



DIGITAL IMAGERY FOR COASTAL MONITORING

INNOVATIVE USE OF DIGITAL CAMERA TECHNOLOGY PROVIDES THE UK ENVIRONMENT AGENCY WITH ADDITIONAL DATASETS FOR HABITAT MAPPING.

Blom, aerial surveying and remote sensing specialists, have provided the UK Environment Agency with efficiency savings while working on the South West Regional Coastal Monitoring Programme. Originally commissioned to capture RGB digital imagery using their Vexcel UltraCAM D, Blom were then commissioned to combine the camera's additional Near Infra Red (NIR) band data with the red and green light bands to produce false colour IR images for some coastal areas. This imagery has now been provided to the programme partners for use in their coastal projects.

The South West Regional Coastal Monitoring Programme is funded by the UK's Department for Environment, Food and Rural Affairs (DEFRA) and jointly project managed on behalf of the programme partners by the Environment Agency and Teignbridge District Council. When complete, the programme will provide the partners and other interested parties with data and imagery that is consistent, high quality and freely available. This collective vision can be used to support strategic decisions and to assess coastal erosion, habitat type and extents and flood risks. The lessons learnt in gathering data over 1,000 km of South West coastline will be important in enhancing efficiency in national coastal mapping projects, due to be undertaken as part of a programme set to commence in 2011.

A key part of the monitoring process is an examination of how the coastline, with its areas of cliff-top erosion, is changing over time. To

this end the Environment Agency contracted Blom to provide high resolution aerial photography and orthophoto production for the whole South West coast; an area stretching from Portland Bill in Dorset to Beachley Point in Gloucestershire and incorporating the Isles of Scilly. This included a first capture for baseline with a further survey to monitor change.

To capture the required imagery Blom employed two aircraft equipped with 90 mega pixel Vexcel UltraCAM D digital cameras. Key to this technology are the four lenses that, as well as capturing high resolution panchromatic imagery as standard, simultaneously gather data in the Near Infrared Band (NIR). The NIR capability of the Vexcel UltraCAM D facilitates viewing RGB (red, green, blue) and NIR bands in different combinations to highlight different features and vegetation types. This technology provided additional value to the programme and enabled the Environment Agency to conduct studies including salt marsh habitat mapping, providing details of the vegetation that supports such rich and varied wildlife. These areas of interest include some 49 Special Areas of Conservation and 59 Special Protection Areas that are designated to safeguard specific habitats and species along the South West Coast.

As with most aerial projects, one of the most important issues in maximizing efficiency is how to get the most from the limited time available in which to fly. In this case, the restrictions were consider-



able. All data gathering was limited to just the three months between July and September, coinciding with when the vegetation cover along the coastline is most abundant. The aerial teams were also restricted to a specified tidal window, roughly equating to two hours either side of low spring tides with no capture at neap tides. These constraints, hampered further by poor weather during the summer of 2006, meant that it was not possible to capture the first baseline dataset as originally intended. After further weather delays in 2007 the decision was made to reduce the capture from three to two datasets, the first taken between 2006 and 2008 and the second completing in summer 2010.

Key to overcoming the constraints of the tidal windows was the efficiency of the flight plan. A shapefile consisting of a polygon defining the AOI (Area of Interest) was supplied by the Environment Agency. This was used to produce a flight plan designed to provide full stereo coverage of the area in the most efficient and cost effective way. Due to the large and complex nature of the site, as well as the tight tidal restrictions, this was not always the most logical way! An important factor in efficient flight planning is that it ensures the area is covered to the quality and accuracy required, but with the minimum number of images. By minimising the number of images captured, it is possible to ensure efficient processing of the orthophotography, reducing the time spent on aerotriangulation, lessening the number of seam lines to be blended and reducing the amount of quality checking.

Ortho-rectified images were generated from the central portion of each digital image, aerial triangulation information and an edited DTM (Digital Terrain Model). At this stage of production further efficiency savings were made when Blom utilised an existing Environment Agency LiDAR dataset to create the DTM on which the orthophotos were based. Subsequently each new ortho-image was mosaiced together with the adjacent images ensuring that colours were accurately blended across the imagery and linear features continued unbroken across seam lines. Upon completion of this process, the TIFF format ortho was cut to the required tile sizes, prior to QC and conversion to ECW format for final delivery. With a total of 12,616 images to process for the baseline data set and 12,507 for the revised 2009/10 area of interest, efficient software and a fast network were essential elements in the production flow line.

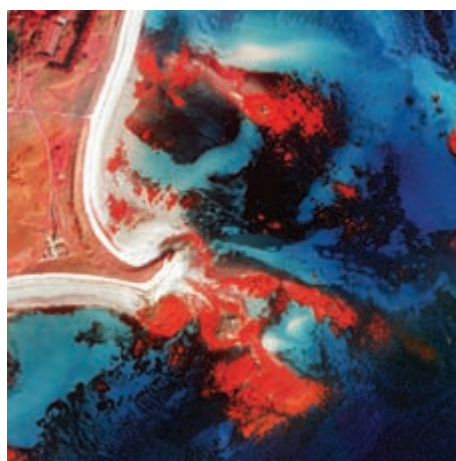
One use for the data has been the creation of a GIS map of habitat type and extent. The habitats are classified using the Integrated Habitat System (IHS); a national classification which allows the programme partners to make direct comparisons with



Isles of Scilly coastline captured in near infrared (NIR) and RGB. See the circular areas of seabed underneath where the buoys/boats are moored, which is where chains and anchors have damaged seaweed on the seabed.



The False Colour Infrared (FCIR) and RGB imagery allows different features to be highlighted. This comparison shows several of the habitats that are being monitored, including sand dunes, a saline lagoon and a rocky foreshore.



The imagery will aid in developing a GIS-based habitat type and extent map.



habitats in other parts of the UK and Europe. Field surveys were carried out to confirm the interpretation and classify any unusual habitat types.

Now that an accurate baseline has been established the programme partners can monitor any future coastal changes. Blom continue to utilise innovative technology to capture RGB and NIR imagery, so that vulnerable habitats such as salt marsh, saline

lagoons, mudflats and sand dunes can be protected to allow the unique wildlife to flourish.

All data captured as part of the South West Regional Coastal Monitoring Programme is freely available to access at www.channelcoast.org.

Article submitted by Michael Cotchin of Blom. For more information, visit www.blomasa.com.