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http://ccom.unh.edu/theme/
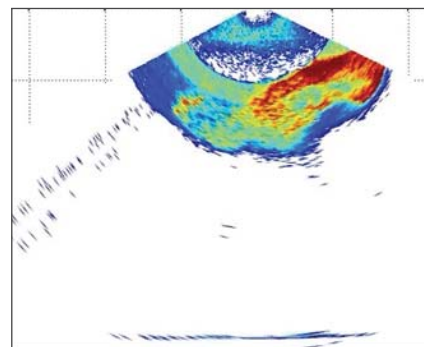water-column-mapping

CCOM/JHC IS AN
EDUCATION AND RESEARCH
PARTNERSHIP AMONG
NOAA, UNH, AND
OCEAN INDUSTRY

WATER-COLUMN MAPPING

What is water column mapping? As with most things, it can take on different definitions depending on the user or application. At CCOM/JHC, it is a form of acoustic remote sensing that is used to explore aspects of the marine environment that are found between the ocean surface and the sea floor. This can include gas bubbles, biology, and physical processes within the ocean. When an acoustic wave interacts with one of these water column features, the acoustic field is changed in some observable way. We typically use multibeam sonar to make our measurements, and so our observations consist of time series of acoustic backscatter that we can map onto a space representing the ocean. We then use characteristics of the acoustic backscatter (e.g., how strong, how variable, what the frequency dependence is, where it originated from) to infer properties of the feature causing the backscatter.

A good example of water column mapping using multibeam sonar is shown in the image to the right. Here, the acoustic backscatter helps describe the spatial distribution of Atlantic herring observed below a research vessel. This data is collected from a Reson SeaBat 7125 multibeam sonar which images a fan-shaped slice of the water column. Several of these images can be combined in order to examine basic school metrics (e.g., volume, area, and other shape parameters) that tell us something about the fish and/or their behavior. Like most of our work related to water column mapping, this type of work is conducted in collaboration with other biologists from NOAA fisheries, private research institutions, and various universities around the world.

Our research in water column mapping cuts across several CCOM/JHC research themes. Our technological expertise in multibeam sonar has allowed us to employ hydrographic multibeam sonars for use in water column mapping, as shown above, but also to utilize fisheries multibeam sonars for seafloor characterization. This is perhaps best illustrated through our work with the Simrad ME70 multibeam sonar, where we are using water column modes to provide high fidelity information about both the water column and the seafloor.
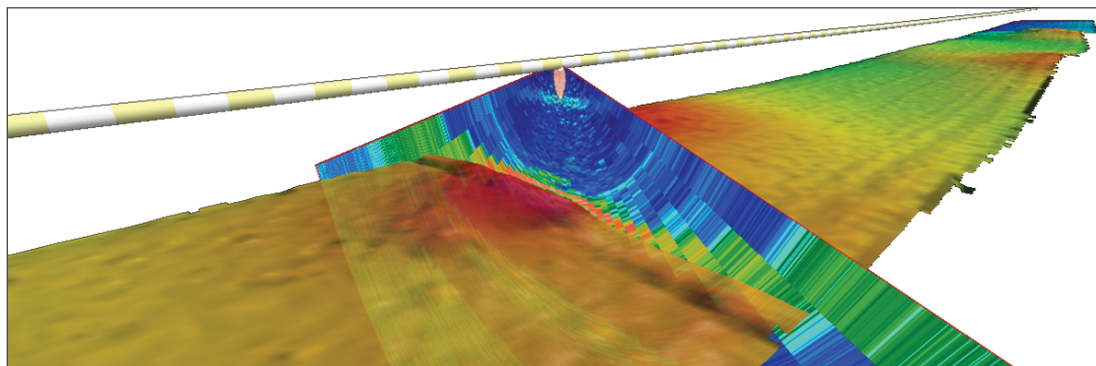
ME70 water column and seafloor bathymetry visualized in the new Fledermaus midwater tool (bathymetry processed off-line by JHC/CCOM software).