# GOSAT Science team activities

## - Update of $CO_2$ emission inventory by mapping observation -

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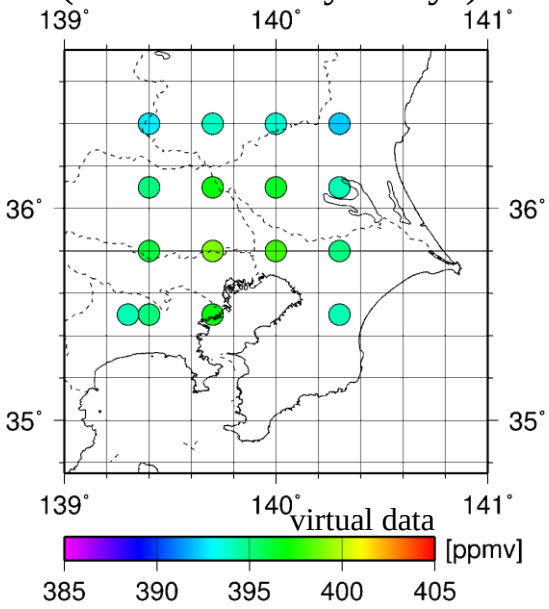
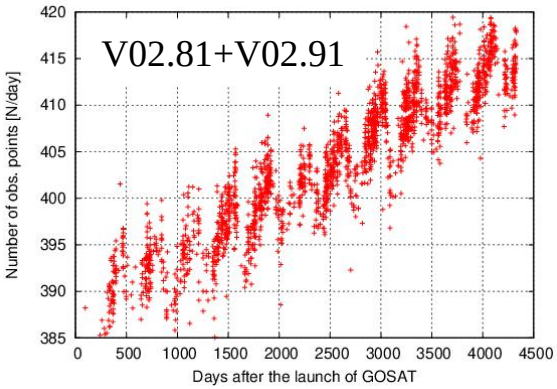
- GOSAT and GOSAT-2 science team have conducted mapping observation around Tokyo city (Kanto Plain)
- $CO_2$ emission inventory has been updated by LEnTKF system on AIST-MM
- Simultaneous observation of CO and $CH_4$ of GOSAT-2 can more tightly constrain?

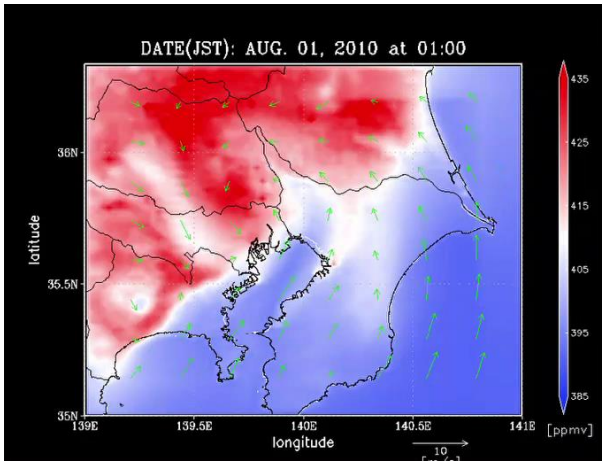
Target position
(1 shot-set every 6 days)



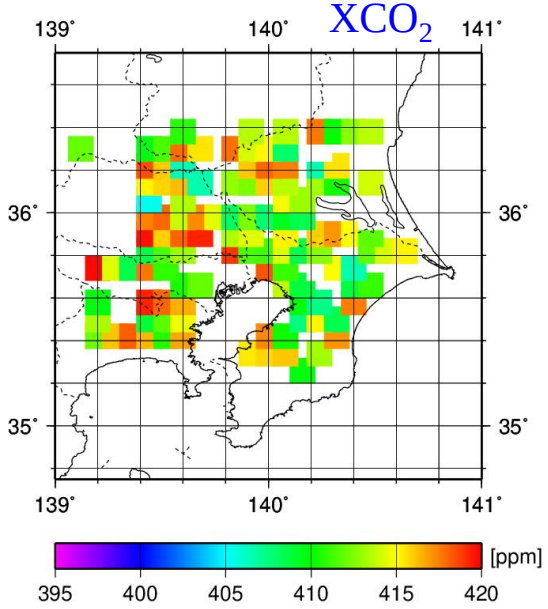

Data over the Kanto Plain



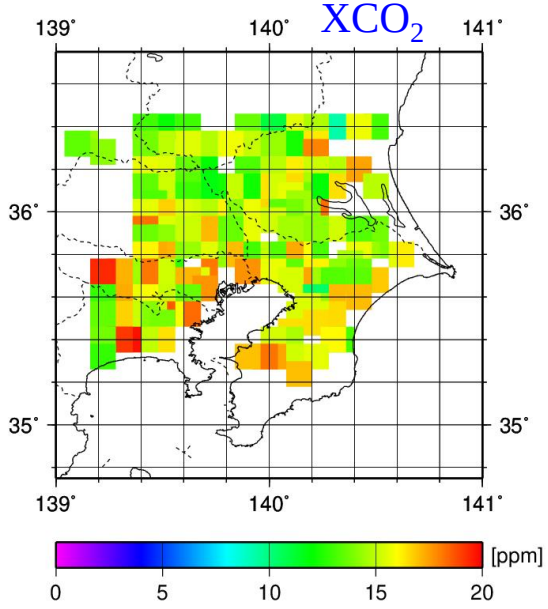

LEnTKF on
regional transport model, AIST-MM



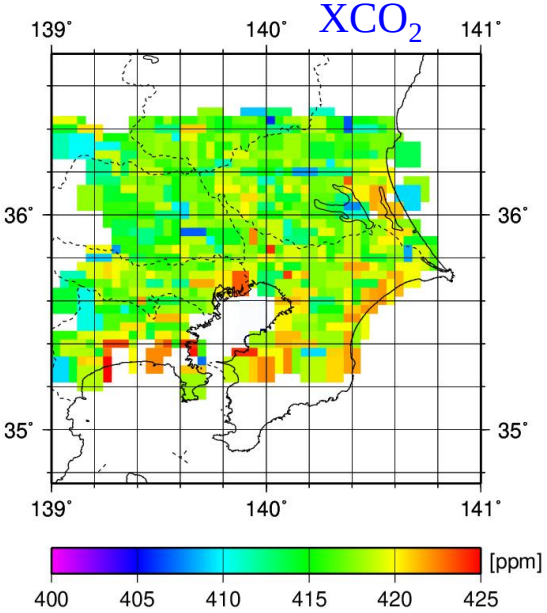
GOSAT $XCO_2$ V02.90-V02.91
(2009～2022_Dec-Jan)



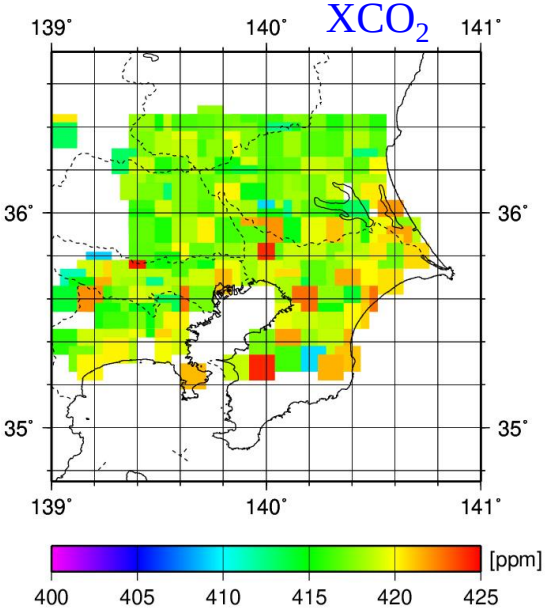

Trend (2 ppmv/yr) removed



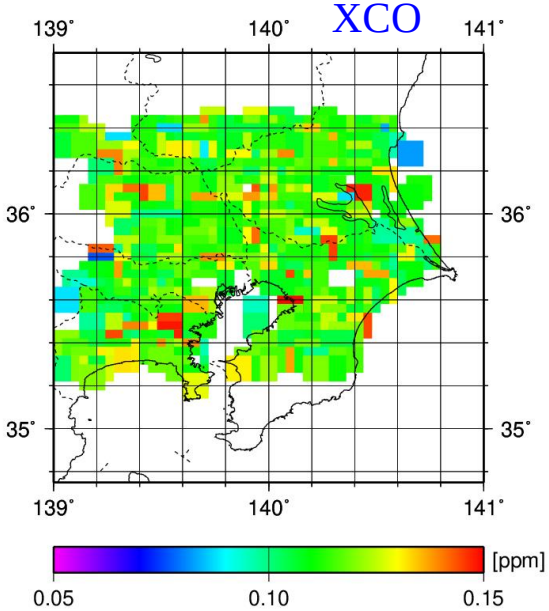

GOSAT-2 $XCO_2$ V02.00
2019-2022_Mar-Dec

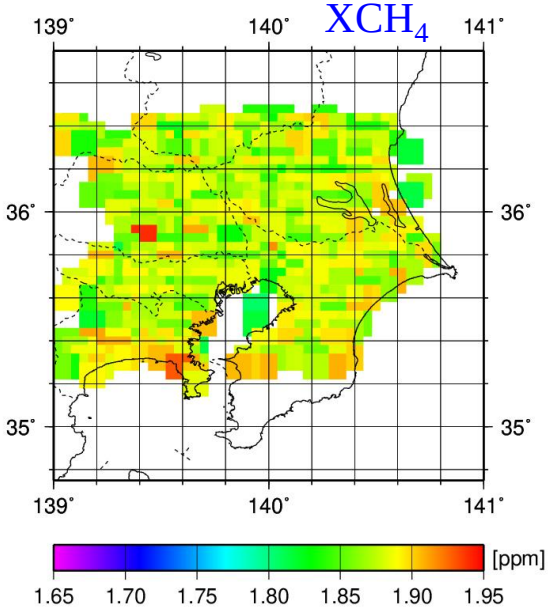



2019-2022_Nov-Feb




GOSAT-2 XCO, $XCH_4$ V02.00
2019-2022_Mar-Dec



# Update of $CO_2$ emission inventory by LEnTKF system on AIST-MM using GOSAT/GOSAT-2 mapping data

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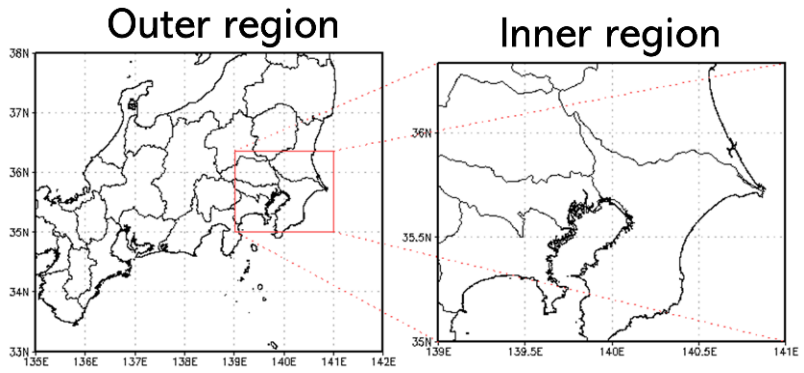
|---|---|
| Meteorological nudging data: | MSM-GPV (JMA) |
| $CO_2$ emission inventory data: | EAGrid2000, scaled to to Japan's total energy consumptions |
| Vegetation model: | BEAMS-diurnal (Wang et al., 2021) |
| Boundary condition: | $CO_2$ concentrations calculated by NICAM-TM (prov. by Y. Niwa) |

| | Outer region | Inner region |
|---|---|---|
| **Grid number (Lon × Lat × Alt)** | 56 × 60 × 35 | 80 × 80 × 35 |
| **Grid resolution (Lon; Lat)** | 0.125°; 0.08333° | 0.025°; 0.01666° |
| **Longitude** | 135.0 °E ~ 142.0 °E | 139.0 °E ~ 141.0 °E |
| **Latitude** | 33.0 °N ~ 38.0 °N | 35.0 °N ~ 36.333 °N |
| **Altitude** | 0 to 5400 [m] | 0 to 5400 [m] |
| **Temporal resolution** | 1 [hour] | 30 [minute] |
| **Calculation time step** | 30 [second] | 10 [second] |

Calculation domains




Parameter estimation of
Local Ensemble Transform Kalman Filter (LEnTKF)