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The influence of topography on sidescan sonar images

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The backscattering signal on sidescan sonar images is to a large degree dependent on the incident angle of the acoustic beam onto the seafloor. As sidescan sonar systems are often used for mapping seafloor lithologies, it is necessary to reduce or even remove the effect of different backscattering strengths caused by varying incidence angles. This study evaluates the influence of seafloor morphology on the acoustic backscattering signal of the deep-towed IFM-GEOMAR DTS-1 sidescan sonar system. Data used are from the Pacific continental slope offshore Nicaragua in a water depth between 800 and 2400 metres. There authigenic carbonate patches formed by cold fluid venting are imaged with a high backscattering level. The carbonates are often located on top or on the flanks of mound structures with a strong morphology. The specific DTS-1 backscattering function is determined on normal, uniform seafloor sediment, and then applied in a new processing algorithm to the raw data of two test areas. The change in amplitude strength when considering seafloor morphology is calculated. The topographic influence on the backscattering signal can be quite significant when imaging mound structures. Nevertheless the high backscatter on mounds is not completely removed, leading to the conclusion that it originates from a different seafloor lithology and roughness.