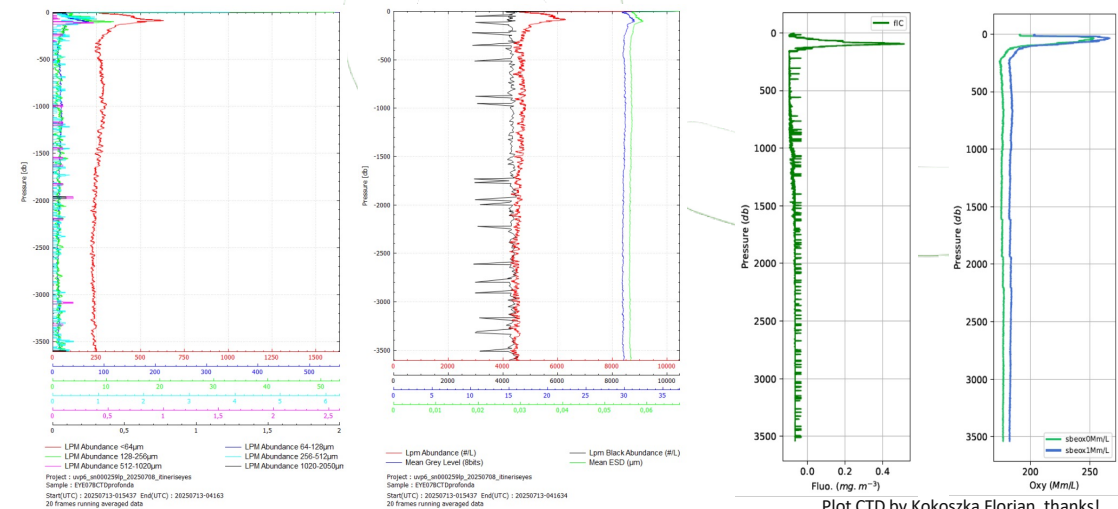
- **In situ:** UVP6 on CTD rosette → plankton & particles
- **Lab:** WP2 nets → ZooScan & FlowCam
- **Analysis:** Machine Learning → image-based ID



Zooplankton specimens detected by UVP6 during the ITINERIS' EYES. At the top are the raw photos taken by the sensor and at the bottom are the same ones after processing on EcoTaxa.

Synergy between Methods

- **Classical taxonomy** → species validation (ground-truth)
- **Imaging** → throughput, standardization, interoperability
- **Combined** → robust, scalable, reproducible
- **Outcome** → stronger biodiversity & ecosystem assessments under change



Plot CTD by Kokoszka Florian, thanks!

Vertical profiles of particle abundance measured with UVP6 for the station EYE07B: left, distribution by size classes (<64–2050 μm); right, total abundance, black particle abundance, mean grey level, and mean equivalent spherical diameter (ESD).

Take-Home Messages

- **Zooplankton Monitoring: Key and Complex**
- Nets remain essential for taxonomy
- ITINERIS tests next-gen tools
- Imaging boosts efficiency and scope
- Integrating methods → better biodiversity & ecosystem insights
- Building long-term, multi-site monitoring capacity
- Embedding this approach within the Long-Term Ecological Research (LTER) network and the Distributed System of Scientific Collections (DiSSCo) infrastructure





THANKS!



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