

ID: W2108755430

TITLE: Physiological constraints on the global distribution of *Trichodesmium*; ? effect of temperature on diazotrophy

AUTHOR: ['E. Breitbarth', 'A. Oschlies', 'J. LaRoche']

ABSTRACT:

Abstract. The cyanobacterium *Trichodesmium* is an important link in the global nitrogen cycle due to its significant input of atmospheric nitrogen to the ocean. Attempts to incorporate *Trichodesmium* in ocean biogeochemical circulation models have, so far, relied on the observed correlation between temperature and *Trichodesmium* abundance. This correlation may result in part from a direct effect of temperature on *Trichodesmium* growth rates through the control of cellular biochemical processes, or indirectly through temperature influence on mixed layer depth, light and nutrient regimes. Here we present results indicating that the observed correlation of *Trichodesmium* with temperature in the field reflects primarily the direct physiological effects of temperature on diazotrophic growth of *Trichodesmium*. *Trichodesmium* IMS-101 (an isolate of *Trichodesmium*) could acclimate and grow at temperatures ranging from 20 to 34°C. Maximum growth rates ($\mu_{\max}=0.25 \text{ day}^{-1}$) and maximum nitrogen fixation rates ($0.13 \text{ mmol N mol POC}^{-1} \text{ h}^{-1}$) were measured within 24 to 30°C. Combining this empirical relationship with global warming scenarios derived from state-of-the-art climate models sets a physiological constraint on the future distribution of *Trichodesmium* that could significantly affect the future nitrogen input into oligotrophic waters by this diazotroph.

SOURCE: Biogeosciences

PDF URL: <https://bg.copernicus.org/articles/4/53/2007/bg-4-53-2007.pdf>

CITED BY COUNT: 241

PUBLICATION YEAR: 2007

TYPE: article

CONCEPTS: ['Trichodesmium', 'Diazotroph', 'Nitrogen fixation', 'Environmental science', 'Nitrogen', 'Effects of global warming on oceans', 'Biogeochemical cycle', 'Oceanography', 'Nutrient', 'Atmospheric sciences', 'Biology', 'Global warming', 'Ecology', 'Climate change', 'Chemistry', 'Physics', 'Geology', 'Organic chemistry']