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Biomasss burning emissions estimation using the fire radiative power approach - the case for multi-spatial resolution measurements

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Current BB emissions estimates are mostly based on EO-derived burned area measures, multiplied by a field-data or modelling estimate of fuel consumption per unit area. This latter parameter is often highly variable and uncertain, leading to large uncertainties on the resultant emissions estimates. Furthermore, since burned area is only detectable post-fire, the method is of limited use in 'real-time' applications. The alternative approach of fire radiative power (FRP) aims to directly relate EO-derived measures of a fire's radiative energy emissions to the fuel consumption that must be sustained in order to produce that heat. Measurements show that heat yields are rather constant across vegetation types, and thus FRP measurements can be considered independent of fuel-type and not reliant on other field- or model-based data. Since FRP relates directly to emissions magnitude at the time of observation, the method is potentially well-matched to operational forecast needs when used with regular geostationary observations. However, the coarse spatial resolutions used by geostationary systems do cause some limitations, most notably the inability to detect the smallest (but sometimes very numerous) fires. For this reason, where available, comparisons of the regional-scale FRP derived from geostationary imagery to those from high spatial resolution datasets is expected to provide the best method of FRP quantification, allowing derivation of 'calibration factors' necessary to adjust low spatial resolution FRP measures for the underestimation resulting from non-detected smaller fires. Suitable imagers to provide these high spatial resolution datasets are BiSpectral Infrared Detection Satellite (BIRD) and future IR Element sensor foreseen on the ESA Sentinel

satellite series.