Geophysical Research Abstracts
Vol. 19, EGU2017-10783-1, 2017
EGU General Assembly 2017


# Estimation of the $CO_2$ fluxes between the ocean and atmosphere for the hurricane wind forces using remote sensing data.

Daniil Sergeev, Irina Soustova, and Galina Balandina
Institute of Applied physics RAS, Nonlinear Geophysical Flows, Nizhny Novgorod, Russian Federation

$CO_2$ transfer between the hydrosphere and atmosphere in the boundary layer is an important part of the global cycle of the main greenhouse gas. Gas flux is determined by the difference of the partial pressures of the gas between the atmosphere and hydrosphere, near the border, as well as to a large extent processes involving turbulent boundary layer. The last is usually characterized by power dependence on the equivalent wind speed (10-m height). Hurricane-force winds lead to intensive wave breaking, with formation of spray in the air, and bubbles in the water. Such multiphase turbulent processes at the interface strongly intensify gas transfer. Currently, data characterizing the dependence of the gas exchange of the wind speed for the hurricane conditions demonstrate a strong variation. On the other hand there is an obvious problem of obtaining reliable data on the wind speed. Widely used reanalysis data typically underestimate wind speed, due to the low spatial and temporal resolution One of the most promising ways to measure near water wind speed is the use of the data of remote sensing.
The present study used technique to obtain near water wind speed based on the processing of remote sensing of the ocean surface data obtained with C-band scattermeter of RADARSAT using geophysical model function, developed in a laboratory conditions for a wide range of wind speeds, including hurricanes (see [1]). This function binds wind speed with effective radar cross-section in cross-polarized mode. We used two different parameterizations of gas transfer velocity of the wind speed. Widely used in [2], and obtained by processing results of recent experiment in modeling winds up to hurricane on wind-wave facility [3]. The new method of calculating was tested by the example of hurricane Earl image (09.2010). Estimates showed 13-18 times excess $CO_2$ fluxes rates in comparison with monitoring data NOAA (see. [4]).

1. Troitskaya Yu., Abramov V., Ermoshkin A., Zuikova E., Kazakov V., Sergeev D., Kandaurov A., Ermakova O. Laboratory study of cross-polarized radar return under gale-force wind conditions // Int. J. Remote Sens. 2016a. . 37. № 9. . 1981–1989.
2. Kanamitsu, M.,Ebisuzaki,W.,Woollen,J.,Yang,S.-K.,Hnilo,J.J.,Fiorino,M.,Potter, G.L.,.NCEP-DOEAMIP-IIreanalysis(R-2) // Bull. Am. Meteorol. Soc., 2002, 83, 1631–1643.
3. K. E. Krall and B. Jahne First laboratory study of air–sea gas exchange at hurricane wind speeds // Ocean Sci., 2014, 10, 257–265.
4. ERDDAP EXPERIMENTAL. AOML Monthly Global Carbon Fluxes dataset. – -. : http://cwcgom.aoml.noaa.gov/erddap/griddap/aomlcarbonfluxes.graph.