BIOGEOGRAPHICAL ANALYSIS OF ABYSSAL BOTTOM HABITATS: USING AN ABIOTIC PROVINCE SCHEME AND METAZOAN OCCURRENCE DATABASES

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ABSTRACT:

Aim To test congruence of Deep-sea province boundaries to biological occurrence data. Province boundaries are from the proposed environmental biogeography scheme of Watling et al. 2013. No attempt has been made to test congruence of provinces to the spatial patterns of the majority of animal taxa within.

Methods (1) Two biological databases of Deep-Sea metazoan records were used to test the abiotic province scheme’s boundaries (ABS 3.0). These are the unpublished Census of Diversity of Abyssal Marine Life (CeDAMar), which includes secondary factors, and the online version of the same dataset (GBIF), where primary data are limited to species occurrence information (Stuart et al. 2008). To test congruence, rarefied alpha diversity to distance relationships within provinces were calculated, using an expected mid-domain effect (MDE) null hypothesis with class replicates per province. (2) An Ideal error equation was developed to calculate resolution loss in satellite alimentary. This gives dimensional values of a hypothetical feature not detected for a regional depth. (3) Semivariance distance relationships were explored for diversity metrics of gastropods in the North West Atlantic.

Location Global Ocean, Deep-Sea, Benthic, Abyssal (3500m-6500m depth).

Results An MDE was not observed for species diversity (CeDAMar), and was rejected for genera diversity (GBIF). Many taxa showed no spatial diversity patterns to province centroids. Most significant trends were opposite than expected for a MDE. Spatial relationships coincided with important Deep-Sea taxa (e.g. polychaetes). Geostatistical analysis of gastropods showed significant spatial trends associated with the 1st order topography of the continental margin.

Main conclusions Congruence of biological diversity patterns to abyssal provinces was not observed. Provinces may need to be re-delineated to include factors related to 1st and 2nd order topographic features within, or abutting, provinces.

References