

Oceanic Methane Concentrations in Three Mexican Regions

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The atmospheric concentration of methane has increased significantly over the last several decades. Methane is an important greenhouse gas, and it is important to better quantify methane sources and sinks. Dissolved methane in the ocean is produced by biological and hydrothermal processes; however, the distribution, variability and role of oceanic methane in the global carbon cycle is poorly understood. We present the first measurements of dissolved methane concentrations in seawater from three oceanic regions in Mexico. Our goals were to determine the methane distribution, evaluate the contributions of natural and anthropogenic processes to its formation, and evaluate the potential contribution of these regions to the global methane inventory. Discrete seawater samples were collected at different depths during different sampling periods from 2004 to 2006. The study areas are: the northern part of the Gulf of California and the nearshore Pacific Ocean from the USA border to Ensenada and from south of Ensenada to Vizcaino Bay. The dissolved methane content was quantified by the phase equilibration method, and methane fluxes were calculated with a simple equation that incorporates the sea-air concentration gradient and a windspeed-dependent gas transfer coefficient. The northern Gulf of California has shown higher fluxes from the ocean to the atmosphere compared to the other regions. The methane in this region is probably produced by biological processes associated with high marine productivity rather than hydrothermal processes.