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New optical package and algorithms for the accurate cloud cover estimation for short wave parameterization.

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Cloud fraction is a critical parameter for the accurate estimation of short-wave and long-wave radiation – one of the most important surface fluxes over sea and land. Sky imaging with optical range fish-eye camera provides an excellent opportunity for collecting cloud cover data supplemented with additional characteristics.
We present new type of operational automatic observational package which is based on fish-eye camera taking sky images with high resolution (up to 1Hz) in time and a spatial resolution of 800x536px. This spatial resolution scale has been justified as an optimal by several sensitivity experiments. For the use of the package at research vessel when the horizontal positioning becomes critical, a special extension of the hardware and software to the package has been developed. For the post processing of sky images we developed the software estimating cloud cover and including the algorithm of the sunburn effect filtering. This algorithm is based on the point color analysis introducing the so-called "grayness rate index" for every pixel. The accuracy of the algorithm has been tested using the data sets collected during several campaigns in 2005-2011 in the North Atlantic Ocean. The collection of images included almost 100000 images for different cloud conditions supplied with observations of standard parameters. The system is fully autonomous. We will demonstrate some results of data processing.
We are about to use these data series to improve our new parameterization of shortwave fluxes at the surface of the Atlantic ocean. New data collections appeared to be well absorbed by this parameterization. The comparison of short wave radiation flux values, calculated based on these data sets is well correlated with ones calculated based on visual observations and with in-situ measurements.
We have high hopes on development of our low-cost package of on-line short wave incoming radiation estimation. Our plans are to make it possible to use this package even at merchant vessels.