

Airborne Hyperspectral Remote Sensing – a novel monitoring tool.

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Coastal monitoring

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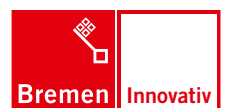
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> Helgoland island is one of the first demonstration areas



> The Condor aircraft with attached payloads



> Scenarios: Coastal Cities, Change Detection, Ports, Environment

Tools for coastal monitoring

Monitoring can be used to assess the biodiversity and sensitivity of invaluable coastal landscapes. Homogenous monitoring of large coastal areas is most efficiently achieved by remote sensing. Hyperspectral imaging provides a very high amount of spectral information per pixel. This allows the computation of value added information, which can be used to differentiate, classify or identify surface materials. It is widely accepted, that this type of information is necessary to satisfy increasing demands for survey and mapping.

Case Study CoastEye: A specialised processing chain for airborne hyperspectral image analysis of coastal areas is currently being developed for demonstration Potential users from areas such as environmental management and coastal monitoring/ planning are actively involved in the definition of areas of interest for campaigns and the processing, exploitation and evaluation of the data and results.

Our data acquisition system

The Platform: Condor

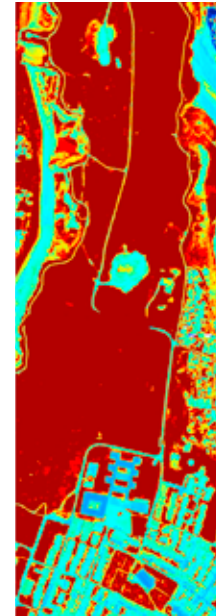
The Condor aircraft is a customized Stemme S10 motor glider, owned by OHB System AG and suitable for carrying payloads in two versatile wingpods. Its aerodynamic design, long flight time and low cost of operation makes it an ideal platform for image acquisition and aerial reconnaissance.

The Sensor: AISA Eagle

The high performance hyperspectral imager AISA Eagle, manufactured by Specim Ltd., Finland, is provided by the Alfred-Wegener-Institute. The sensor is combined with a GPS/INS unit and an acquisition computer, which are completely integrated into a Condor wingpod, and can be controlled by the operator through the interface in the cockpit.

Example

Hyperspectral imagery offers more than just continuous spectral information for every pixel. The multitude of physical measurements for each element in the data allows the use of sophisticated methodologies for image exploitation. It is also well known that remote sensing provides the most efficient means of surveying and mapping large areas if compared with the time and effort needed for ground truth field campaigns. In summary, hyperspectral imagery provides a faster and cheaper solution with improved accuracy in classification.



The figure illustrates some hyperspectral imagery for part of the island of Helgoland in the German Bight. It is divided into three columns representing selected methods of data processing.

> The left column shows a view of a band combination in the visible light, used for visual image interpretation.

> The middle column shows an image product that can only be derived from hyperspectral data. This so called Minimum Noise Fraction (MNF) separates particular information from the noise in the dataset and shows the high diversity of surface materials in different colours.

> Standardised remote sensing data like the Normalised Difference Vegetation Index (NDVI) is shown in the right column. This is used to obtain information concerning the status of vegetation. This index is normally developed from multispectral data but can also be retrieved from hyperspectral imagery.

**Further Information under www.ohb-system.de
www.awi-bremerhaven.de**