ACOUSTICS2008/1821
Imaging buried objects using synthetic aperture processing

Steven Schock
Florida Atlantic University, Dept of Ocean Engineering, 777 Glades Rd, Boca Raton, FL 33431, USA

FM sonar generates images of buried objects using synthetic aperture processing. A spherical projector illuminates objects buried in the seabed out to the range associated with the critical angle. Scattering off buried targets is measured with one meter long line hydrophone arrays embedded in sonar vehicle wings. The histories of the projector and hydrophones positions, used for compensating acoustic data during synthetic aperture processing, are calculated based on navigation data provided by an inertial measurement unit and Doppler velocity log. Three orthogonal image projections of the seabed containing 5, 7.5, 10 and 15 cm diameter cylinders, buried up to 30 cm in seabeds consisting of sand and sandy mud in three meters of water, show the burial depth and orientation of the cylinders. The temporal resolution of the imagery is approximately 6 cm. The azimuthal resolution varies between 5 and 20 cm and is a function of target range and relative bearing with respect to the sonar vehicle. This imaging technique can be applied to marine archeological investigations in water depths of two meters and greater.