

Scientific summary

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Estimating and evaluating GPP in the Sahel using MSG/SEVIRI and MODIS satellite data

Remote sensing is an important method for studying environmental variables across large regions of the Earth. There are many different sensors on different satellites, all of which have their own characteristics. This study investigated the use of two sensors for estimating gross primary production (GPP) in the Sahel region of Africa.

GPP is the amount of carbon that is absorbed by the vegetation and forms the foundation for growth of the biosphere. Accurate estimation of GPP on regional and global scale can help in the development of improved vegetation and climate models, as well as helping to predict and assess the risk of famine in vulnerable regions such as the Sahel.

The Meteosat Second Generation's Spinning Enhanced Visible and Infrared Imager (MSG/SEVIRI) and the Moderate Resolution Imaging Spectroradiometer (MODIS) are two sensors which can be used to estimate GPP, and where the ones used in this study. MSG/SEVIRI is a geostationary satellite orbiting over Africa and provides data every 15 minutes. MODIS is mounted on the polar orbiting Terra and Aqua satellites and provides daily data, which is often used to create cloud free global datasets every eight days. GPP was calculated using the light use efficiency method and compared against data collected on the ground in Senegal.

Main findings

The results show that MSG/SEVIRI derives GPP performs better than MODIS GPP when compared to *in situ* data. There was a tendency for MSG/SEVIRI to overestimate GPP in the dry season and underestimating it during the growing season. MODIS was shown to severely underestimate GPP during the growing season, a result which has been noted by other studies in the Sahel and similar environments.

MSG/SEVIRI should according to the findings of this study be more suitable for further studies in which the actual value of GPP is important. If general trends and patterns is the focus MODIS data could be more suitable due to lower data size and being available for a longer time period.

Keywords: Geography, Physical Geography, GPP, Sahel, Dahra, Remote Sensing, Meteosat, MSG, SEVIRI, MODIS

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