

MD4-200 Unmanned Aerial Vehicle and Retrieval of Bidirectional Reflectance Factor from Aerial Photographs

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Unmanned aerial vehicles (UAV) offer numerous new appealing possibilities for remote sensing applications, when compared to conventional manned aerial vehicles. By deploying UAV based instruments during field campaigns the operators can more freely choose optimal timing and location for the remote sensing measurement, the legislation and regulations for operating an UAV are not as strict as for larger aerial vehicles, and the costs for single flight are minimal.

The possibilities of a highly automated UAV, model md4-200 by Microdrones GmbH, Germany, have been researched at Finnish Geodetic Institute. The model is capable of carrying 200-300 grams of payload, depending on wind conditions; it has a sophisticated flight controller, capable of conducting pre-programmed aerial photography missions; and has an onboard inertial measurement unit with a data logger. Currently the onboard instrumentation is limited to a small digital camera, Ricoh GR Digital II.

The UAV equipped with the camera has been used during several research expeditions in conjunction with other instrumentation, including Finnish Geodetic Institute Field Goniospectrometer (FIGIFIGO) and several airborne instruments. The current UAV setup is developed for taking multiangular reflectance measurements from large (some meters) samples of ground surface. After rigorous calibration the data measured using the UAV setup has been found to correlate strongly with a similar sample measured with FIGIFIGO (Fig. 1).

In this presentation some preliminary data from Snortex 2009 (FMI-ARC, Sodankylä, Finland) field campaign will be presented. Also during this presentation the technical aspects of the UAV will be demonstrated.

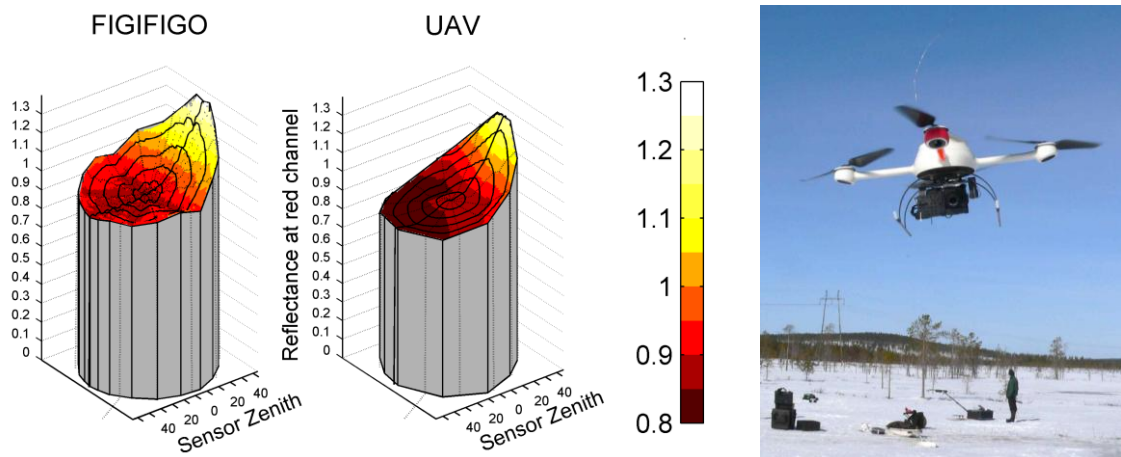


Fig. 1, Left and middle: Bidirectional reflectance factor of smooth snow measured simultaneously with FIGIFIGO and the digital camera of the UAV during Snortex 2009. Both measurements show similar increased reflectance in forward direction. Right: A picture of the md4-200.