

ACOUSTICS2008/3563
**Towards an understanding of how a synthetic aperture sonar
images buried targets**

Peter Gough and Michael Hayes
University of Canterbury, Private Bag 4800, 8022 Christchurch, New Zealand

One of the useful features of synthetic aperture sonar (SAS) is that in the reconstructed image, the cross-track resolution is inversely proportional to the bandwidth and the along-track resolution is proportional to the transducer's along-track extent and that these are more or less independent of the center frequency. An unexpected aspect of SAS imaging so far is that objects buried in sand/sediment are sometimes visible even at geometries where the incident angle far exceeds the critical angle for the bulk materials. It is surmised that the roughness of the sea/sea-floor interface is the significant contributing factor.

So as an adjunct to the main Kiwi SAS programme, a seafloor "document" camera co-located with a three-transducer active sonic probe has been designed and deployed in controlled circumstances. The intention is to estimate the critical parameters that best describes the roughness of the sea floor and perhaps how these parameters relate to the way the SAS images shallow buried targets. In regions of reasonable visibility, the camera is used to provide ground-truth.

The paper details the construction of the camera and sonic probe as well describes some preliminary results using smooth and raked sand.