

Novel Drone-based System for Ecosystem Monitoring

Application, Analysis and Interpretation

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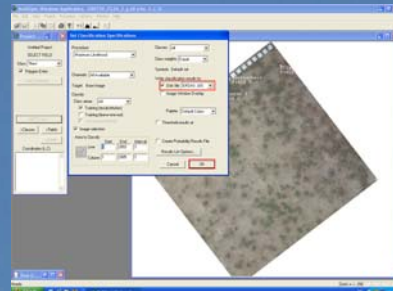


The Microdrone

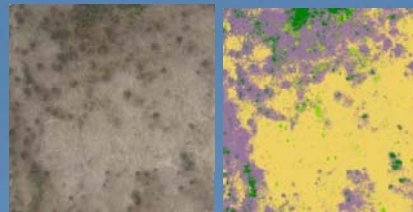
The **MD4-200** is a VTOL AUMAV (VTOL = Vertical Take Off and Landing, AUMAV = Autonomous Unmanned Micro Aerial Vehicle) (microdrones GmbH, Kreuztal, Germany). The drone is built completely with carbon fiber reinforced plastics and has a weight of 900g. The microdrone is equipped with a high-resolution digital camera (Pentax, 10 MByte). Depending from the flight height resolutions of less than 1cm/pixel are possible. The installed GPS provides position hold and autonomous waypoint navigation. The **Altitude and Attitude and Heading Reference System** uses the following sensortypes: accelerometers, gyroscopes, magnetometer, airpressure, humidity, temperature. Flight time is up to 20 minutes depending from weather conditions and payload.

Image analysis

Aerial photos can be analyzed with different commercial software. For monitoring of the vegetation cover the freeware MultiSpec[®] is used. A supervised classification by selecting training areas for selected classes from known areas (plants, sand) was applied to identify the vegetation cover. For further analysis the data can be imported into Arc Info/View.



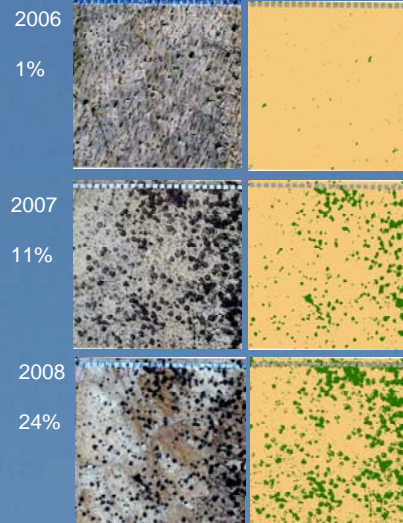
Using MultiSpec for classification of vegetation



Automatic classification of vegetation cover (3 types) and sand by MultiSpec

Vegetation monitoring

An example of an annual survey of the vegetation cover in an artificial watershed.



Ecosystem monitoring

The mini-drone is currently used for the monitoring of the development of landscape structures (e.g. vegetation, stream network, surface properties) of an artificial watershed in Lusatia (SFB/TRR38). Furthermore, the system can be applied to various airborne observations of ecosystems.



The artificial watershed „Hühnerwasser“ in Welzow Süd