



Numerical Modeling of the Influence of Cool Skin on the Heat Budget and Thermal Regime of Water Pools

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The influence of cool skin layer on the ocean-atmosphere energy exchange is studied. A set of numerical experiments were carried out with one-dimensional model of the water pool LAKE. Three types of cool skin parameterization were employed. Initial and boundary conditions were generated from the field experiments data, which took place in the shelf areas of the Black Sea, Arctic Ocean and Sparkling Lake. Numerical results have demonstrated that LAKE model with cool skin parameterization satisfactorily simulates the characteristics of skin layer, in particular – the temperature contrast between the skin layer and the water at some depth below the surface. Model results stays within the variation limits of field data.

Model results suggest that the presence of skin layer leads to decrease of heat loss through the surface of the water pool on time scales from several days to several months and therefore to the changes in thermal regime including vertical stratification. In particular, presence of cool skin leads to formation of more stable stratification in water column due to higher temperatures of upper layers of water pool. This effect might be of high significance for modelling of processes at the air-water interface and in the water column as well.