

DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

The decline of coral reefs is of general and environmental interest and also a commercial concern due to the high value for tourism, particularly in poor island nations. Coral reefs have high organic productivity and biodiversity, and are home for thousands of animal and plant species. The coral reef decline is caused by various human activities such as overfishing and high nutrient input through fertilizer, and natural variation associated with sea temperature increase, sea level rise and meteorological phenomena that include violent storms and hurricanes. Important steps to be taken to reduce ecosystem changes include improved monitoring and protective measures. However these steps require a better understanding of local and global forcing factors that affect the current coral reefs ecosystem as well as historical and prehistorical changes. To study ancient oceans, scientist use sediments with remains of marine organisms.

Foraminifera are single-celled mostly marine organisms whose calcite skeletons preserve information about current and past changes in marine environments. The body of foraminifera is covered by shells that are about the size of a sand grain, composed of calcium carbonate or sediment particles collected by the organism from the surrounding environment. The shape, structure and ornamentation of the foraminiferal shells differs with life habit and habitat. The foraminifera are highly sensitive to changes in environmental parameters (e.g. pH, salinity, productivity, pollution, oxygenation). Thus, foraminifera perfectly fit into basic tenets of geology: the present is the key to the past, the past is the key to the future. Following this track, knowledge of relationships between environmental variability and foraminifera today can be used to reconstruct past environments and past climate change from the foraminiferal shells preserved in sediments. Also an understanding of foraminiferal reactions to environmental changes can be gained, then this can be applied to predict how coral reefs ecosystems inhabited by foraminifera will react to the future natural or anthropogenic changes.

This study will result in the analysis of foraminiferal assemblages to obtain information about forcing factors that drive changes in shallow marine ecosystems of the eastern Gulf of Mexico over the past ~150 years. The chosen study area is unique by being inhabited by the world's third largest coral reef. One of the well-known common features for calcifying organisms is the demand for calcium carbonate from sea water to build the test or skeleton. Abnormalities and size in foraminiferal shells will be examined to determine factors that induce corrosive conditions for foraminifera and corals. The variability in foraminiferal species abundance and diversity in sediment cores should provide answers about the factors and mechanisms that influence changes in Dry Tortugas National Park and Marquesas Keys Nature Reserve (eastern part of Gulf of Mexico) over the most recent ~150 years.