Backscatter and Seafloor Acoustical Properties of Wellington Harbour; Preliminary Results and Potential.

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We present a backscatter map of Wellington Harbour generated from an EM3000D multibeam echosounder. It took more than 30 days of surveying using the 10.5 m-long, 8.5 gross tonnage Pelorus launch, to acquire the full ~80 km^2 of multibeam. The water depths range from -1.29 m (above datum) to +32.1 m. Calibration and full processing of the backscatter data were undertaken using IFREMER's SonarScope® software. Processing included signal corrections, attenuation of specular reflection and speckle noise filtering aiming at attenuating the effects of recording equipment, seafloor topography, and water column. The result is a comprehensive Backscatter Strength (BS) map of the Wellington Harbour.

The BS imagery was used for both qualitative and quantitative interpretation, and gives access to a level of detail higher than with conventional multibeam bathymetry. The calibrated BS is generally used to provide information on the physical characteristics of the seafloor, whereas the imagery obtained from the BS statistical compensation is used for qualitative interpretation as it helps characterizing sediment facies variations as well as geological and fine topographic features such erosional bedforms and fault scarps otherwise not recognized with the same level of detail using conventional surveying.

We generated a number of BS angular profiles over a variety of backscatter facies and bedforms in the harbour, to which we applied a functional descriptive model of the physical BS angular response. BS angular profiles may be used for a first-order interpretation of the substrate composition, as the shape of the BS angular profiles provide further information on the seafloor characteristics (interface roughness, impedance and volume scattering). Parameterisation of the BS angular response provides means to quantify the BS angular profiles and relates them to seafloor variations. BS angular responses may also be used in class separation in a segmentation.