



## Long-term effects of elevated pCO<sub>2</sub> and temperature on prokaryotic community composition in mesopelagic waters of the NW Mediterranean Sea

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Mesopelagic communities are subject to higher pCO<sub>2</sub> levels than surface ones. Some studies have been performed on the combined effects of elevated pCO<sub>2</sub> and temperature on surface pelagic communities but nothing is known in the mesopelagic zone. In this study, we investigated the effects of elevated pCO<sub>2</sub> and temperature on prokaryotic community composition and related variables in long-term (2 months) experiments with mesopelagic waters (300 m depth) collected off the Bay of Villefranche, NW Mediterranean. Two experiments were conducted with two temperatures (13 and 16°C) and two pCO<sub>2</sub> levels (ambient pCO<sub>2</sub>, 400  $\mu$ atm; elevated pCO<sub>2</sub>, 1000  $\mu$ atm). Genetic fingerprints (16S rRNA gene based denaturing gradient gel electrophoresis) were assessed to determine the prokaryotic community composition. In the first experiment, bacterial community composition clearly differed between control and elevated temperature. In addition, at elevated temperature, the bacterial community was different at the two pCO<sub>2</sub> levels. In the second experiment, both bacterial and archaeal communities responded to changes in temperature, but the response was inconsistent with the first experiment. The bacterial community clearly differed between the two pCO<sub>2</sub> levels at control temperature. This could be due to the different initial prokaryotic communities present. Also, prokaryotic, viral and flagellate abundances, TEP concentration and prokaryotic respiration showed some differences between treatments but no strong consistent trends between experiments (see companion abstract, Liu et al.). Sequences of excised bands are being analyzed to assess the phylotypes in the initial communities and the effects of temperature and pCO<sub>2</sub> changes on specific phylotypes. Overall, we found that temperature and pCO<sub>2</sub> changes can potentially affect community composition but that temperature has a stronger and more consistent effect on the mesopelagic prokaryotic community.