Seepage-Related Authigenic Carbonates in the Gulf of Cadiz: Distribution and Controls

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Numerous seafloor occurrences of authigenic carbonates have been discovered in the Gulf of Cadiz during the last 7 years. Mineralogic, isotopic and biomarker analyses indicate that these authigenic carbonates (dolomite crusts, nodules, chimneys or filled burrows and aragonitic slabs or pavements) are related to gas seepage. U/Th dating of samples from the Iberico mud diapir indicates that they were formed during episodes of intense methane flux to the seafloor, in a long span of time (at least during the last 250 ky).

Seep sites and authigenic carbonate deposits were initially assumed to be isolated occurrences but, with the increase of the survey coverage they now have been encountered in several other locations (between 500 and 4000 m water depth), indicating that they are far more common features than previously anticipated.

This work describes an evaluation of the distribution of seafloor fluid seepage indicators observed on underwater video profiles, during sample retrieval by video controlled grab, which are correlated with sediment samples and acoustic characteristics on the seismic profiles and on the side-scan sonar backscatter images. A relationship between the occurrences of the authigenic carbonates with other fluid escape structures such as mud volcanoes and mud diapirs is postulated.

The occurrences of the seeping sites are in close relation with mud volcanoes and mud diapirs, indicating that those structures are the preferential pathways for fluid escape. The Mediterranean Outflow Water (MOW) appears to have an effective control on the occurrence of the different types of authigenic carbonates, dolomite crusts, nodules and chimneys, occur in places where the MOW has a strong erosive effect.

Key words: Cold seepage; authigenic carbonates; Gulf of Cadiz.