Global XCO_2 anomalies as seen by Orbiting Carbon Observatory-2

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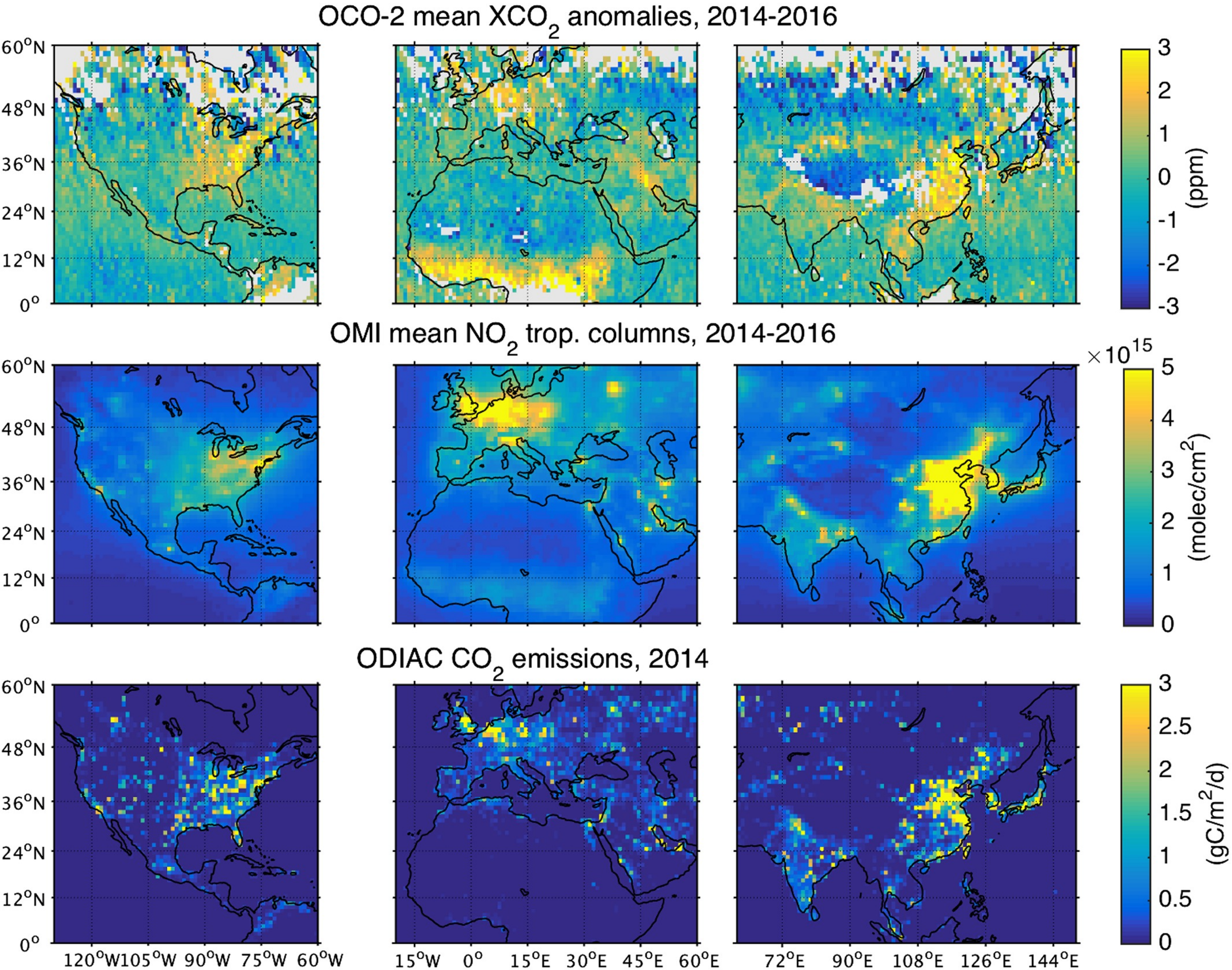
@JanneHakkaraine



Hakkarainen et al., GRL, 2016.

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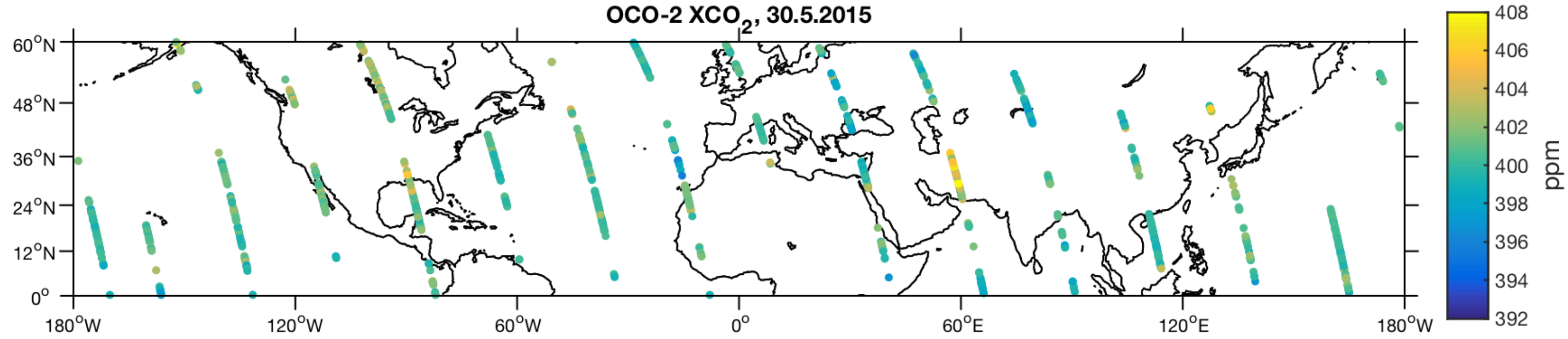
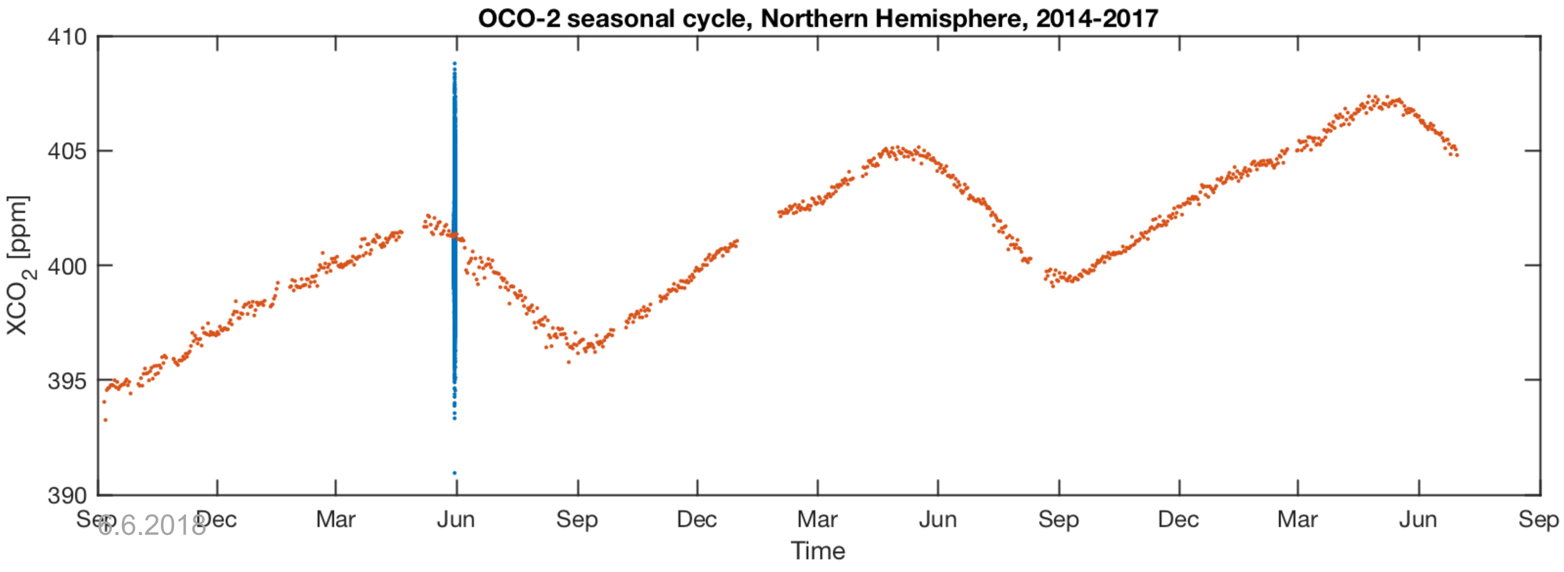
XCO_2 anomaly: definition



XCO2 (anomaly) = XCO2 (individual) - XCO2 (daily median)



Remove the seasonal variability and the increasing trend

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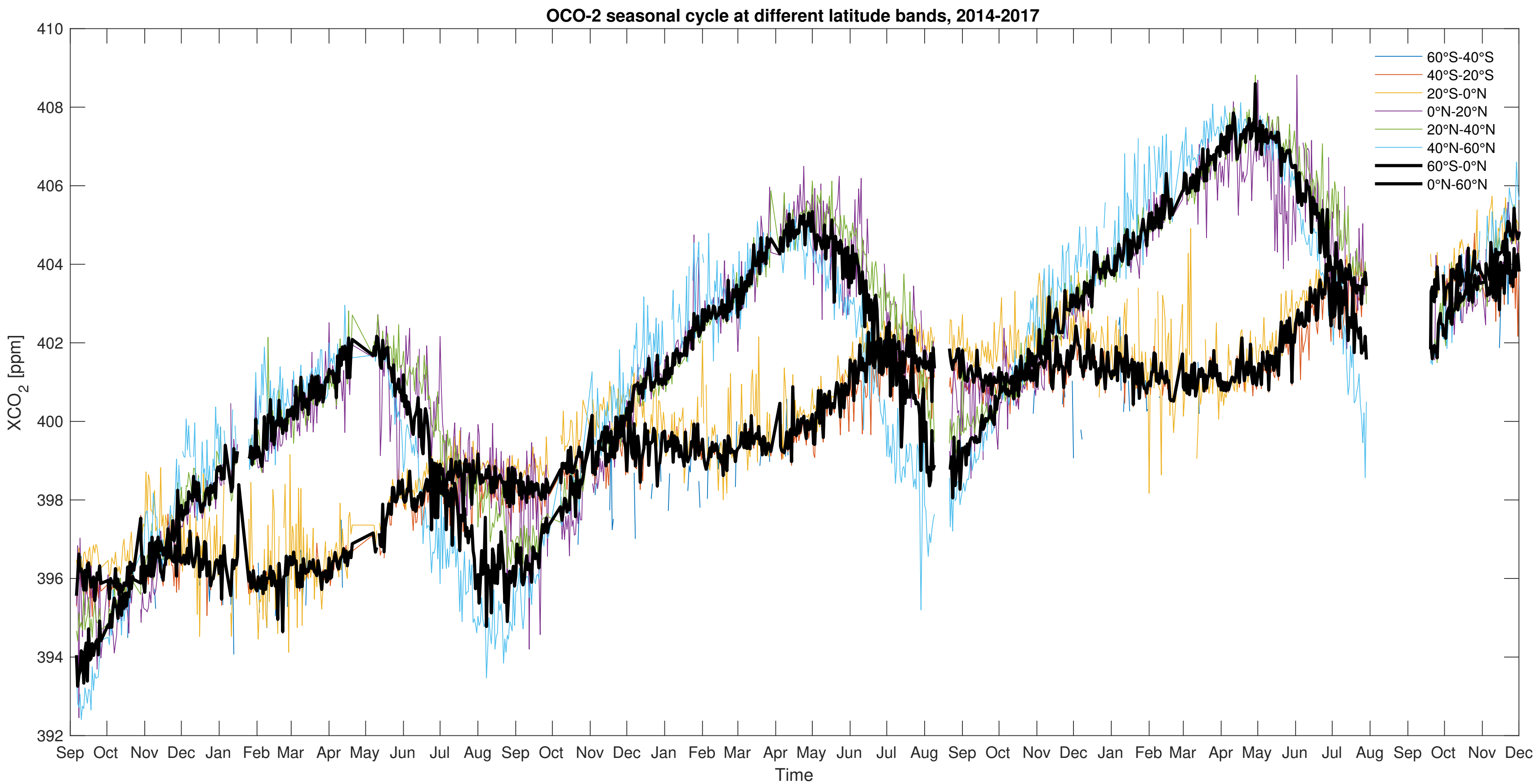
Background choice

Northern and southern hemisphere must be considered separately.
In NH the seasonal cycle is more variable at different latitudes in summer.



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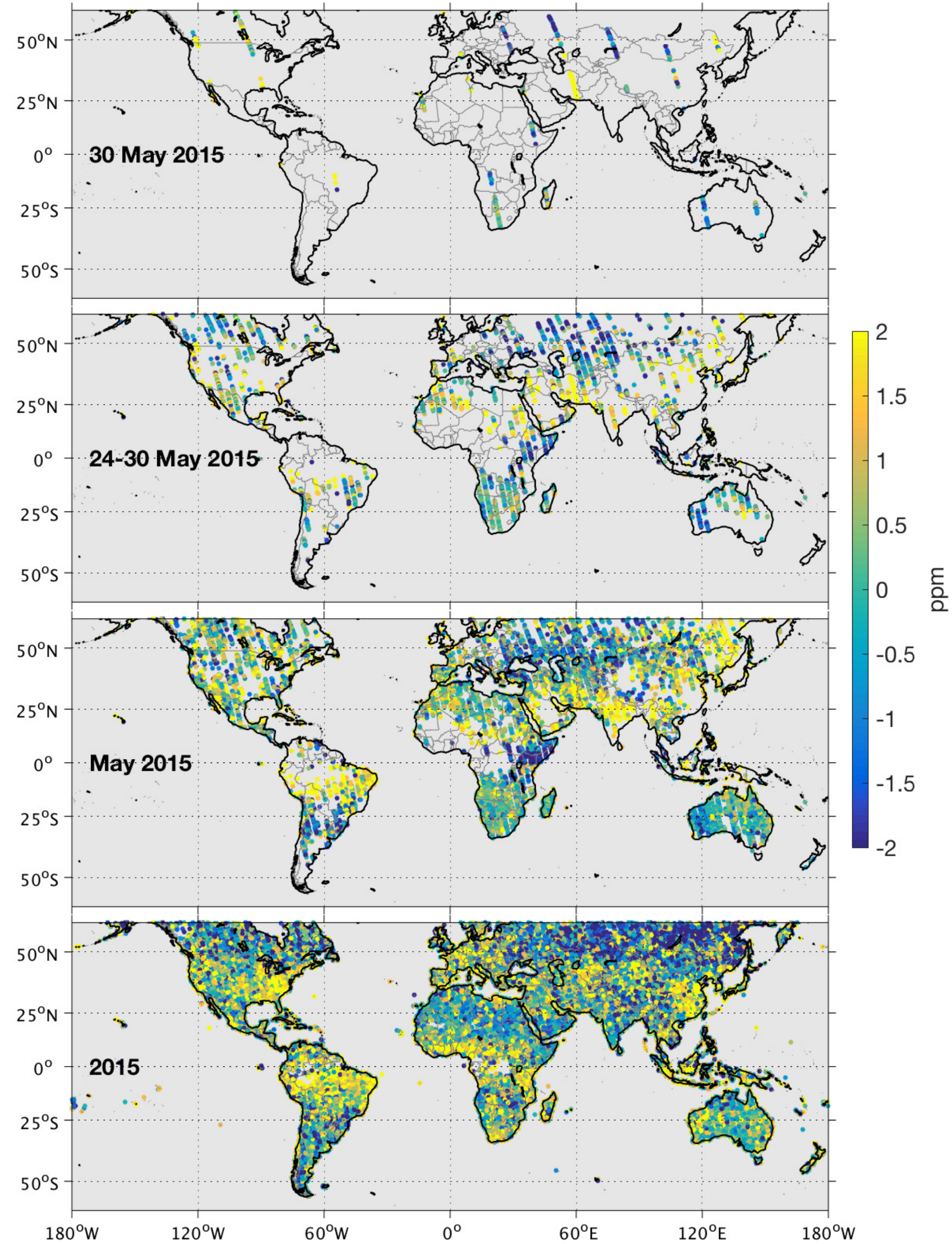
Data coverage



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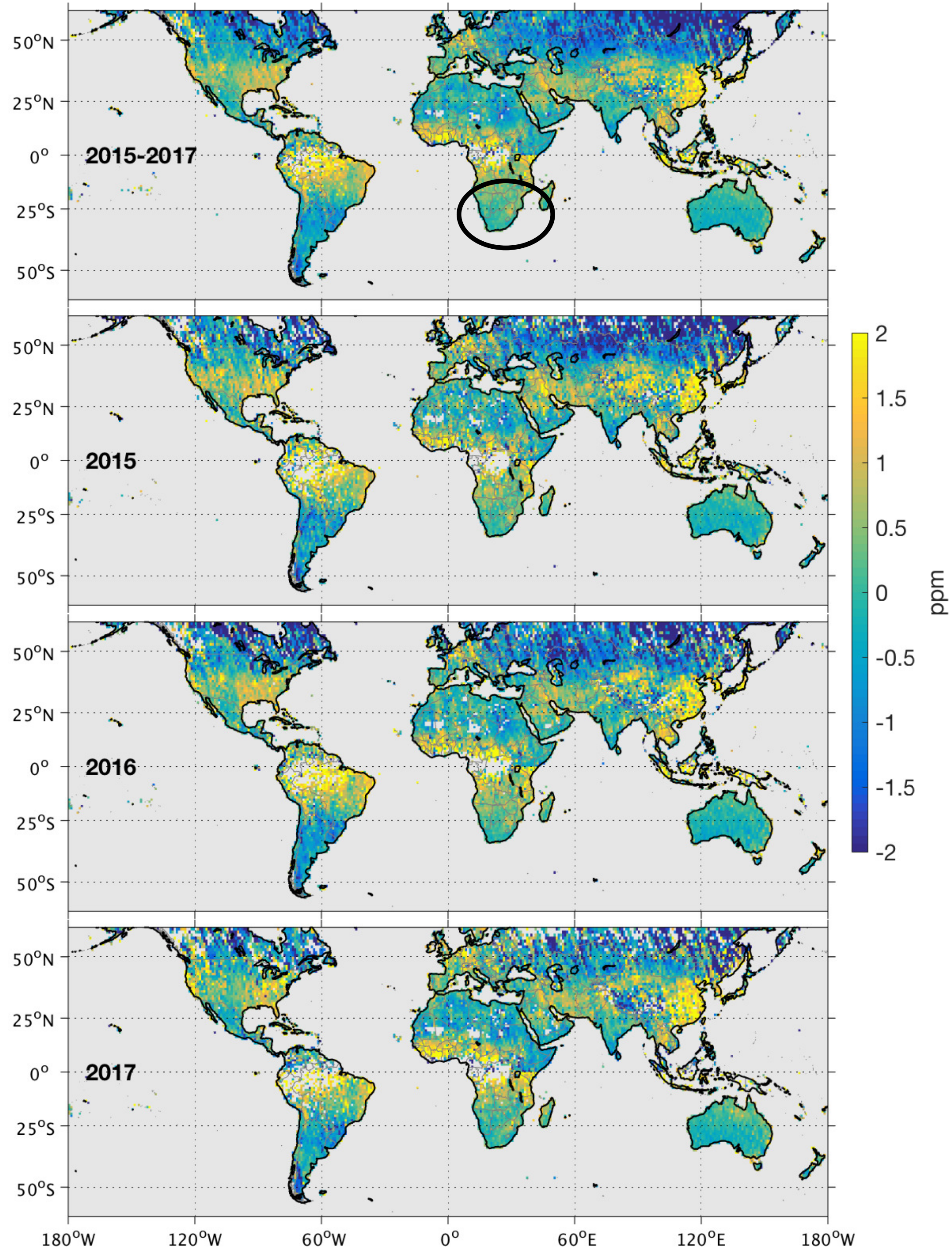
Results

The anomaly spatial patterns are consistent during different years.

Some differences are related to missing data especially in summer 2017.



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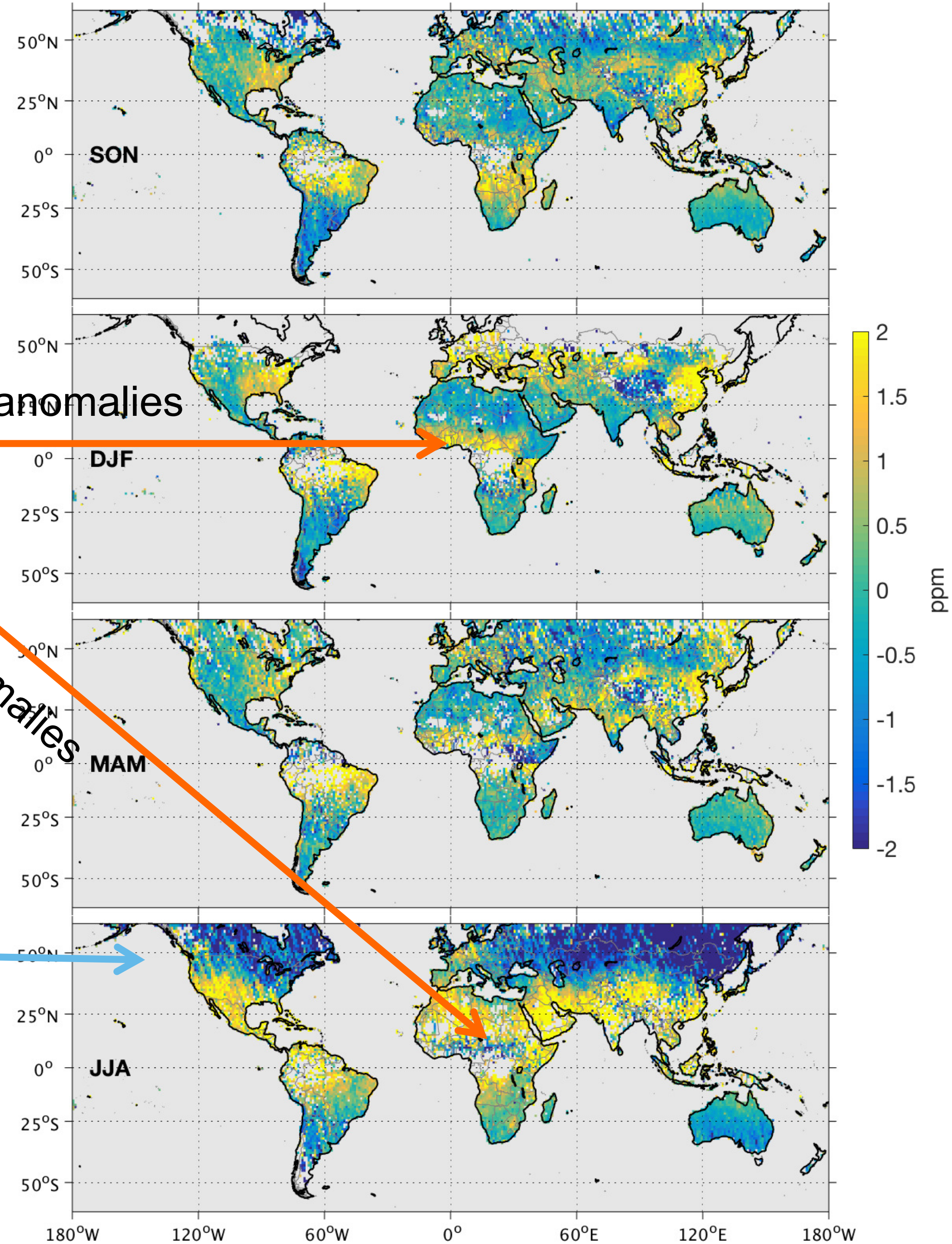
Seasonal anomalies

Biomass burning seasons in Africa are correctly represented

Midlatitudes growing season



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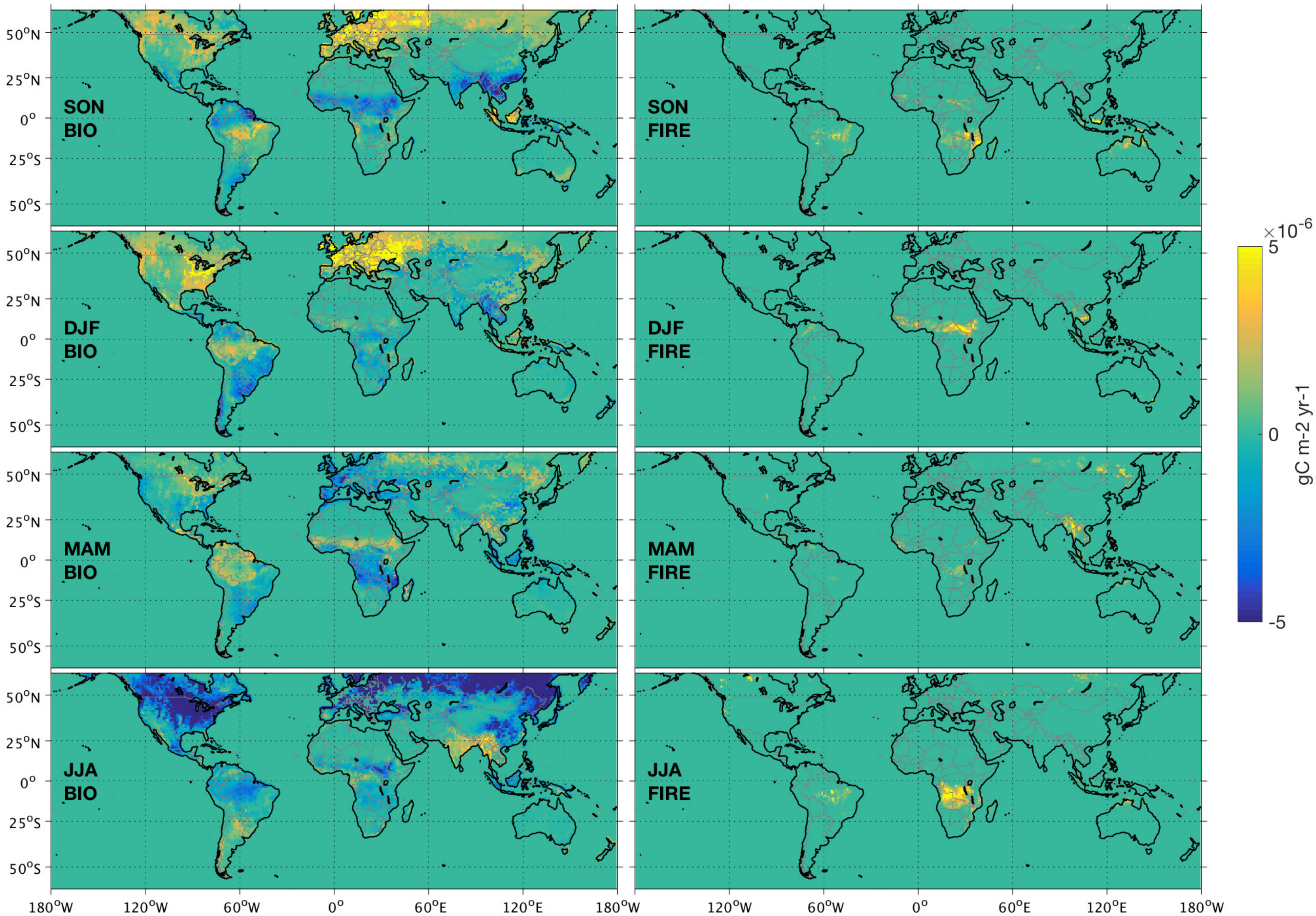
Comparison with NOAA CarbonTracker fluxes



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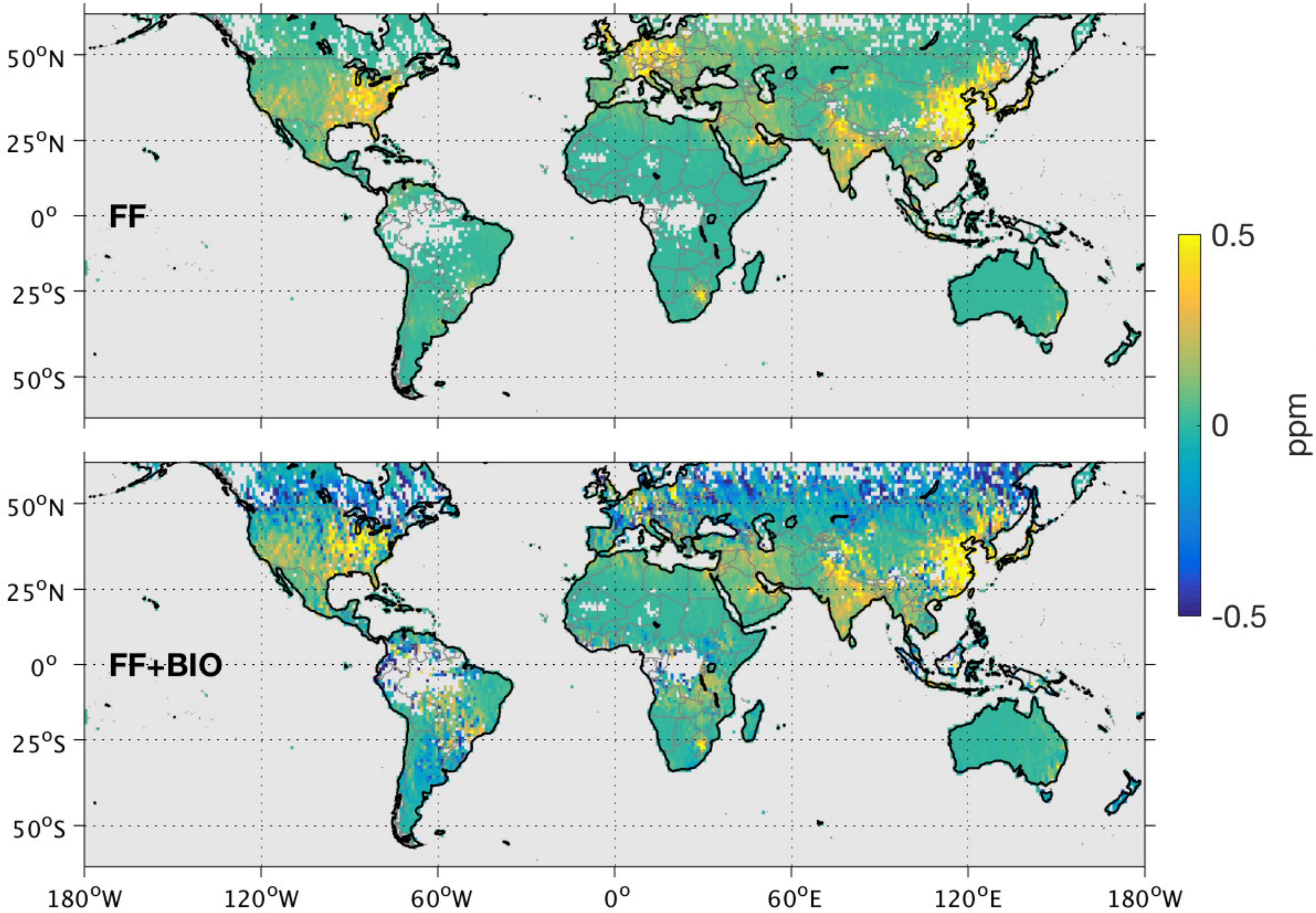
FLEXPART Model enhancements for 2015



OCO-2 pixels aggregated to one-second averages and modeled three days backward

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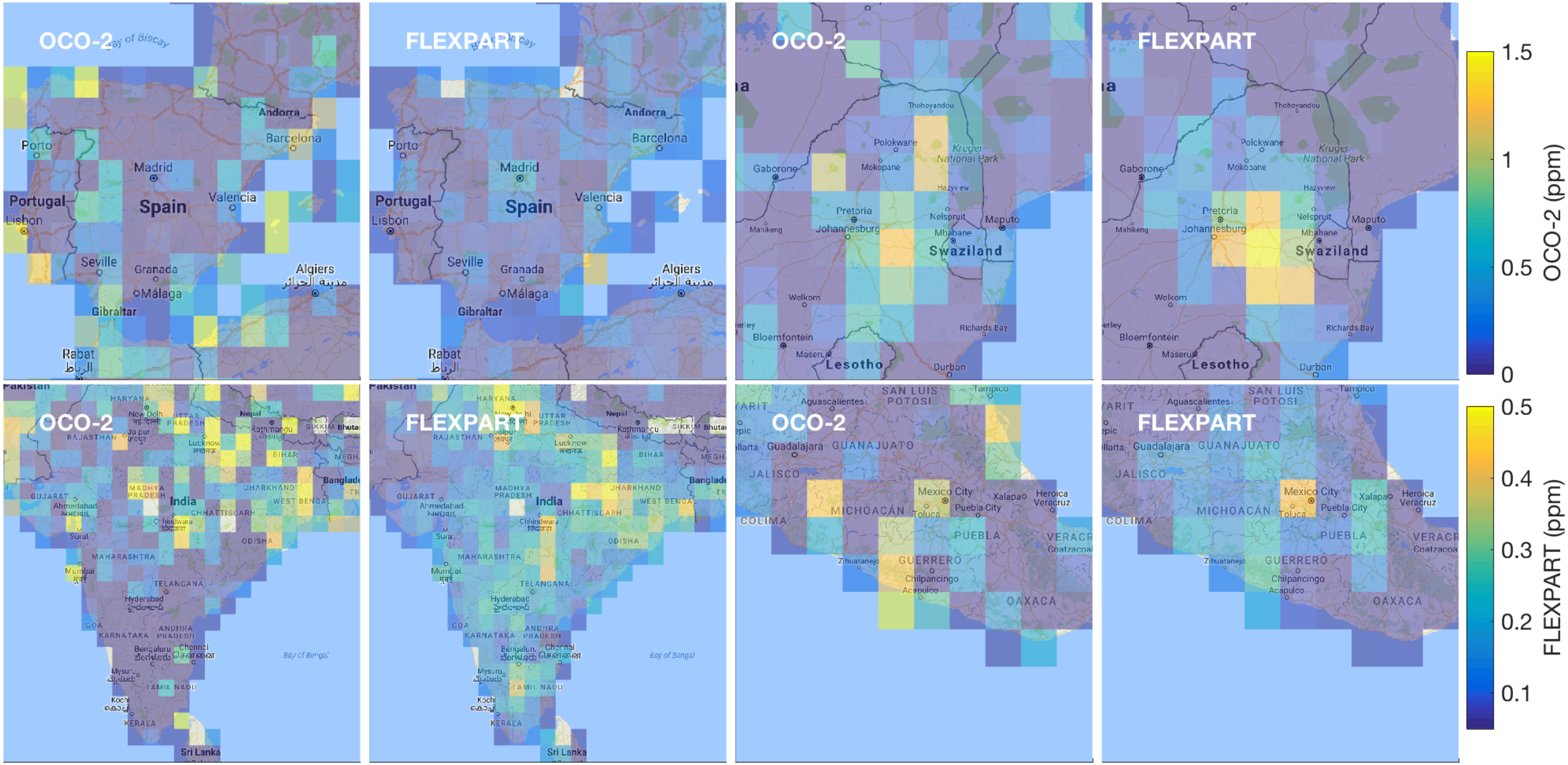
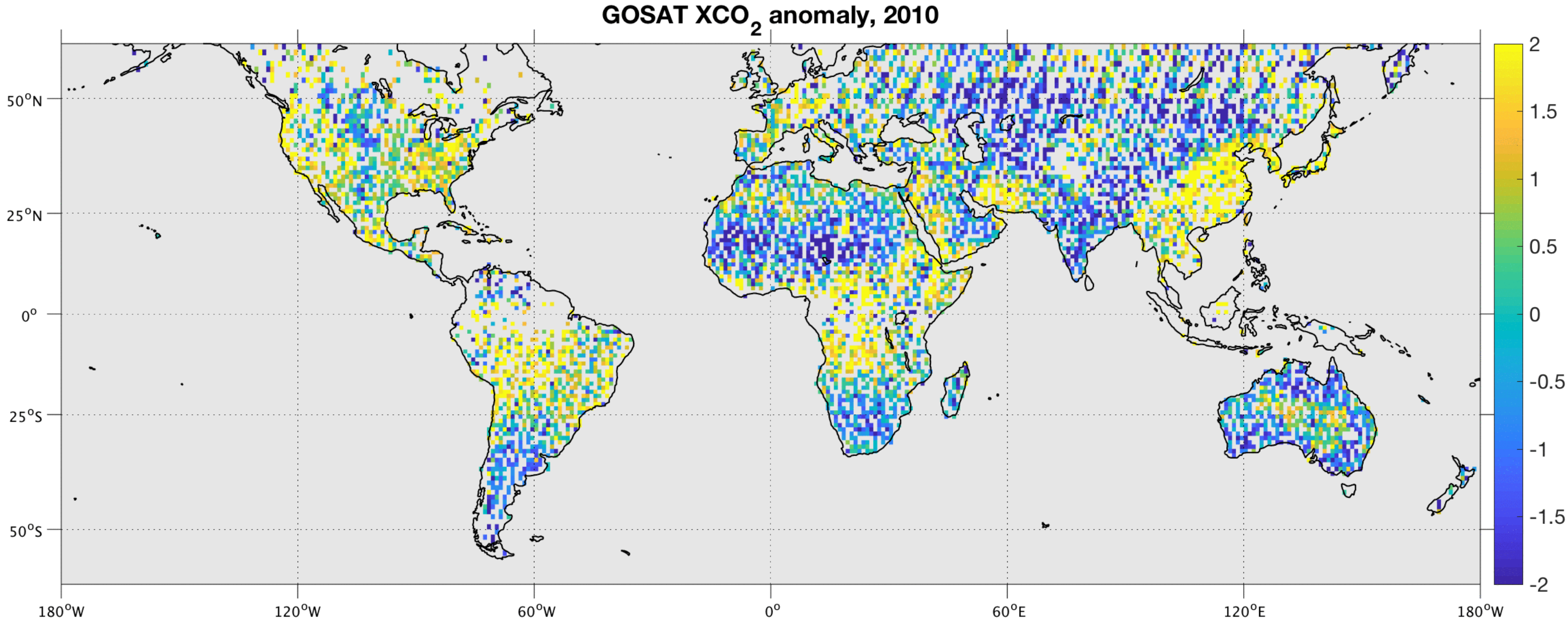
OCO-2 and FLEXPART case studies



GOSAT XCO_2 anomalies



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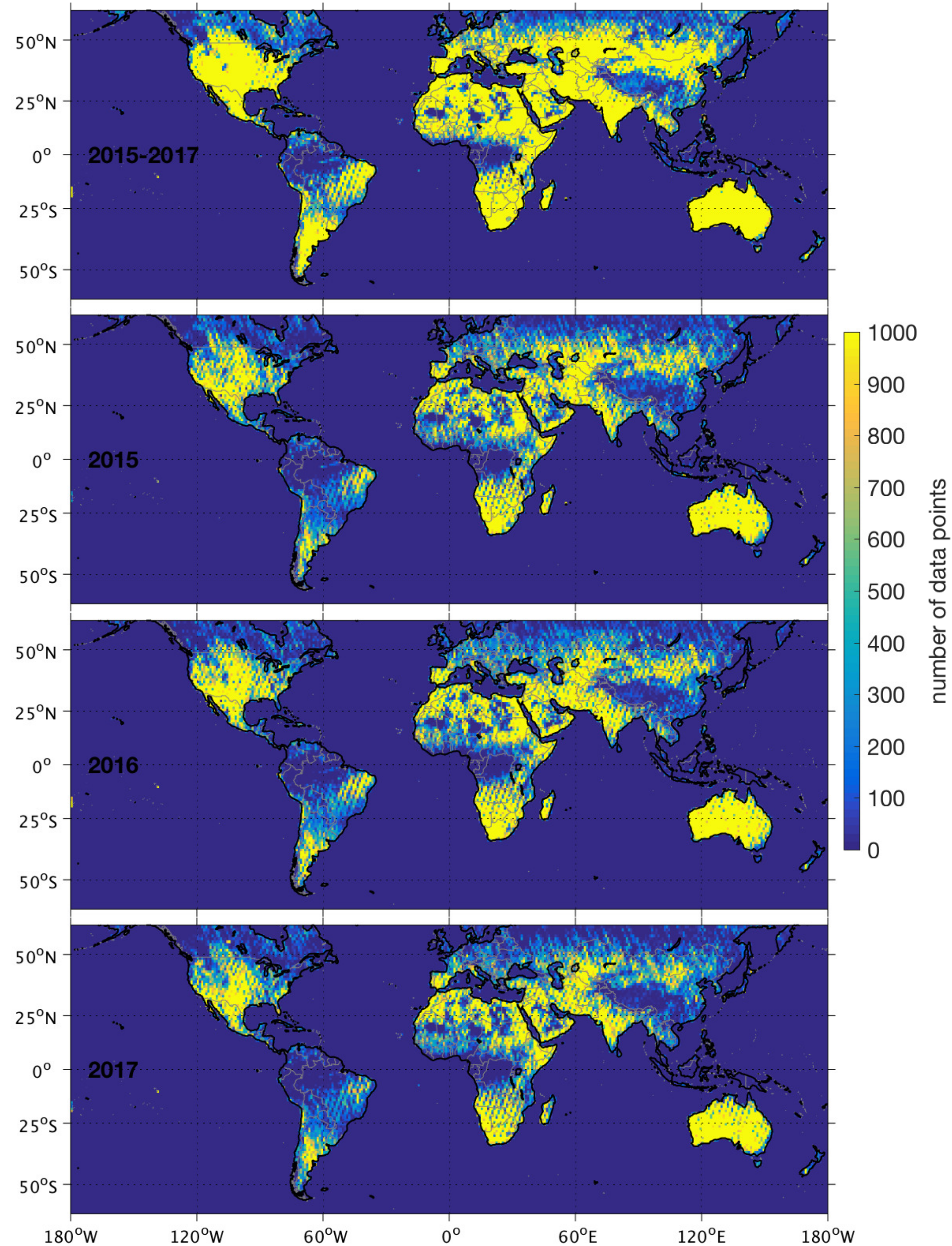
Data availability

Less data are available over areas with frequent cloudiness and/or large aerosol load, as well as where sunlight is not available (northern midlatitudes over land).



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Simulated seasons