DRONESYSTEMS

Funded by the European Union

Water Surface Elevation Survey

Contactless river water-level profiles from a UAV radar altimeter

WHAT IT IS

A UAV flies along the river with a radar altimeter (Geolux LX-80) and an RTK/PPK GNSS receiver and records the water surface elevation continuously, with no contact with the water and no access to the banks needed. The result is a water-level profile along the river centerline, from which the water surface slope is derived.

TYPICAL USES

- **Hydraulic models:** calibration and validation data for river models used in flood risk mapping and forecasting.
- **Conveyance and maintenance:** where water levels rise along a reach, and whether they changed since the last survey.
- **Poorly monitored reaches:** hydraulic gradients where there are no gauges.
- **Discharge:** the water surface slope needed for the UAV discharge workflow.

WHAT YOU GET

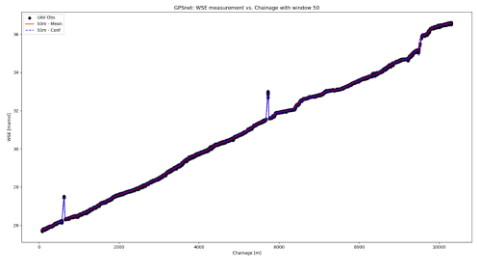
- Water surface elevation along the centerline at better than 1 m spacing, accuracy 3 cm or better, in your vertical datum (e.g. DVR90).
- CSV per reach: chainage, mean, median and confidence interval per moving window (typically 50–100 m, 10–20 cm steps), plus water surface slope.
- Profile plots and the raw georeferenced radar data on request.

HOW IT IS FLOWN

- Flight altitude 10–45 m above the water, max 5 m/s, two passes (one on each side of the centerline), terrain following from a DEM.
- BVLOS flights are operated under EASA PDRA-G03 in the 'specific' category with a survey UAV and a relay; VLOS flights in the 'open' category.
- From you: the river centerline or recent imagery, one or a few take-off sites, and the vertical datum you work in.

PRODUCTIVITY

- **VLOS:** 1.5–4.5 km of river per hour depending on access and line of sight.
- **BVLOS:** first measured survey day (Gudenå, October 2026): 8 km of river from three take-off sites in 3 h 21 min on site, 7 km per hour while airborne. Full BVLOS productivity figures follow after the November 2026 survey.



Example output: WSE profile along a river reach, measured values and moving-window mean with confidence interval.

KEY FACTS

Sensor	Geolux LX-80 radar altimeter, SkyHub payload controller
Positioning	RTK (NTRIP) or PPK, multi-band GNSS
Accuracy	3 cm or better (vertical)
Resolution	< 1 m along the centerline
Altitude	10–45 m above water
Platform	VLOS: DJI M300 RTK · BVLOS: Dronevolt Kobra with relay
Output	CSV profile, slope, plots

WHAT A QUOTE COVERS

- Planning and preparation (centerline, routes, permits)
- Survey days, crew of two (BVLOS: UAV and relay link)
- Transport and accommodation
- Data processing and reporting

Prices depend on reach length, number of cross sections, access and VLOS/BVLOS. Quote on request.

CONTACT

Drone Systems

Sune Nielsen · sune@dronesystems.dk

+45 21 85 17 44 · www.dronesystems.dk

Workflow developed in UAWOS – Unmanned Airborne Water Observing System, Horizon Europe grant agreement 101081783 · uawos.dtu.dk · Technical basis: UAWOS surveying protocol D3.1 (WSE Surveying Protocol) · DRAFT 3 November 2026