ROLE OF METEOROLOGICAL, HYDROLOGICAL AND BIOGEOCHEMICAL FORCINGS ON CARBONATE SYSTEM VARIABILITY AT PALOMA STATION (GULF OF TRIESTE)

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The Gulf of Trieste is the Northernmost area of the Adriatic Sea and, as other shallow shelf areas, is more influenced by exchanges with the atmosphere than deep seas. Hence, it is thought to be highly sensitive to the effects due to the increase of CO_2 dissolved in seawater induced by global atmospheric CO_2 increase. The most concerning consequence of CO_2 dissolution in marine waters is the decrease of pH: a process commonly referred to as “ocean acidification”.
On the other hand, the dynamics of carbonate system in this coastal zone are also influenced by the variability of oceanographic conditions, mainly induced by meteorological and hydrological forcings, and by production and regeneration processes.
We present preliminary results of a monitoring activity started in January 2008, addressed to a better comprehension of the effects of meteorological forcings and biogeochemical processes on the carbonate system and pH in the Gulf of Trieste.
Real-time meteorological data, hydrological and biogeochemical monthly sampling were collected in the site of the mast PALOMA, located in the centre of the gulf (25 m of depth).
During 2008, the highest values of pH_T, (spectrophotometric method, Total scale, 25°C), were measured in the upper layer during summer (pH_T=8.120), as a result of a event of production. A strong thermohaline stratification of the water column occurred from June to beginning of August, when remineralization processes in the deeper waters (AOU>142.87 µM -O2) released CO2 (fCO_2=1044 µatm) and caused a decrease of pH_T (7.648). This process was probably interrupted by one unusually storm event with strong wind (up to 163 km/h) that occurred on 08/08/2008, since in September the water column appeared well ventilated.
Total alkalinity (TA) concentrations were modulated both by river inputs and by biogeochemical processes, as the remineralization of organic nitrogen coupled to ammonia production, which determined the maximum values of TA in August and November (up to 2693 µmol/kg).