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Changes in microbial community structure under variable oxygen conditions at the Crimean shelf (Black Sea)

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Today's rapid global warming together with the eutrophication of oceans appears to promote a deoxygenation of some of the world's water bodies, which eventually leads to hypoxia and even anoxia in regions of low ventilation. Under hypoxic conditions (less than 60 μM oxygen) most animals are negatively impacted and microorganisms dominate benthic processes. As a result, it can be expected that in zones with oxygen dynamics around this tipping point, benthic and microbial community structure will vary considerably in space and time, with repercussions on the flux of energy and matter trough the ecosystem. Here we present effects of varying hypoxic conditions on benthic microbial communities and how the variations in oxygen supply cause structural shifts in microbial communities at the Crimean Shelf. In order to asses the influence of varying oxygen levels on microbial community diversity and composition, sampling was performed along an oceanographic transect subjected to oxygen concentrations between 0-150 μmol L-1 oxygen, during the MSM 15-1 research cruise on the Black Sea. Sediments were analyzed by community fingerprinting using ARISA (Automated Ribosomal Intergenic Spacer Analysis) to assess the connections between oxygen supply and benthic microbial community structure, together with the distribution of biogeochemical parameters.
Comparing oxic, hypoxic and highly dynamic hypoxic zones at the Crimean Shelf, both organic carbon and microorganism abundance showed similar distributions in the sediment. We found a strong change in community structure and in biogeochemical function across the spatial oxygen gradient from oxic to anoxic conditions, and also between temporally variable and stable hypoxic zones. This study is supported by the EU 7th FP project HYPOX.