Usage of videomosaic for computed aided analysis of North Sea hard bottom underwater video for baseline study of offshore windmill park

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Windmill park on the open North Sea coast at Hävsul area in Norway is one of the first in the world to be build on such extreme high-energy coast. To determine possible environmental impact of this project, baseline study was performed in 2010-2011. Two areas, impacted (area where windmill park is planned to be build) and reference were chosen. For hard bottoms work class ROV was used to take underwater video, as no traditional sampling methods are suitable for such environment and depths. The system was equipped with powerful (400 Watt) xenon lights, USBL navigation and HDTV color camera. For video analysis videomosaicing approach was used. Combining overlapping frames into a single picture allows include in the analysis all visual information, and avoid over counting due to the possible presence of the same feature in the number of differnt frames.

Bottom fauna and flora in the area include highly heterogenic small patches of various red algae, encrusting algae and encrusting animals. For lesser depths kelp "forests" are common, some megabenthos species are also present. Due to extreme patchiness of the bottom views, it is difficult to process them manually. To overcome this problem computer aided analysis method was developed.

Computer aided videomosaics analysis method used for this study is based on color differences of different bottom features. After manually creating training color pallets for different features, it is possible to process large amount of visual data obtaining repeatable and reliable quantitative estimations on the coverage. Additional benefits of videomosaickning are extended abilities to manipulate visual data, what allows more accurate manual estimation of certain features, such as counts of mega benthos species individuals.

Although initial study was successful and color based features extraction approach proved to be robust and accurate, it can't reliably separate certain features (for example, different red algae species). Additional researches on implementing textures and shapes based analysis are needed.