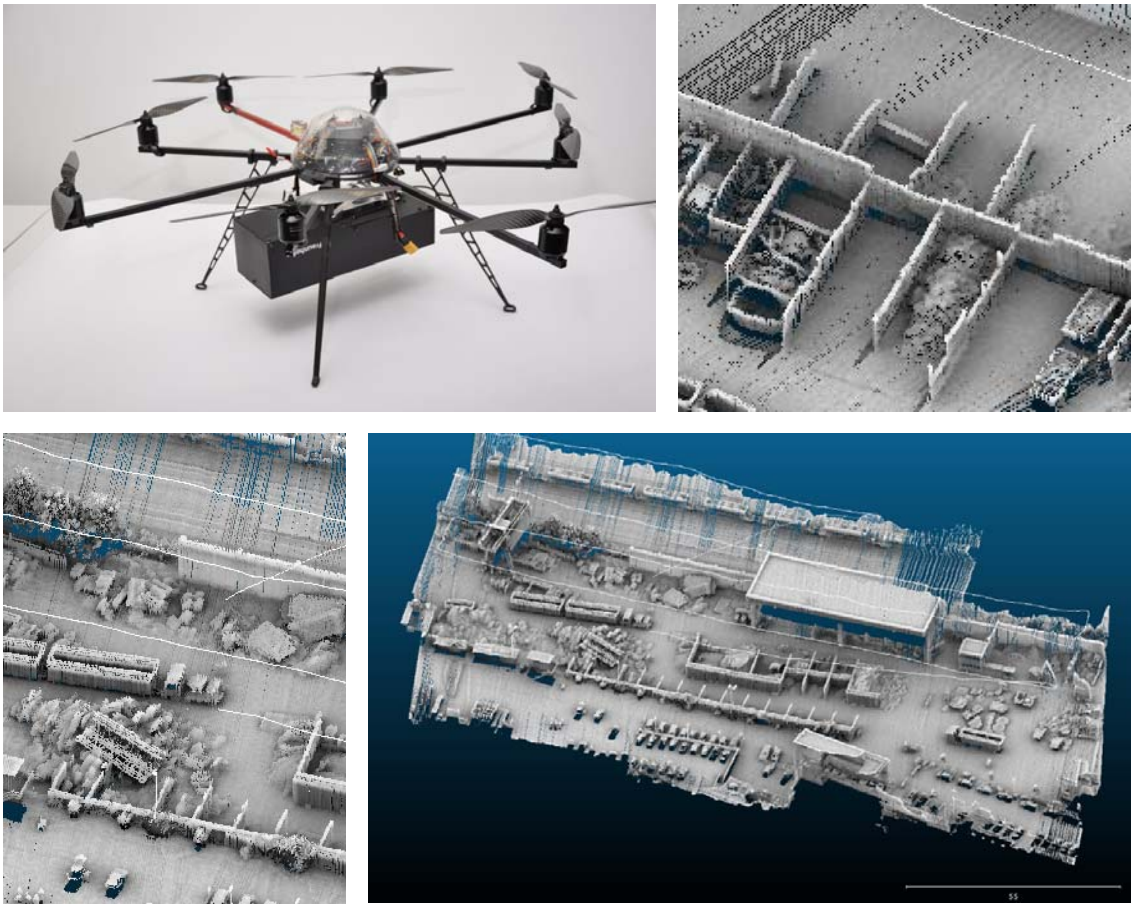
UAV Mounted LiDAR – a Solution for the Pacific?

The following summarizes the presentation by Teja Kattenborn (Karlsruher Institute of Technology, and partner of company GeoCopter, www. GeoCopter.eu). Since the last 1 ½ years Teja Kattenborn is in close collaboration with the Fraunhofer Institute within the development of a UAV compatible LiDAR sensor. The GIS&RS unit at SPC is linked.

Light Detection and Ranging Systems (LiDAR) are known to be the most accurate and robust data source for the 3D representation of complex sites, e.g. vegetation or urban areas. As being an active sensor, LiDAR offers a high flexibility with regard to illumination conditions. Hence, data acquisition can be performed at any time of the day and is independent of shadows, e.g. within or below vegetation canopies. Therefore airborne LiDAR has already a long history in the field of remote sensing. Due to high transportation costs and low area sizes traditional airborne LiDAR campaigns do not offer a cost efficient or long term solution for islands of the South Pacific.

However, recent developments in the field of unmanned aerial vehicles (UAV) lead to flexible airborne platforms and therefore efficient remote sensing solutions. Accordingly the Fraunhofer IPM Institute, a leading European research Institution, is currently developing a feasible LiDAR solution for UAV platforms. After several flight campaigns with the German UAV company GeoCopter the UAV-based LiDAR solution is close to become operational (see attached images of a recent test campaign). The current system setup will allow for the automatic acquisition and processing of 3D point clouds with a spatial resolution and accuracy below 10 cm^2 and an area coverage of up to 8 hectares per flight (costs for UAV and sensor will range from 25.000 to 35.0000 USD). Together with SOPAC, SPC further tests and application developments in the south pacific are currently targeted by the Fraunhofer IPM for 2015.



Top left: Copter-type UAV platform (GeoCopter) and LiDAR sensor (Fraunhofer IPM). Top right & bottom left: Close-ups of a point cloud (xyz measurements) of a test campaign, March 2015. Bottom left: Area (approx. 6 hectares) targeted during one test flight. Although the test campaign was situated on an industrial complex, the results show the high potential for other applications. The high point density and accuracy enables to map vertical and horizontal vegetation structures, i.e. forest canopy structure or layers as well as the underlying terrain surface to derive absolute vegetation heights. Thus, the system could not only facilitate mapping and monitoring deforestation, but also spatially complex processes, such as forest degradation.

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