

**An Inverse Model of the Black Sea Vertical Mixing Processes
and the Mixing Parameterization**

Sergei Kochergin[†], Şükrü Beşiktepe^{*}, Leonid M. Ivanov[†] and E. Özsoy^{*}

[†]*Ukrainian Academy of Sciences*

Marine Hydrophysical Institute,

2, Kapitanskaya Str.

Sevastopol 33500 Crimea, Ukraine

^{*}*Institute of Marine Sciences,*

Middle East Technical University,

P.K. 28, Erdemli, İçel 33731 Turkey

An adjoint model is developed formulating the one dimensional vertical mixing problem in the interior of the Black Sea, coupled with a model of the plume of Mediterranean Water modified on the shelf. The model seeks to determine the interior vertical mixing coefficients and the entrainment functions from observed profiles of temperature and salinity and input functions of plume initial values.

A separate method based on the interior diffusion equations, without explicit inclusion of the plume is used to calculate mixing coefficients from salinity profiles. In addition, direct methods are used to simulate the observed temperature and salinity mean profiles in the Black Sea.

Because the parameterization of vertical mixing is a major problem in numerical modelling of the Black Sea circulation via General Circulation Models, the results are of importance. Various degrees of success in the different types of models and their deficiencies are discussed.