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Designation:

Description:

Today we know that diazotrophs are common and active in nitrogen (N) replete regions, however the factors controlling their distribution remain elusive. Previous studies in upwelling regions revealed that the composition of diazotrophs responded to changes in hydrodynamic forcing over seasonal scales. Here we used high-frequency observations collected during a 3-week cruise in the upwelling region off NW Iberia to describe changes in the activity and composition of diazotrophs over shorter temporal scales. The cruise started after a strong upwelling event followed by a few days of relaxation-downwelling, and soon after another upwelling pulse. Higher N₂ fixation rates (2.2 ± 0.7 μmol m⁻³ d⁻¹) were measured during relaxation-downwelling, when surface nitrate concentration was low. During the fertilization associated with the upwelling, N₂ fixation dramatically decreased to 0.10 ± 0.09 μmol m⁻³ d⁻¹. The comparison with nitrate consumption and diffusion confirmed the minor role of N₂ fixation (<1%) as a source of new N for primary production. The unicellular cyanobacterium UCYN-A2 was the dominant diazotroph during the cruise. UCYN-A2 abundance was four times higher during relaxation-downwelling (4 × 10⁴ copies L⁻¹) compared to upwelling conditions (0.2 × 10⁴ copies L⁻¹), when the unusual Epsilonproteobacteria increased their relative abundance. These results indicate that diazotrophs can respond rapidly to changes in the environment, and point out to the availability of N as a key factor controlling the activity, composition and distribution of diazotrophs in eutrophic regions.

Category: Scientific Program Abstract > Special Sessions > SS39

The present and future of nitrogen fixation in aquatic systems

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SHORT-TERM VARIABILITY IN THE ACTIVITY AND COMPOSITION OF THE DIAZOTROPH COMMUNITY IN A COASTAL UPWELLING SYSTEM

Category

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