

Can we use green LIDAR drones to detect zooplankton in lakes?

1 The green laser (532 nm) can penetrate the water and can provide information about the presence of zooplankton.

2 Depending on the turbidity, the existing LIDAR is that green laser can reach up to 3x the Secchi depth.

3 Zooplankton migrates to the surface during night. This migration is well documented, but their horizontal spatial variability is still inefficiently sampled.

4 Zooplankton were thought to be transparent, but they apparently interacts with light, specifically backscattering the light.

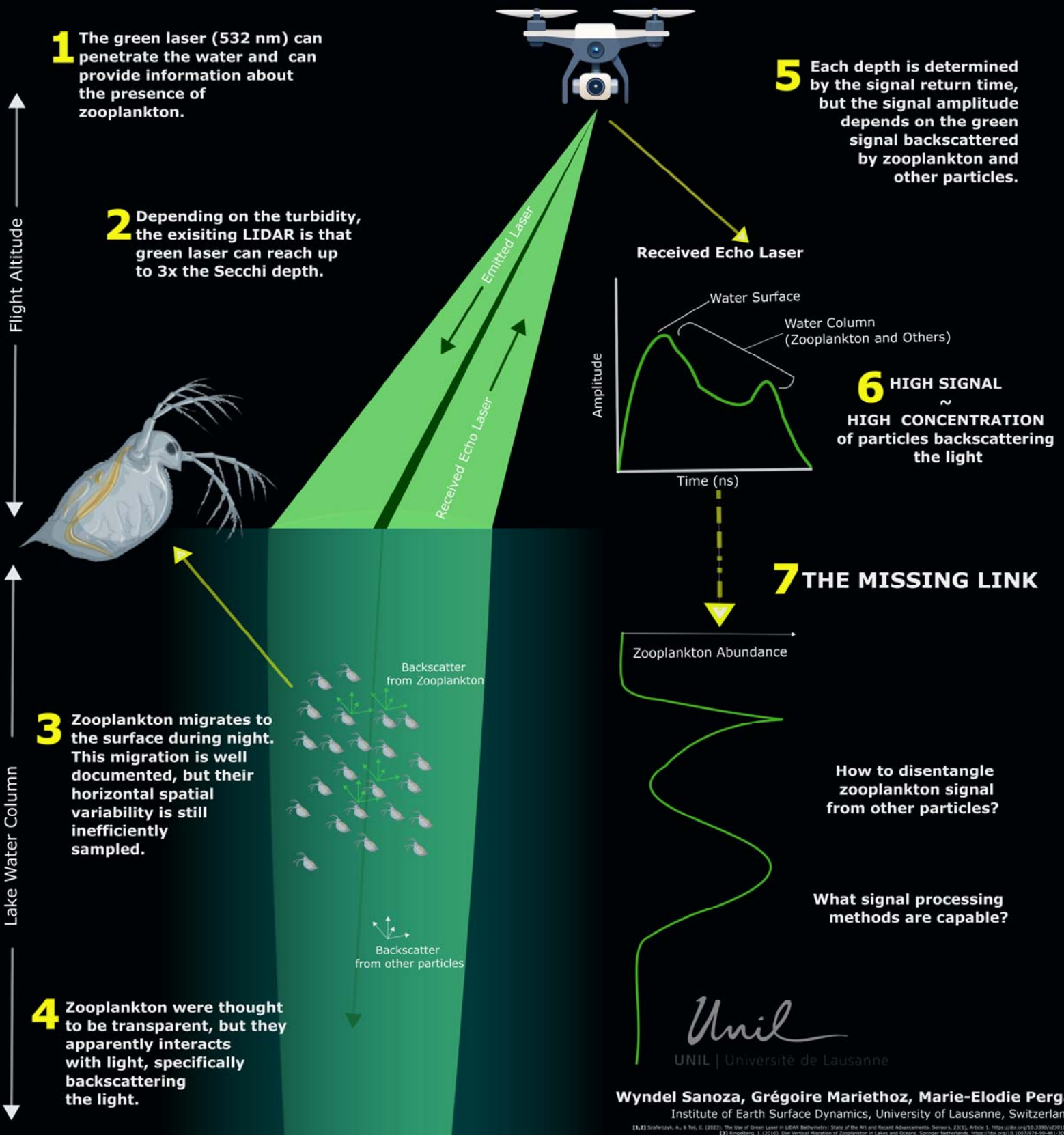
5 Each depth is determined by the signal return time, but the signal amplitude depends on the green signal backscattered by zooplankton and other particles.

6 HIGH SIGNAL ~ HIGH CONCENTRATION of particles backscattering the light

7 THE MISSING LINK

How to disentangle zooplankton signal from other particles?

What signal processing methods are capable?



Unil

UNIL | Université de Lausanne

Wyndel Sanoza, Grégoire Mariethoz, Marie-Elodie Perga
Institute of Earth Surface Dynamics, University of Lausanne, Switzerland

[1,2] Sollenkov, A., & Thié, C. (2022). The Use of Green Laser in LIDAR Bathymetry: State of the Art and Recent Advancements. *Sensors*, 23(1), Article 1. <https://doi.org/10.3390/s23010292>
 [3] Ringberg, J. (2016). Diel Vertical Migration of Zooplankton in Lakes and Oceans. Springer Netherlands. <https://doi.org/10.1007/978-90-481-3093-1>
 [4] Senoo, Y. L., Shetic, N., Weiland, E. J., & Johnson, D. T. (2007). Light scattered by selected zooplankton from the Gulf of Mexico. *The Journal of Experimental Biology*, 250(7), 213-220. <https://doi.org/10.1242/jeb.022515>
 [5] Chumadze, J. H., & Thorne, K. E. (2003). Comparison of airborne lidar measurements with 420 kHz echo-sounder measurements of zooplankton. *Applied Optics*, 44(26), 5504-5511. <https://doi.org/10.1364/AO.44.005504>