Supporting the mapping of intertidal mussel beds with Unmand Airborne Vehicles

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The high resolution images that are acquired for selected sample areas provide detailed information about the composition of the mussel bed, even showing individual mussels and oysters.
The data can be explored as an 2D image or as a 3D model, providing also insight about the height distribution within the mussel bed.

Oyster, 13 cm long

Mussel, 3 cm long

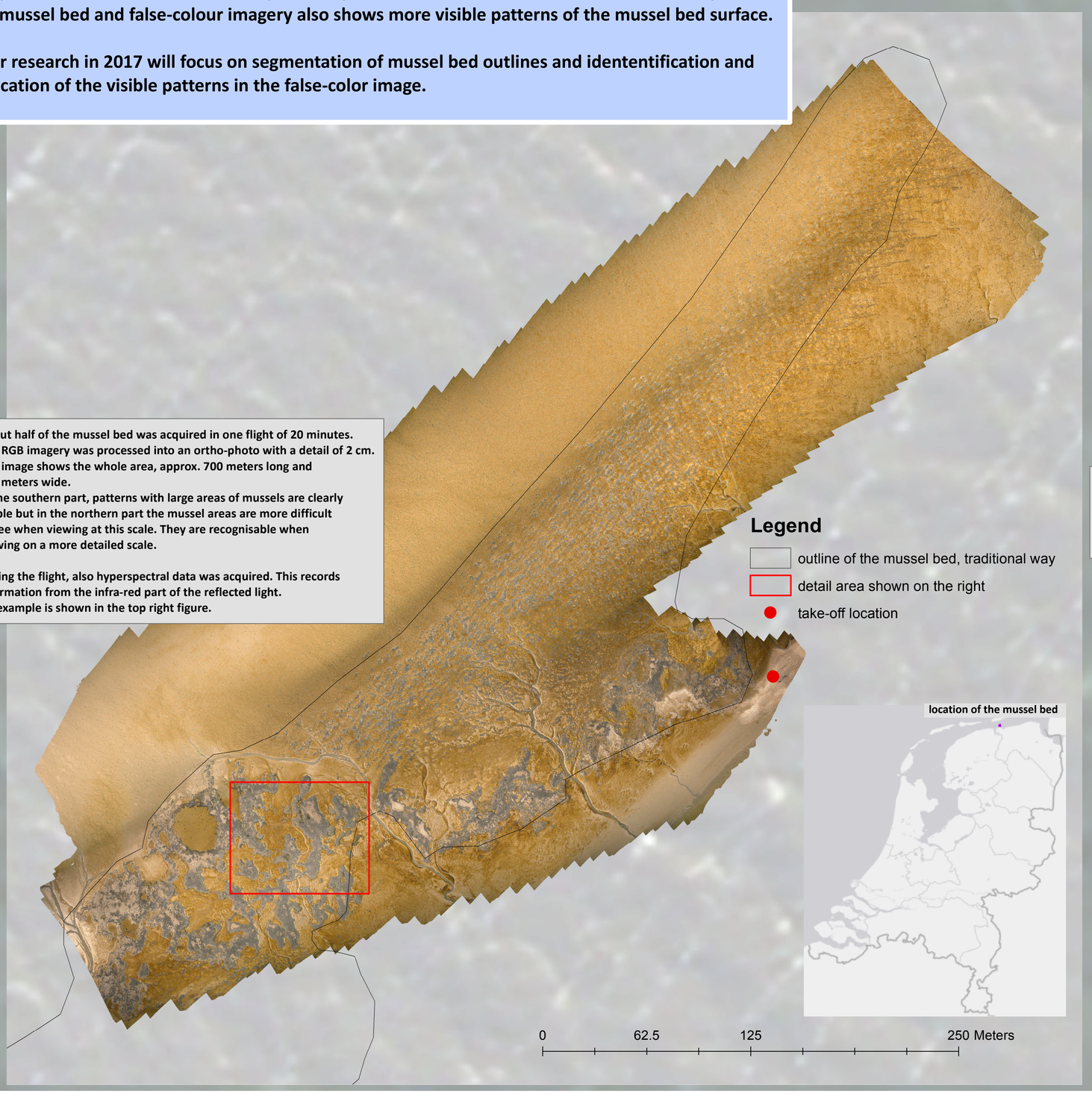
The traditional way of mapping the intertidal mussel beds requires fieldworkers equipped with hand gps devices to walk around and over the mussel beds to map its position and coverage of mussels.
The outline of the mussel bed is mapped, no geometric details on the composition of the mussel bed is recorded.
Samples are taken for length distribution measurements and associated fauna assemblage.

With an Unmanned Airborne Vehicle or drone, photos are taken of the mussel bed and computed into an ortho-photo with a detail of 2 cm.
Current legislation limits the operation area for drone flying to 500 meters from the take-off point. To map a mussel bed longer then 1000 meters requires multiple take-off locations.
Images with a detail of 1 mm can be acquired by flying at an altitude of 5 meters above ground level. This method is used to sample selected parts of the mussel bed.

This poster shows the result of an experiment of mapping an intertidal mussel bed with a drone.
The traditional way of mapping cannot be replaced by mapping with a drone, mainly due to legislation issues for drone flying. The maximum distance that a drone is allowed to fly from the take-off position is 500 m whereas mussel beds can be several km long and often more than 500 m off-shore. This makes it difficult to find suitable take-off positions with a firm surface and requires much travel time by boat.

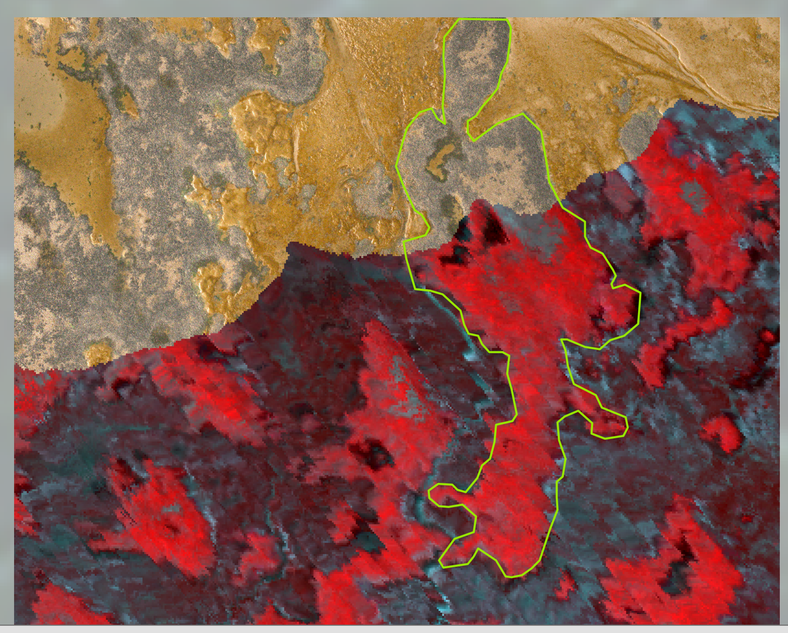
The experiment shows that the derived products provide additional information about the composition of the mussel bed and false-colour imagery also shows more visible patterns of the mussel bed surface.

Further research in 2017 will focus on segmentation of mussel bed outlines and idententification and classification of the visible patterns in the false-color image.



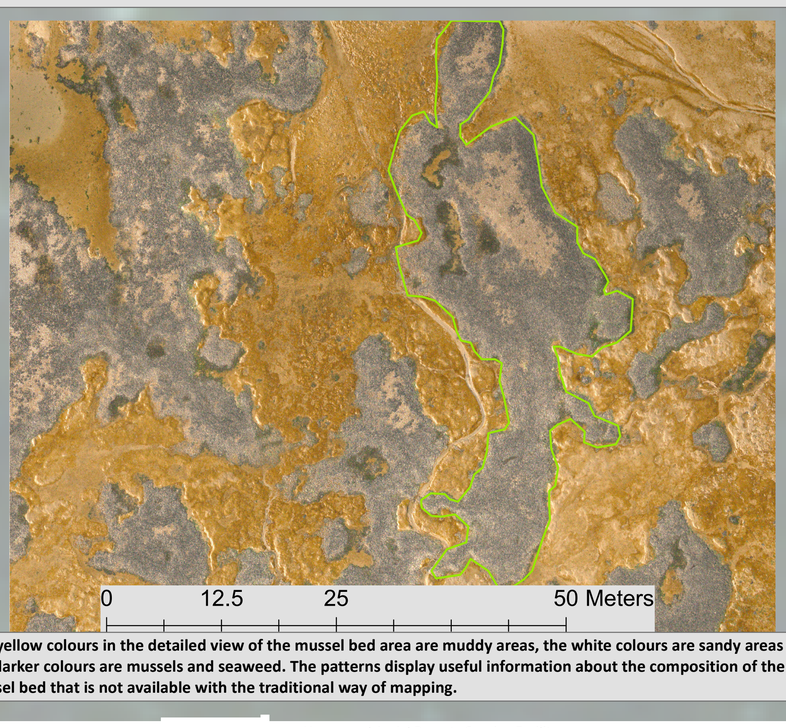
About half of the mussel bed was acquired in one flight of 20 minutes.
The RGB imagery was processed into an ortho-photo with a detail of 2 cm.
The image shows the whole area, approx. 700 meters long and 300 meters wide.
In the southern part, patterns with large areas of mussels are clearly visible but in the northern part the mussel areas are more difficult to see when viewing at this scale. They are recognisable when viewing on a more detailed scale.

During the flight, also hyperspectral data was acquired. This records information from the infra-red part of the reflected light.
An example is shown in the top right figure.



The bottom half of the picture above show a false-colour representation of the recorded hyperspectral data. This shows vegetated areas in shades of red and non-vegetated areas in shades of blue. The bright red colours are seaweed that cover the mussels. The darker red colours show patterns in the muddy areas that are not visible on the RGB image.

The green contour is digitized for comparison purposes only, it indicates the same area in both images.



The yellow colours in the detailed view of the mussel bed area are muddy areas, the white colours are sandy areas and the darker colours are mussels and seaweed. The patterns display useful information about the composition of the mussel bed that is not available with the traditional way of mapping.

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This poster shows results of the project KB-WOT Visserij 2016: Drone mapping of mussel beds

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