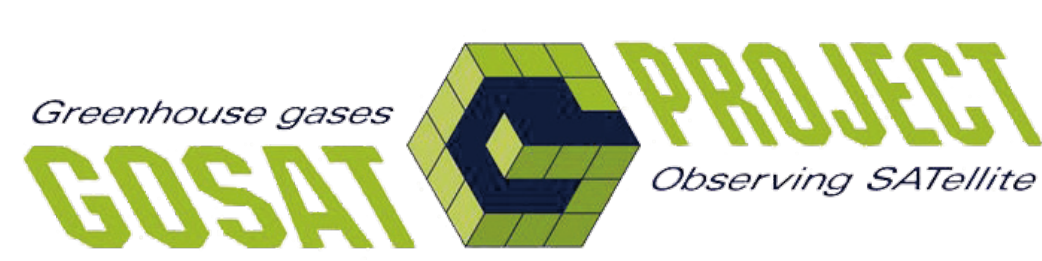
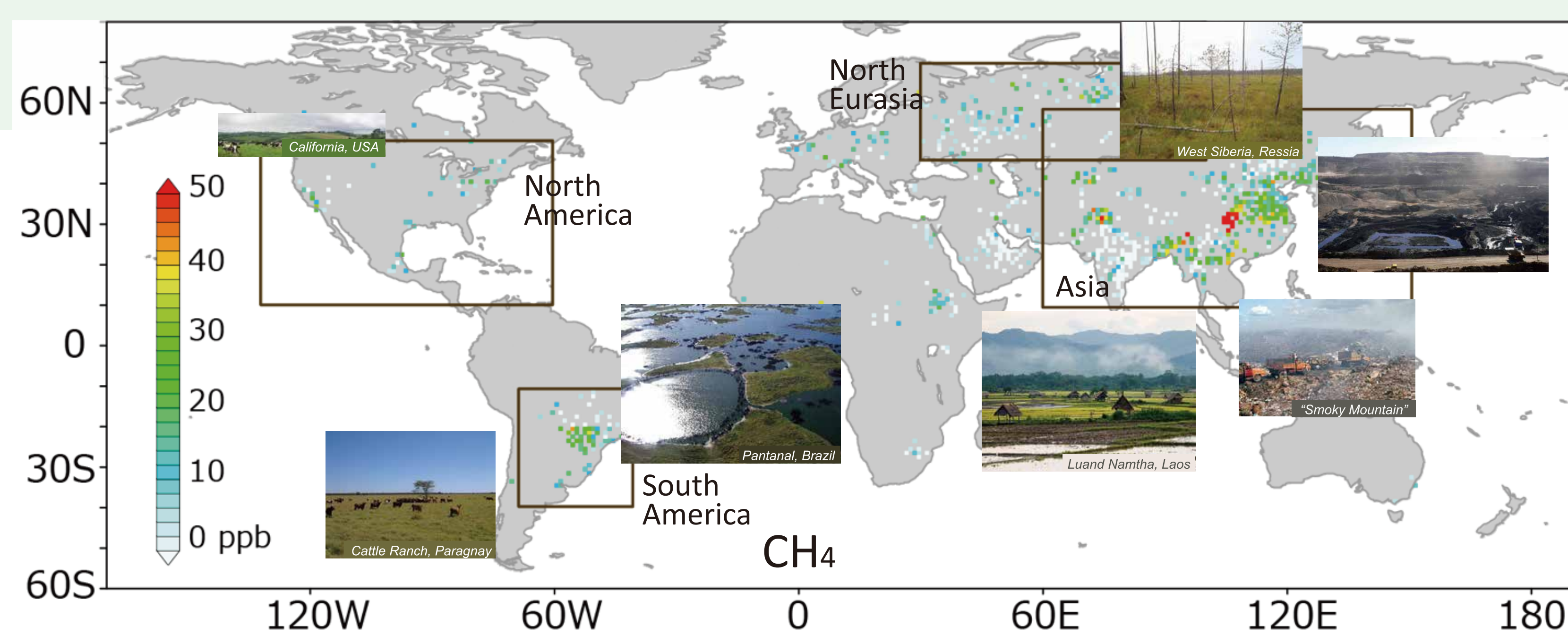
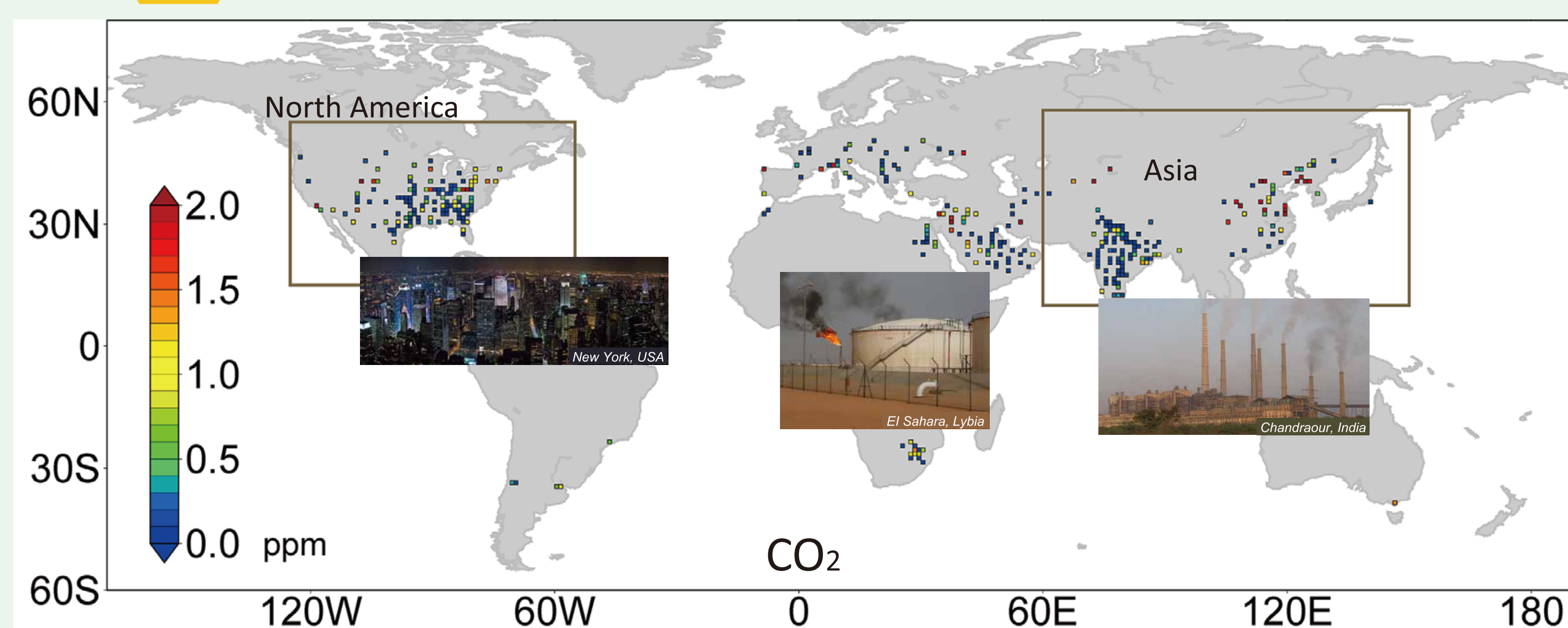


Contribution to the Paris Agreement using space-based GHG monitoring



GOSAT to Detect Anthropogenic CO₂ and CH₄ Emissions

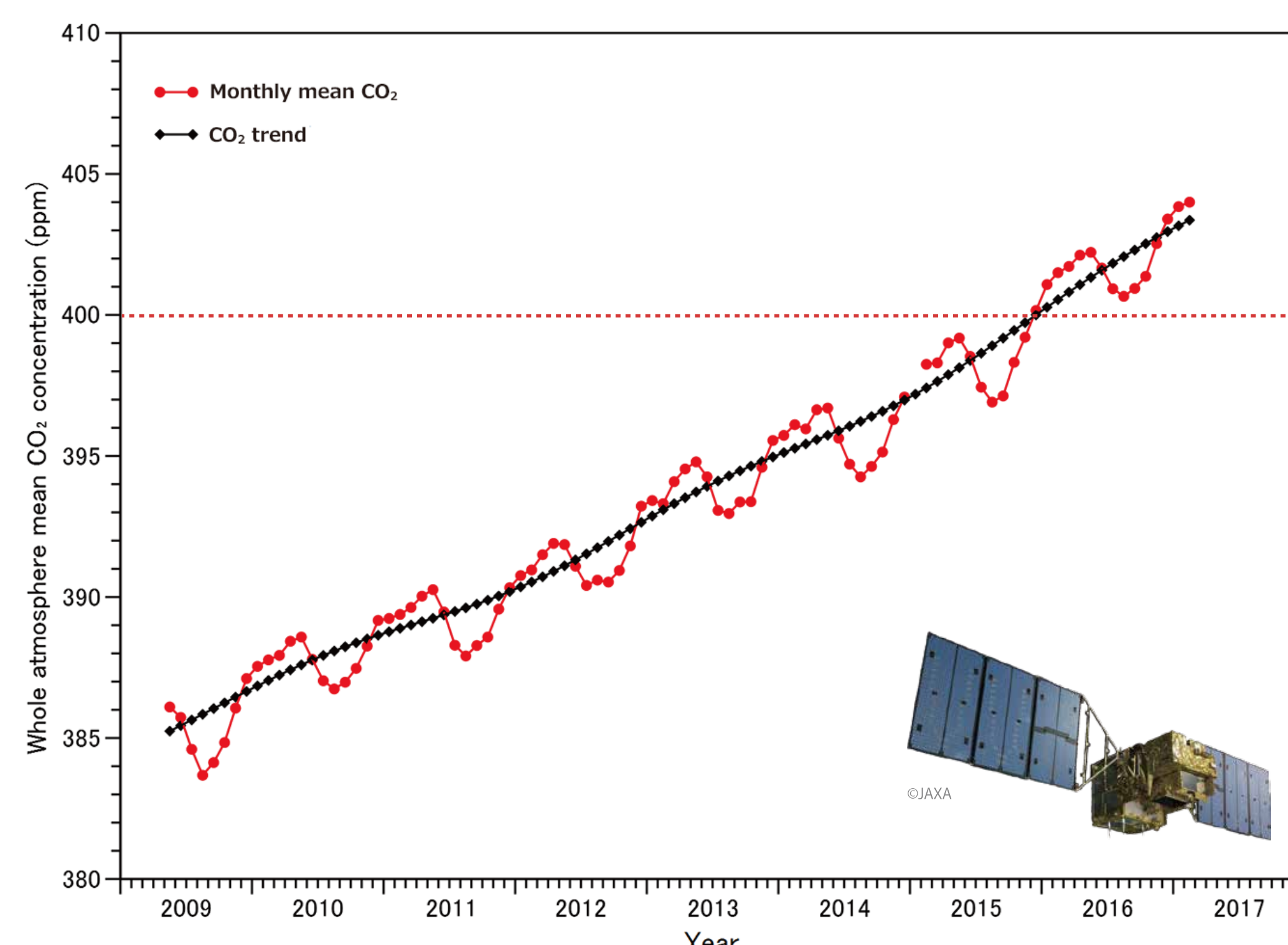


* Photo by David Iff; Javier Blas; Sndhansha; Ninabalkar; Cgoodwin; NASA; Alice Yo; Peter V; Takas Bahay.

CO₂ concentration was analyzed for 5.5 years from June 2009 to December 2014, CH₄ for 3.5 years from June 2009 to December 2012 based on GOSAT data. CO₂ increases in mega-cities and energy industry areas, and CH₄ in densely populated, intense farming, or oil/natural gas producing areas, have the tendency for higher concentrations than those in their surroundings. The study demonstrates the potential utility of monitoring anthropogenic emissions** of these greenhouse gases from space.

** Higher CO₂ concentration is found at China: Zhangjiakou, Anshan, Harbin, and Tianjin; India: Kolkata; Eastern part of Uzbekistan; Southern edge of Kazakhstan; Eastern area of Kyrgyzstan; Northern edge of Tajikistan; Northwestern part of Saudi Arabia; Jordan; US: Pittsburg, Los Angeles; Mexico: Acapulco. Higher CH₄ concentration is found at China: Chengdu, Chongqing; India: Kolkata, Meghalaya; Bangladesh: Dacca; Pakistan: Lahore; US: Pittsburg, New York, Los Angeles; Brazil: Campo Cerrado, Pantanal; Russia: Surgut.

Whole-atmosphere Monthly Mean CO₂ Concentration by GOSAT

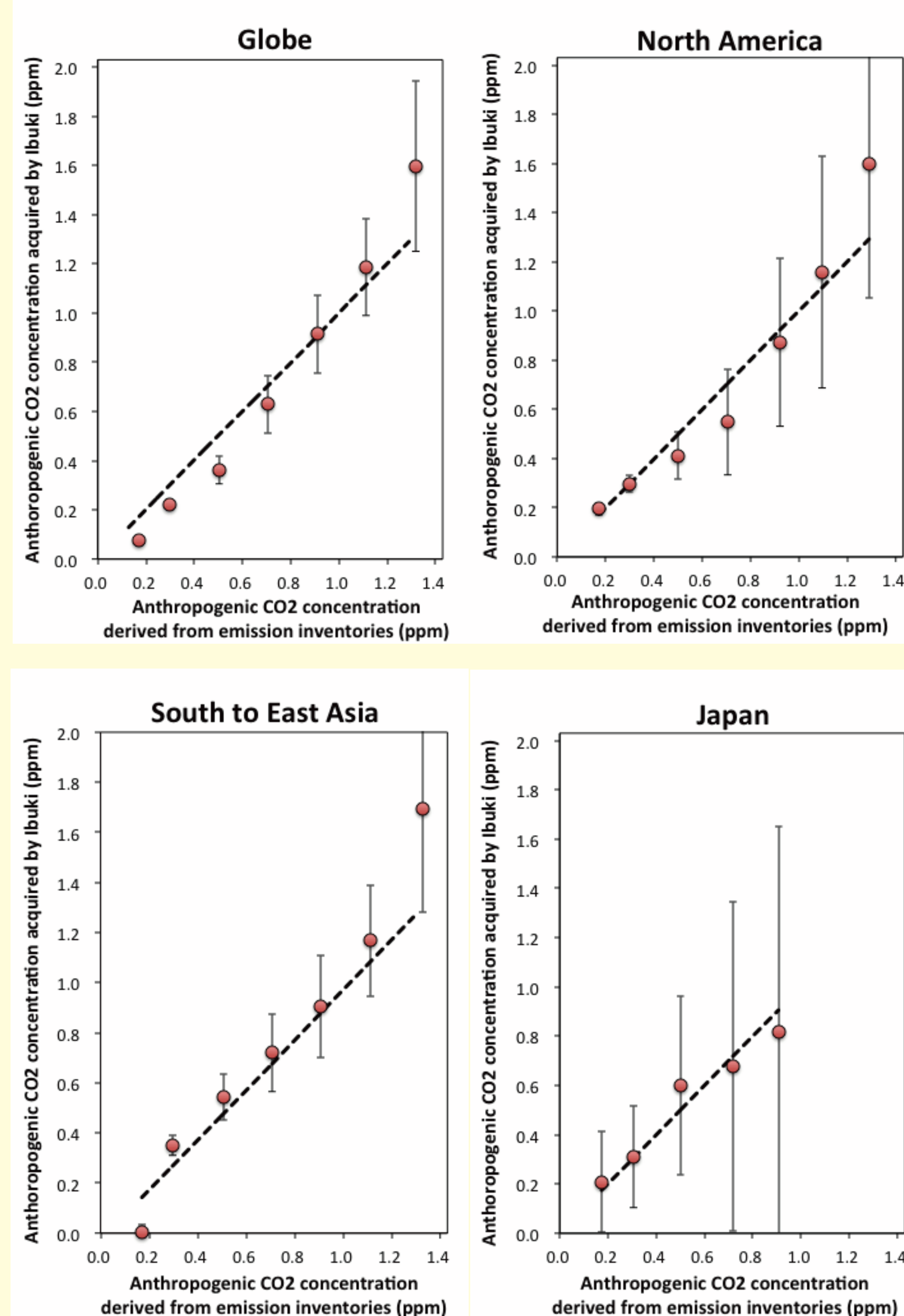


The whole-atmosphere mean CO₂ concentration was calculated based on GOSAT data, covering from the surface to the top of the atmosphere (70km above the surface), for almost 8 years after May 2009. Monthly mean CO₂ concentration reached 404.0 ppm in May 2016, and CO₂ trend* reached 400.2ppm in February 2016 (seasonal fluctuations subtracted).

* The values constituting the black line show the average of 1 – 2 years.

GOSAT data agree with the estimations using data on fossil fuel emissions (inventory)

Anthropogenic CO₂ concentrations in mega-cities including the metropolitan area in Tokyo were analyzed for the five and half years from June 2009 to December 2014, based on the observational data acquired by GOSAT. It was found that the anthropogenic CO₂ concentrations estimated from GOSAT data generally agree with those estimated using data on fossil fuel emissions (inventory) in Japan. These results can be shared as notable emerging scientific findings since it indicates that



satellite observations can become a useful monitoring and verification tool for CO₂ emission inventories that were aggregated and published by all nations.