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Calculation of incoming shortwave fluxes for the Atlantic Ocean using SAIL and MGO parametrizations and CLAAS-2 cloud satellite data.

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One of the sources of information about incoming shortwave fluxes to the ocean surface, along with in-situ measuring and satellite data, can be the calculation of fluxes using parametrizations.
Two types of parametrizations, developed at different times in the MGO and IO RAS, were used in the work. Parameterization are based on in-situ measurements of short-wave fluxes coming to the surface of the Atlantic Ocean and the corresponding meteorological parameters. The main goal of such parametrizations is the construction of climatology for shortwave fluxes base on VOS data.
As input data, a new cloud CLAAS-2 climatology was used to calculate the daily average fields of incoming shortwave fluxes to the Atlantic. As reference data, we used the satellite database of incoming shortwave fluxes for the Atlantic - SARAH.
As a result of the work, we were able to compare the effect on the quality of calculations of different approaches in accounting for the cloud layer - MGO (accounting for the total and total and lower clouds). In this case, the systematic error is reduced by an amount of the order of 15 W / m2 and approximately by the same amount of RMS. And the differences in the construction of the parametrization (MGO- two step, SAIL – one step parametrizations). For some areas of the Atlantic, the difference in the systematic error between parametrizations can reach from 30 to -50 W / m2.
In the same way, we compared the results of SAIL calculations for the whole CLAAS-2 dataset, which revealed the strengths and weaknesses of this parametrization for its further application in the calculation of shortwave fluxes. For the entire data set, the systematic error lies in the limit of +/- 10 W / m2, the RMS varies from 20 to 50 W / m2 depending on the area of the Atlantic Ocean and the corresponding cloud regime.
As a conclusion, it can be noted that SAIL parametrization works very well for a cloud cover up to 4 Octa. Further development of SAIL parametrization is possible by separately taking into account the direct and scattered flux of incoming shortwave radiation, since within the growth of possible cloud modes it is very important to know when the direct current prevails over the scattered one, and when on the contrary.

The work performed was done by using data from EUMETSAT's Satellite Application Facility on Climate Monitoring (CM SAF).