Geophysical Research Abstracts,
Vol. 11, EGU2009-3231, 2009
EGU General Assembly 2009


# Sea surface temperature and mixed layer depth changes due to cold-air outbreak in the Gulf of Mexico

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The main objective of this work is to show the impact of a cold-air outbreak ("North") on the sea mixed layer of the Gulf of Mexico. A numerical model, based on the thermal energy equation and the balance equation between thermal and mechanical energy, is used for computing both, the sea surface temperature (SST) and the sea mixed layer depth (MLD) changes due to atmospheric forcing before and during the "North" (on October 18th to 23rd 1999).

It is analyzed the importance of the contributions to the temperature tendency by thermal forcing in surface, vertical entrainment of cold water from the thermocline, as well as the horizontal transport of thermal energy by drift ocean currents and by turbulent transport. The contributions to the entrainment velocity by deepening of the mixed layer and Ekman pumping velocity are also analyzed.

As the "North" is developed, the changes in the SST are markedly influenced by the wind speed at the sea surface level, such that at the end of the considered period the vertical entrainment becomes a determining processes in the cooling and in the deepening of the mixed layer.

A comparison of the computed SST changes with the corresponding observed changes in two buoys settled in the Gulf of Mexico (42002 and 42003) is carried out. The results showed a better approach to the observed in the buoys when the entrainment of cold water was incorporated in the model.