

Monitoring of anthropogenic influence on water areas of Hawaiian Islands using RADARSAT and ENVISAT radar imagery

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There are discussed the results of monitoring of anthropogenic influence on coastal water areas caused by a deep outfall in Mamala Bay (Oahu Island, Hawaii) using RADARSAT and ENVISAT satellite radar imagery in this paper. The area of propagation of surface anomaly caused by this outfall was detected considering informative features of received radio signals using the method of sliding window. At the first stage of the processing two training classes were created: (1) "background" and (2) "anomaly" (deep outfall surface manifestation area). Samples of informative feature values were formed for each class, their statistical characteristics were computed and appropriate thresholds for class separation were determined. Then the studied sample was analyzed. Taking into account informative features of this sample, ocean surface patterns were attributed to one of these classes using various criteria. During the monitoring, sea truth data on hydrophysical fields were used, as well as wind field characteristics acquired in the complex experiments in the studied area in 2003 – 2004. Analysis of radar imagery acquired under various hydrometeorological conditions shows various manifestations of surface anomalies due to the rising to the surface of disturbances caused by the deep outfall (dimensions, contrast, shape and propagation direction of the anomaly, etc.). Anomalous areas were detected in RADARSAT and ENVISAT imagery in the areas near the outfall collector. These anomalies manifested themselves in radio signal amplitude decrease. Taking into consideration the mechanisms of ocean surface radar image formation it is shown that damping of gravity-capillary components of surface waves occurs in these area. Recommendations how to decrease the anthropogenic load on Mamala Bay water area (Oahu Island, Hawaii) are worked out basing on the satellite monitoring results.