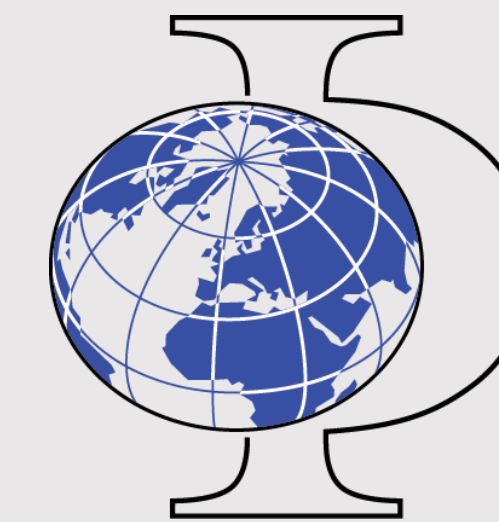


The seasonal cycle of atmospheric CO₂ in South America over the last ten years seen by GOSAT

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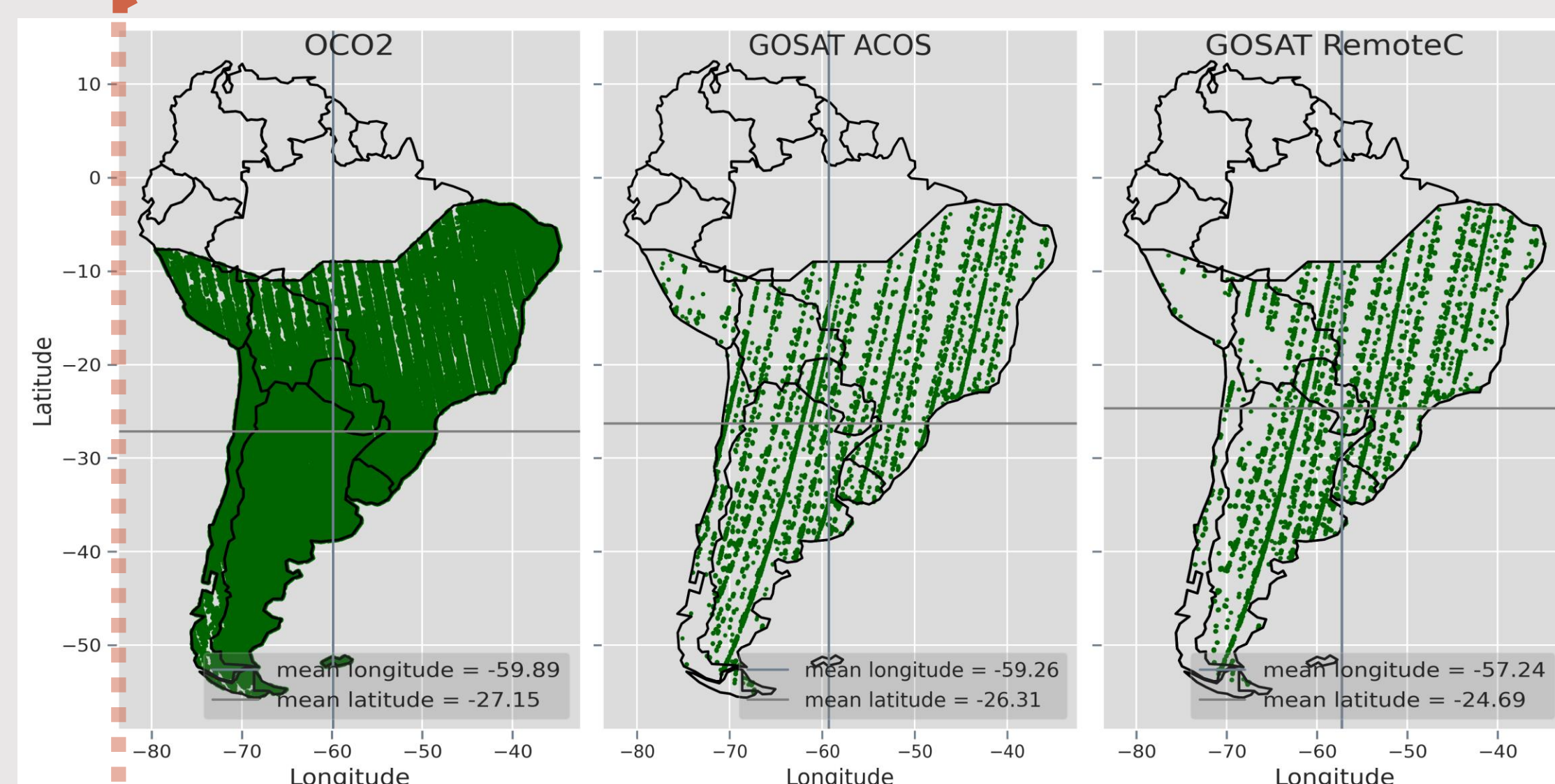


Motivation

- Limited number of in-situ CO₂ measurements in South America.
- Satellite-based XCO₂ measurements can improve & validate carbon cycle models.

Data

- Comparison of CO₂ concentrations of GOSAT ACOS, GOSAT RemoTeC (RT), in-situ (IS) and OCO₂.
- Comparison of CO₂ fluxes from the inverse model TM5-4DVar assimilating different measurements in the South America Temperate (SAT) region.



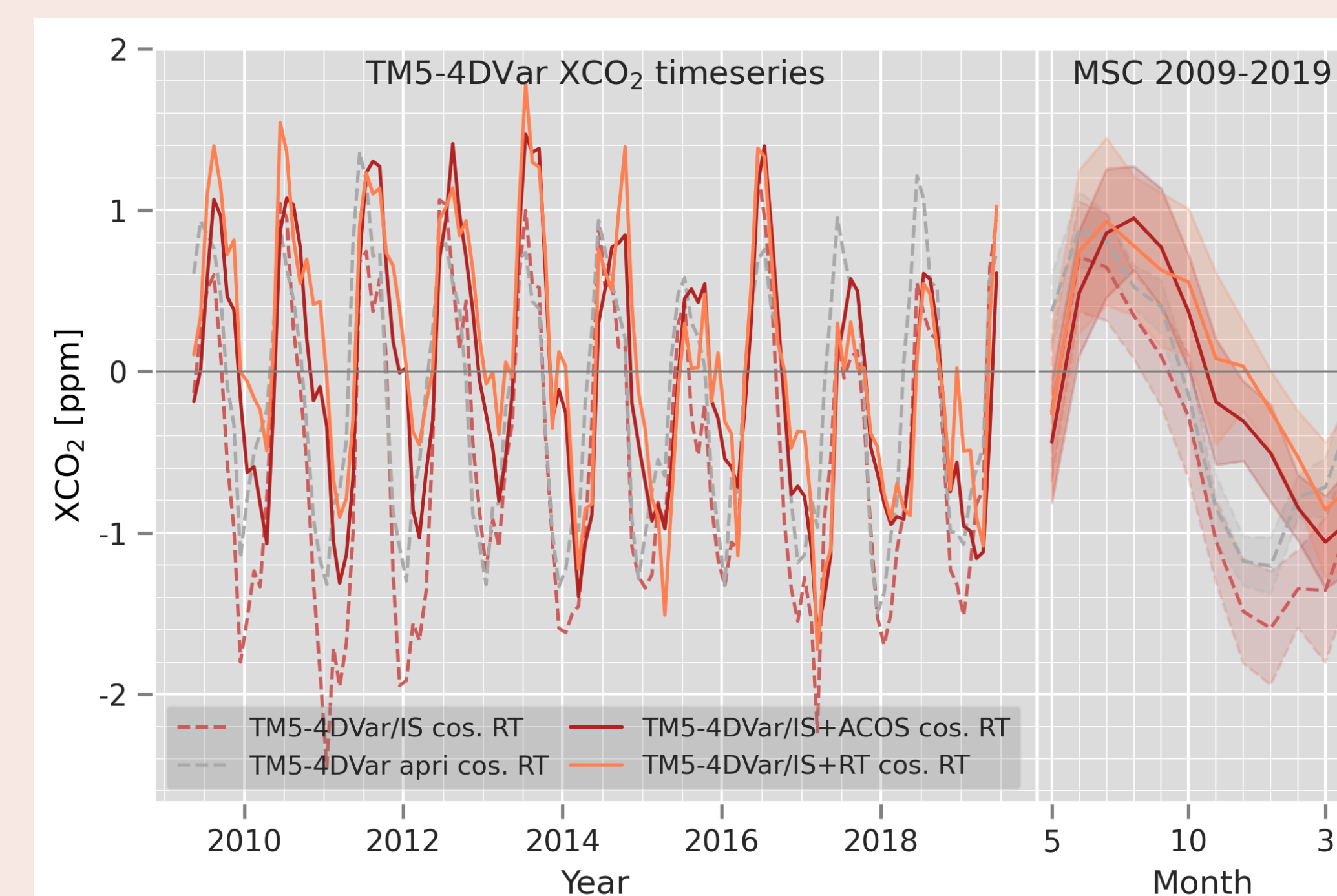
Methods

- Comparison of atmospheric inversion fluxes and concentrations:
- TM5-4DVar assimilating IS and GOSAT+IS
 - Model intercomparison project (MIP) assimilating IS and OCO₂+IS

- Satellite XCO₂ measurements provide **new information about the carbon cycle** in the South America Temperate region.
- Satellite based CO₂ concentrations and fluxes show a **different seasonal cycle in CO₂ concentrations and fluxes** compared to conventional inversions using in-situ measurements only.

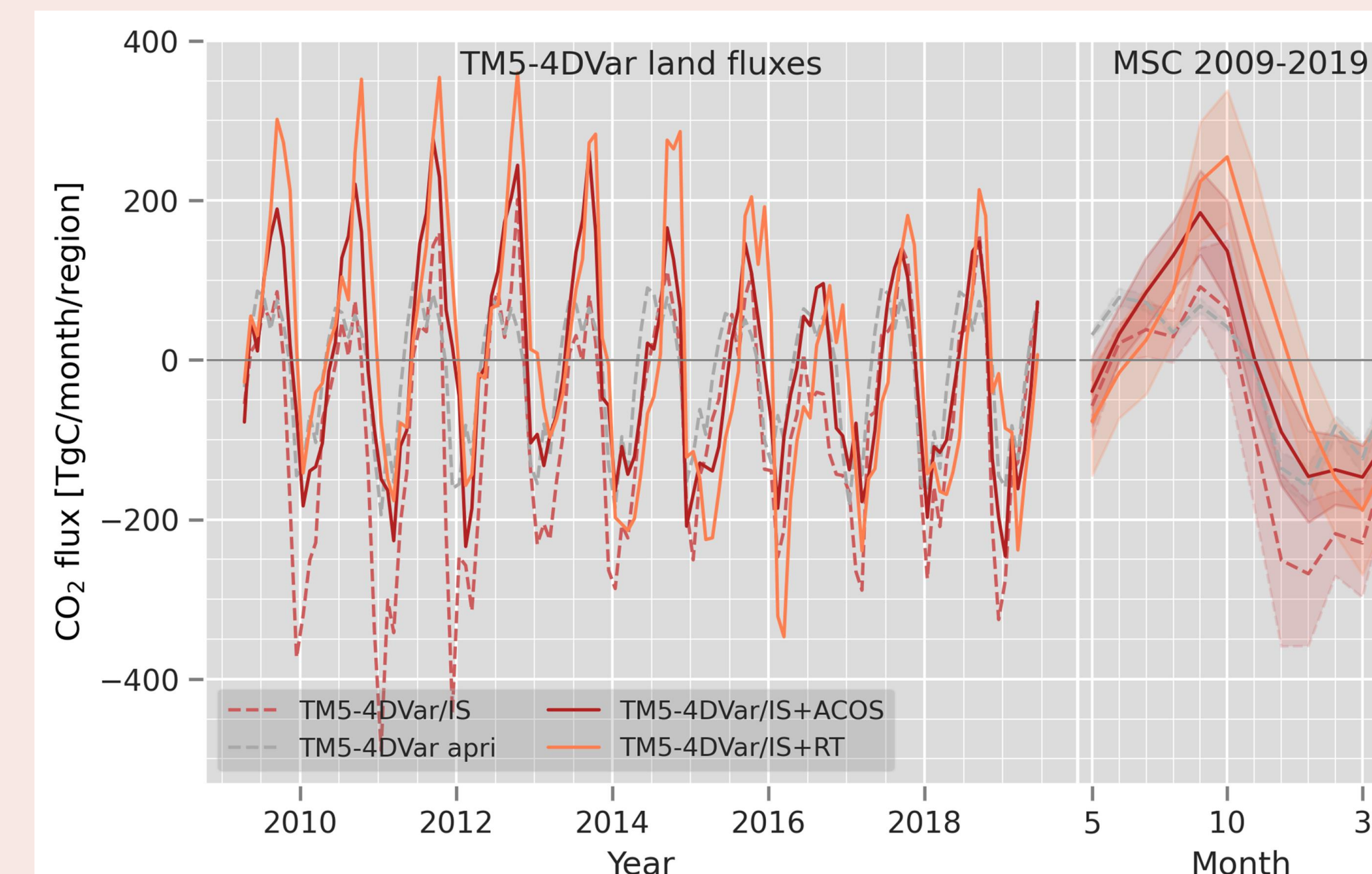
XCO₂ concentrations

Assimilating satellite measurements **shifts the seasonal cycle** of XCO₂ in time by 1-2 months compared to in-situ assimilation only and apriori.



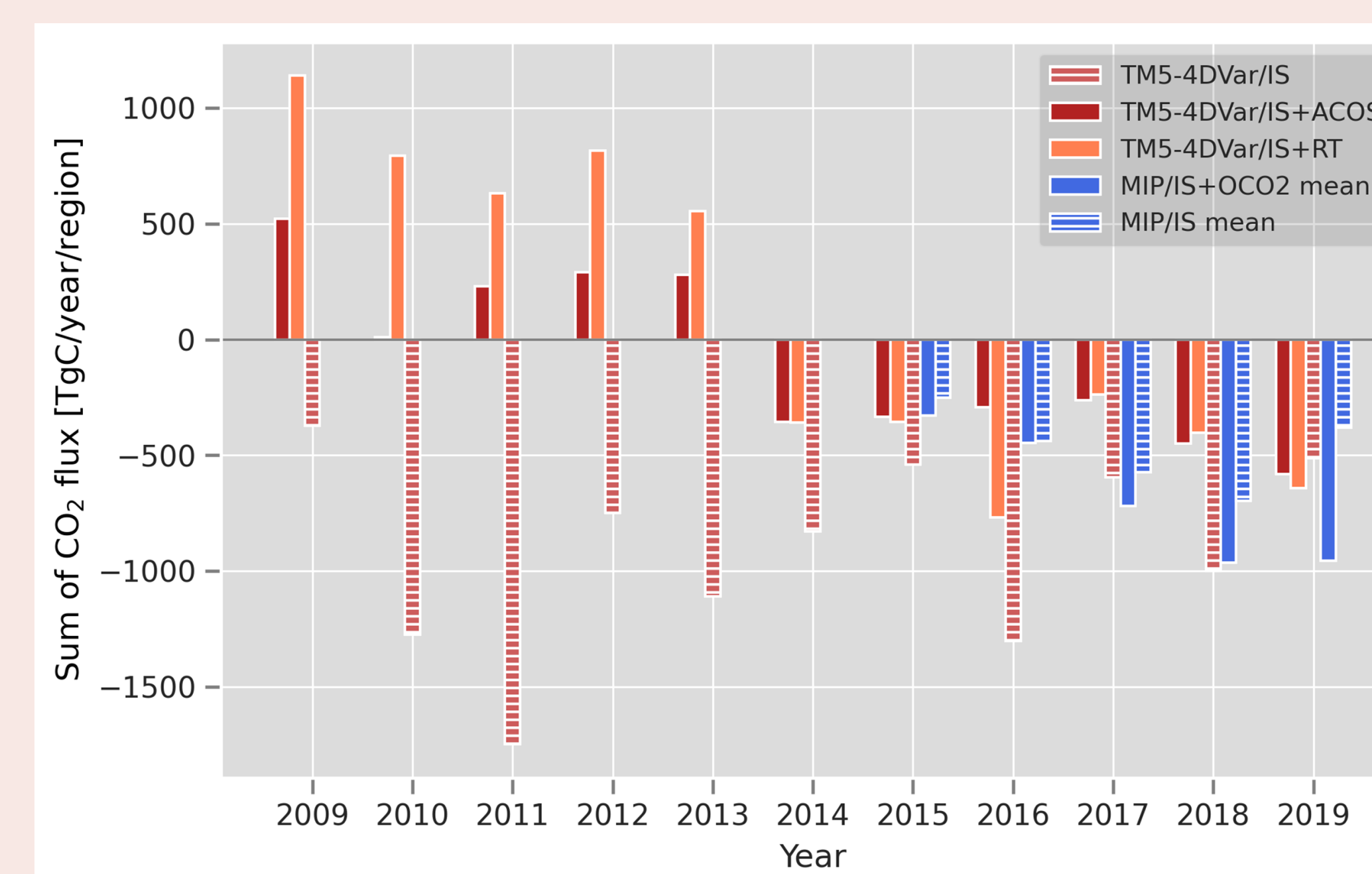
CO₂ fluxes

- Seasonal CO₂ flux from in-situ assimilated model shows the **same seasonal cycle** as satellite assimilated model when using ACOS retrieval.
- But different satellite retrieval shows **different seasonal cycle** by 1-2 months.

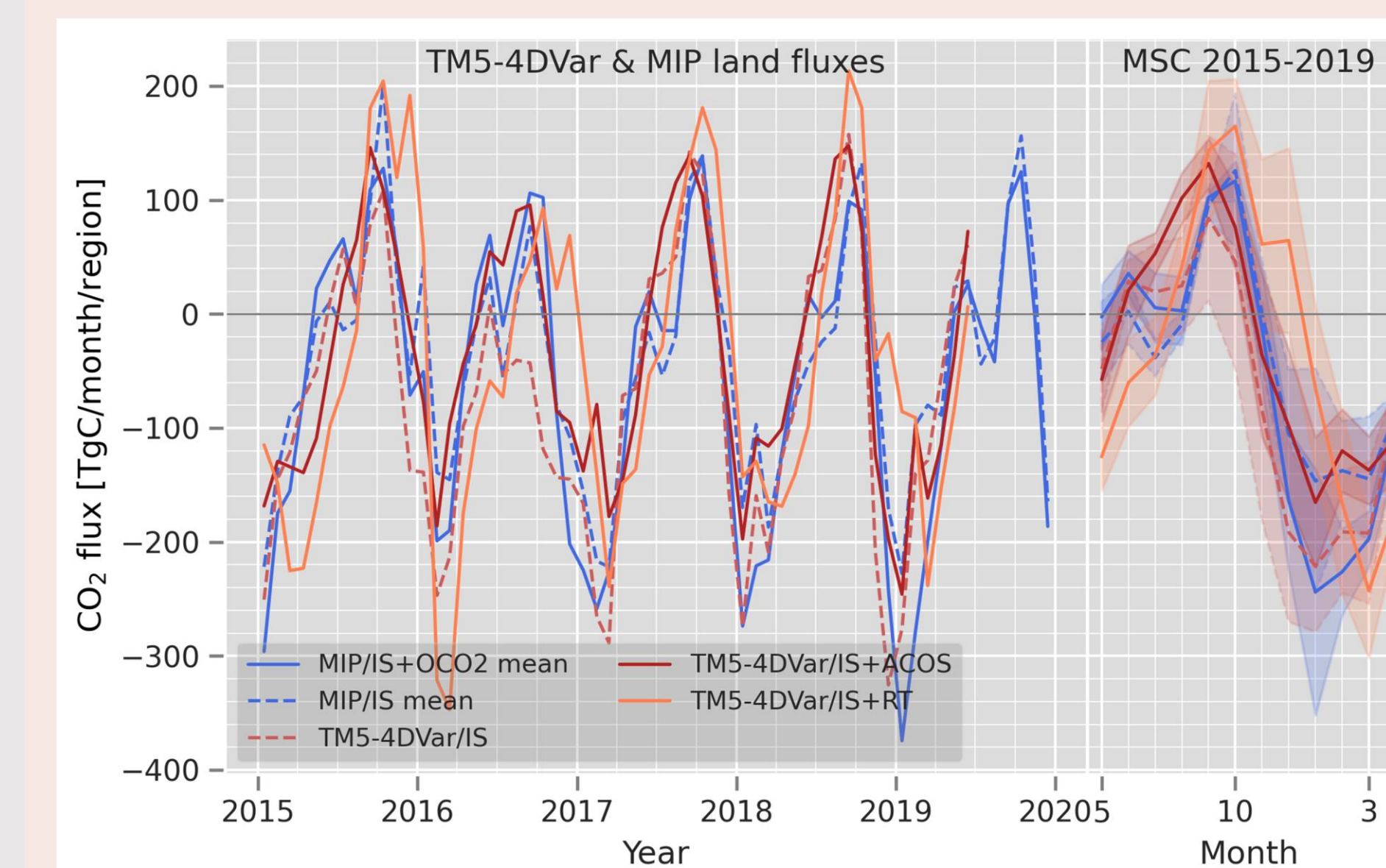
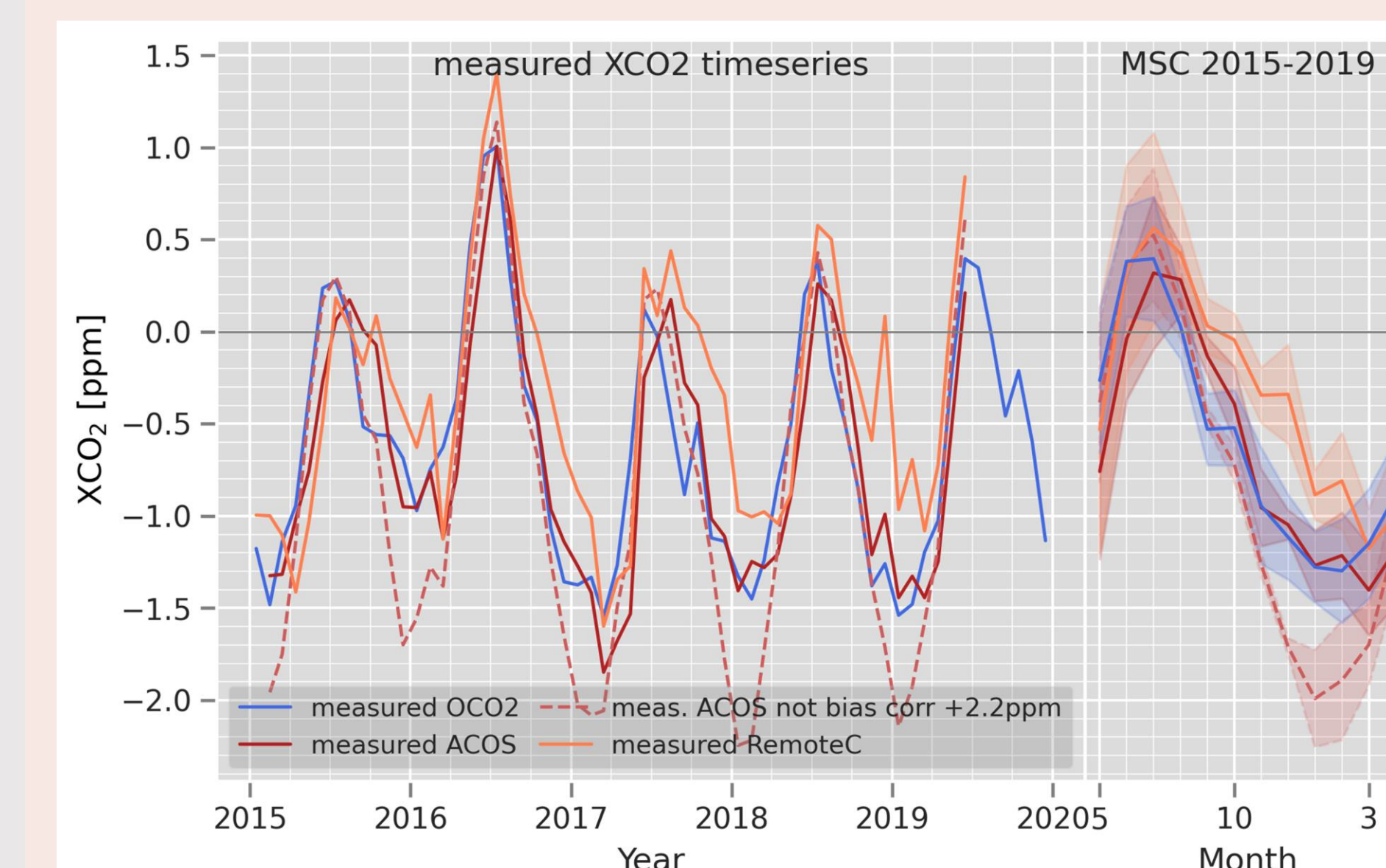


Trend

- Satellite based **fluxes switch sign** from positive to negative fluxes in 2014.
- In-situ assimilation has smaller negative flux after 2014.



Validation



Further Questions

- Why do satellite based fluxes show differences among each other?
- Where does the trend in annual fluxes come from?

What's next

- Investigate sampling bias by looking into subregions.
- Look at surrounding TRANSCOM regions.

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