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Poster
The use of remote sensing technologies has enabled the monitoring of greenhouse gas (GHG) concentrations in various ecosystems, particularly where surface measurements are limited, such as in the Amazon Rainforest. Measurements obtained by satellite instruments provide average concentration values along the atmospheric column and must be validated against in situ measurements to identify possible biases. The Copernicus Atmosphere Monitoring Service (CAMS) global inversion-optimized greenhouse gas fluxes and concentrations product provides the CH4 total column dry mole fraction and just the CH4 dry mole fraction. This study compared the CAMS CH4 dry mole fractions and the values in the total column with measurements taken at the Amazon Tall Tower Observatory (ATTO) site in the Central Amazon between 2012 and 2020. Evaluating measurements at 18:00 (UTC), the mean difference between CH4 concentrations and total column CH4 and those at the ATTO site was 9.1 ± 0.8 ppb (RMSE: 29.2 ± 0.5 ppb) and -49,7 ± 1,0 ppb (RMSE: 55.1 ± 0.8 ppb). The result indicates that CAMS CH4 dry mole fraction concentration agrees more with the tower measurements than the total column concentration product and should be considered when investigating the GHG concentrations in the Amazon Forest. Therefore, an initial analysis was conducted on how CH4 concentration may be affected by changes in the fraction of primary forest vegetation in the Amazon Forest, based on coverage maps from the MapBiomas project with 30 m spatial resolution and the CAMS concentration product. For one Amazon Brazilian state (Acre), the primary forest vegetation fraction decreased from 0.977 to 0.969 over an area of 60,000 km2. Additionally, an increase in CH4 concentration anomaly was observed in this region with a decrease in the fraction of primary forest vegetation, suggesting a dependency between LULC and atmospheric methane concentration. Furthermore, the fraction of LULC class pasture increased from 0.013 in 2015 to 0.021 in 2020. This increase will be further investigated to analyse if it is related to the observed CH4 anomaly changes in the period. The next step will involve extending this analysis to other states within the Amazon biome.
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