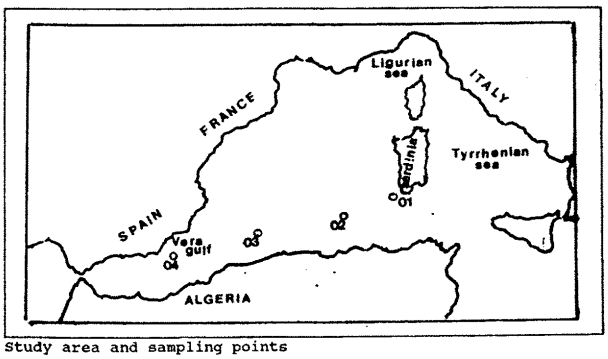
## Gas exchange at the air - sea interface in the Mediterranean Area

A. BATTAGLIA [a], R. BONIFORTI [b], S. CERADINI [a], R. DELFANTI [b], W. MARTINOTTI [c], C. PAPUCCI [b] and C. VANNINI [c]

[a] CISE-Tecnologie Innovative, SEGRATE (**Italy**)
[b] ENEA-CRAM, La SPEZIA (**Italy**)
[c] ENEL-CRTN, MILANO (**Italy**)

To elucidate the mechanisms governing the air-sea fluxes of $CO_2$ under different meteoclimatic conditions ENEA (Ente Nazionale per le Nuove Tecnologie, l'Energia e l'Ambiente), ENEL (Ente Nazionale per l'Energia Elettrica) and CISE (Centro Informazioni Studi Esperienze) have carried out an experimental study in the Western Mediterranean sea.

The study is to be considered as preliminary to a large study that ENEA, ENEL and CISE will carry out in the frame of the CEC MAST II Program, Mediterranean targeted project. The experimental activity was carried out on July-August 1991 during the cruise of the oceanographic R/V *Bannock* of the Italian National Research Council. The studied area was localized along the way between Sardinia Island (Italy) and Vera Gulf (Spain) (Fig.1).




Study area and sampling points

Gas exchange process was investigated by the radon deficiency method and by direct evaluation of the net $CO_2$ flux across the air-sea interface. The driving force for $CO_2$ gas transfer has been characterized in terms of the difference between the $CO_2$ partial pressure in the surface sea water and in the overlying atmosphere ($\Delta pCO_2$) (TAKAHASHI *et al.*, 1983).

$CO_2$ was determined by gascromatography after sampling in air at 10 m above the sea surface. Inorganic carbon species were determined in water by pH and total alkalinity measurements (GRAN, 1952). In addition dissolved $CO_2$ in sea water was determined by gascromatography after gas purging from water by means of $CO_2$-free air.

The gas exchange coefficients, expressed in terms of the piston velocity, estimated on the basis of the radon deficiency method were evaluated (BROECKER and PENG, 1974). The method and results of the piston velocity calculations based on the vertical distribution of $^{222}Rn$ in the mixed layer are reported in another separated paper presented at this Congress (BONIFORTI *et al.*).

Meteorological parameters (air and water temperature, pressure, humidity, wind speed and direction etc.) sea water parameters (total alkalinity, pH, free dissolved $CO_2$) and air $CO_2$ concentrations were measured in order to provide data sets useful in developing and evaluating gas transfer models.

Moreover, a total number of 12 water samples were collected from the investigated area and analized for $^{14}C$. Radiocarbon analysis was performed by benzene syntesis method (TAMERS, 1975) and very low background liquid scintillation counting (LKB Wallac Qantulus 1220).The obtain data will be useful to estimate water masses mixing in the Western Mediterranean sea.

Field activity permitted to experiment on board large volume (200 l) water samplers and to evaluate $CO_2$ extraction efficiency from such large devices.

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## Transformed ferroalloy waste products as possible scavengers in the Krka River Estuary (Eastern Adriactic Coast, Croatia)

Halka BILINSKI, Zeljko KWOKAL and Marko BRANICA

"Rudjer Boskovic" Institute, ZAGREB (**Croatia**)

In the recent paper describing processes affecting the fate of mercury in the Krka River Estuary (BILINSKI *et al.*, 1992) we have identified some of the minerals at the freshwater-seawater interface (FSI). The sampling station was under the waterfalls (Skradinski Buk). The identified solid phases were calcite, quartz, calcium silicate hydrate and takanelite. It was assumed that some of these particles are connected with industrial wastes from the ferroalloy factory situated in the vicinity of the city of Sibenik, 30 km downstream from the sampling station.

αMn and αFe are produced in the factory from the ore braunite. Slags identified with calcium manganate and with bustamite are deposited in the vicinity of the factory. Industrial dust is released in the air in large quantity.

In the present work, transformations of these waste products were studied in the Krka River estuarine waters of different salinities. The greatest part of the waste is rather water soluble. In addition to natural minerals, different minerals were obtained by the dissolution and reprecipitation process, some of which were identified earlier in the Krka River Estuary and can act as scavengers for many trace metals.

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