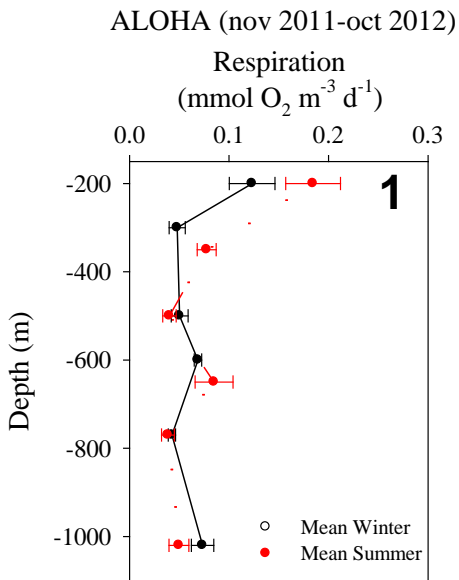


## Mesopelagic zone microbial respiration at Station ALOHA

Submitted by: Sandra Martinez-Garcia and David Karl

The mesopelagic zone is defined as the between 200-1000 m. Remineralization of organic matter in the mesopelagic is largely controlled by microbial communities (i.e. microbial respiration, MCR). The scarcity of respiration measurements is considered to be one of the main factors limiting our understanding of carbon flow in the mesopelagic ocean. Respiration is not frequently measured, because its measurement represents a methodological challenge due to problems with detection limits, extended incubation times and problems in reproducing in situ conditions. The aim of this project was to study temporal and vertical variability of MCR at the mesopelagic zone at Station ALOHA. A new method, 'In vivo Electron Transport System activity method' (developed by postdoctoral scholar Sandra Martinez-Garcia), that avoids long incubation times, was used. Mean mesopelagic MCR was  $0.073 \pm 0.007 \text{ mmol O}_2 \text{ m}^{-3} \text{ d}^{-1}$ . MCR rates in the upper mesopelagic zone (200-350 m) were higher than the rates in the lower mesopelagic zone (350-1000 m) ( $0.108 \pm 0.016$  and  $0.056 \pm 0.004 \text{ mmol O}_2 \text{ m}^{-3} \text{ d}^{-1}$ , respectively) (Fig.1). This vertical decrease of respiration rates is consistent with higher microbial biomass

### Vertical variability

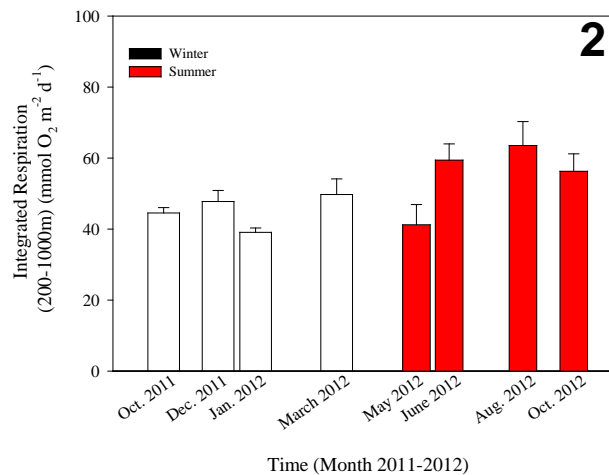


and organic matter concentration in the upper mesopelagic zone due to the export from the euphotic zone. During the summer period MCR in the upper mesopelagic zone was higher than during winter ( $0.131 \pm 0.002$  and  $0.085 \pm 0.018 \text{ mmol O}_2 \text{ m}^{-3} \text{ d}^{-1}$ , respectively) (Fig. 1). Mean depth-integrated MCR (200-1000 m) was  $50.2 \pm 2.9 \text{ mmol O}_2 \text{ m}^{-2} \text{ d}^{-1}$ . MCR depth integrated rates were higher during the summer than during the winter ( $55.1 \pm 4.2$  and  $45.3 \pm 2.0 \text{ mmol O}_2 \text{ m}^{-2} \text{ d}^{-1}$ , respectively) (Fig. 2), this probably related to the higher export of organic matter from the euphotic

zone. Integrated mesopelagic CR rates **monthly variability was  $14.3 \pm 2.9\%$**  of the mean value for the entire period. These results suggest a relative constancy of microbial respiration volumetric and integrated rates at the mesopelagic zone at Station ALOHA throughout the year.

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### Monthly variability



This project on microbial respiration also included data collected in the euphotic zone (0-200 m) on the same cruises. These upper water column data have just been published in *Limnology and Oceanography* ("Microbial respiration in the euphotic zone at Station ALOHA," S. Martinez-Garcia and D. M. Karl). These data are also included in the spreadsheet, along with another high-frequency MCR data set collected on the C-MORE HOE-DYLAN 9 expedition.