Airborne Data Processing Software AddOn

RiHYDRO

for commercial hydrographic and bathymetric surveying

- ***Automatic classification of water surface points***
- ***Generation of a water surface model (WSM) based on classified water surface points***
- ***Refraction correction of points below the water surface model (WSM)***
- ***Support of different import and export formats for classification purposes***
- ***Use point clouds from different scanners to identify water surface points***
- ***Import externally generated WSM***
- ***Processes a large number of files for unattended operation in batch mode***
- ***Smoothly integrated into RiPROCESS***

For smooth processing of scan data acquired with *RIEGL* Hydrography Laser Scanners the Airborne Data Processing Software AddOn RiHYDRO is offered as supplement to RiPROCESS.

When processing bathymetric laser data, additional processing steps have to be applied since both, the laser beam's refraction at the air-water interface and the lower propagation speed within the water column must be taken into account in order to obtain a geometrically correct point cloud. Those specific processing steps – usually called "refraction correction" – have to be carried out for each flight strip right after the standard ALS processing workflow.

Refraction correction of the points below the air-water interface (i.e. both points on the water bed and within the water column) requires a geometric **W**ater **S**urface **M**odel (WSM). WSMs can be generated from the laser data by one of the tools offered with RiHYDRO. An alternative option is to import already existing water surface models. In the first case, the water surface points must be classified before. For this task, a specific point classification tool in RiHYDRO is provided, which allows classifying the points on horizontal water surfaces automatically.

The user can specify the index of refraction of the water and also a depth bias value to be taken into account during refraction correction.

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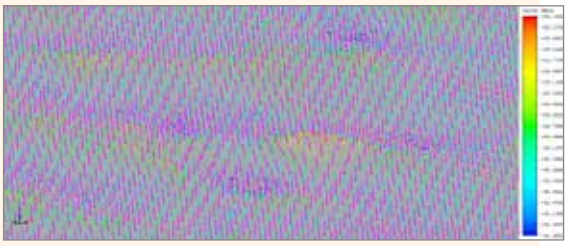
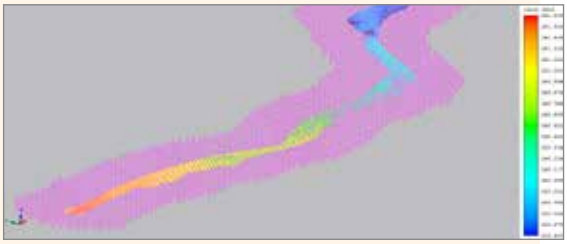
LASER MEASUREMENT SYSTEMS

Refraction Correction - Typical Workflow using RiHYDRO Tools

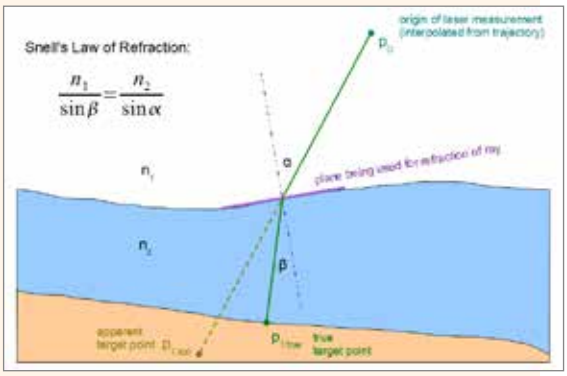
Profile view of classified water surface points



Maritime WSM visualized as normal vector field



Riverine WSM visualized as normal vector field



Refraction correction of targets below water surface

Classification of Water Surface Points

A tool for the automatic classification of water surface points is provided. Classification is based on identification of areas with layers of water surface points and subaqueous points. From such areas the classification of water surface points is extended to the entire water body.
Classification can be checked and modified manually in critical areas prior to the generation of a water surface model. Classification by third-party software is supported.

Generation of Water Surface Model (WSM)

Based on the classified water surface points, a geometric water surface model (WSM) is generated for each flight strip. For this task, a tool is available that allows the generation of a grid-based WSM containing height (and – optionally – normal vector) for each cell. This tool may be run in different modes, depending on whether standing water (sea, lakes) or riverine surfaces have to be handled.
Alternatively, already existing WSMs (i.e. generated by third-party software and given in a well-defined exchange format) may be imported by another tool.

Shift of Targets Below Water Surface to Correct Positions

Finally, the underwater targets have to be shifted to their correct positions according to refraction (beam bending and waveform compression). Therefore, a tool is available that is applied to each flight strip. Based on the underlying WSM, for each relevant ray, a representative plane is estimated and used to calculate the correction vector.
Optionally, all points, whose coordinates have been changed during this step, may be classified by this tool.

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