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Assessment of the Fire Radiative Power retrieved by BIRD and the MODIS Active Fire Products from near coincident data acquisitions

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Due to its spatial resolution and sensor characteristics, the experimental small satellite BIRD (Bispectral InfraRed Detection, active from 2001 through 2003) was superior to any past or current spaceborne instrument in its capacity to detect and characterize fires. Based on a comparison of historical BIRD data with observations from MODIS, we present the first systematic comparison of MODIS FRP retrievals to higher resolution data and provide a first estimate of FRP underestimation due to coarse resolution and variable pixel sizes of the MODIS product. We also highlight differences in FRP retrievals that are due to the usage of different FRP retrieval algorithms, namely the MODIS algorithm adapted to BIRD, the BIRD algorithm and the MIR-radiance algorithm adapted to BIRD. We conclude that the algorithm independent FRP underestimation of MODIS when compared to BIRD may be in the order of 20 %. Since many of the low intensity fires are not detected are smouldering fires - such as peat fires - which release a greater share of methane and carbon monoxide per mass unit burned when compared to flaming fires the FRP underestimation may lead to a larger underestimation of global warming potential by algorithms that derive emissions from fire radiative energy. Prospects for cross validation efforts using the BIRD type sensor on the TET-1 satellite launched in 2012 and on the BIROS satellite to be launched in 2014 with the VIIRS sensor on Suomi NPP as well as geostationary sensors are briefly discussed.