# 2010
# MASSACHUSETTS CLEAN TECHNOLOGY AWARDS

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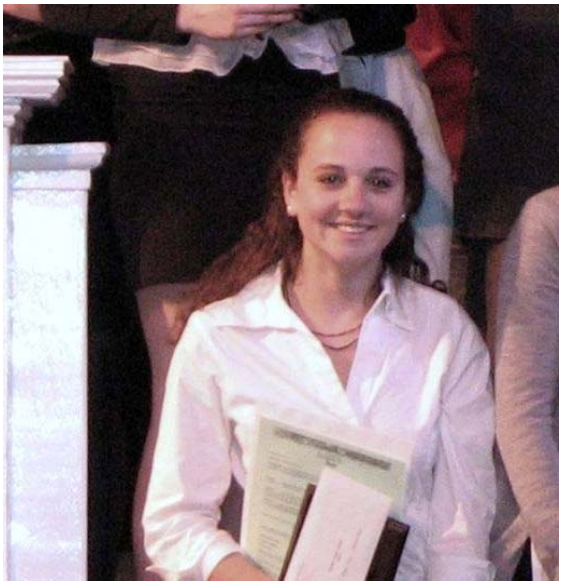

## Region V: Southeastern Massachusetts

## Rachel Dragos: Falmouth Academy, Falmouth

## Climate Science: *Last Glacial to Deglacial Upwelling Changes in the Flores Sea Inferred from Relative Abundance Changes in the Planktonic Foraminifera G. bulloides.*

**About Me:**

I am a sophomore at Falmouth Academy and live in Sandwich, MA with my parents. In addition to being a dedicated student and a big part of the school community, I train rigorously in classical ballet and I am always planning for the next show. I love to write, particularly poetry, and love to spend time with my friends. I have been a vegetarian for three years, and in the future hope to pursue an environmental and/or writing career.

**My Project:**

The earth's climate is extremely complex and deciphering past climates is a difficult but necessary task, especially for understanding challenges associated with future climate change. The purpose of this experiment was to determine upwelling (upward circulation) changes in the Flores Sea during the last glacial to deglacial periods from the abundance changes of the planktonic foraminifera, *Globigerina bulloides.*

*G. bulloides* prefer upwelling and therefore work as an indicator of upwelling strength which is a result of monsoon strength, and therefore an indicator of past monsoon strength. Woods Hole Oceanographic Institute collected a core from the Flores Sea in 2006 at 562m water depth and took samples from the core at constant intervals, drying and splitting them, resulting in samples with approximately 300 foraminifera.

In this experiment, the relative abundance of *G. bulloides* in eight samples was determined and compared with temperatures, as indicated by oxygen-18 isotope readings previously taken from the core, and ages, established from Carbon-14 dating. The small sample size of the data limited the experiment, but overall relative abundance percentages appeared lower during the last glacial period and higher in the warmer Holocene. Futher research is needed to investigate a correlation with the relative abundance of *G. bulloides* using records from Hulu Cave, China; this further research might help clarify hypotheses about past climate. This experiment supported (with limitations) the suggestion that monsoon strength has varied in the past with ocean temperatures. With possible temperature changes induced from global warming looming near, changes in monsoon and upwelling strength should be seen as a possible danger.