

# **Tan<sub>2</sub>Sat**: the next generation of Chinese greenhouse gas monitoring satellite mission

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# Global Stocktake and MVS



## PARIS AGREEMENT

### Article 14

1. The Conference of the Parties serving as the meeting of the Parties to this Agreement shall periodically take stock of the implementation of this Agreement to assess the collective progress towards achieving the purpose of this Agreement and its long-term goals (referred to as the "global stocktake"). It shall do so in a comprehensive and facilitative manner, considering mitigation, adaptation and the means of implementation and support, and in the light of equity and the best available science.

2. The Conference of the Parties serving as the meeting of the Parties to this Agreement shall undertake its first global stocktake in 2023 and every five years thereafter unless otherwise decided by the Conference of the Parties serving as the meeting of the Parties to this Agreement.

3. The outcome of the global stocktake shall inform Parties in updating and enhancing, in a nationally determined manner, their actions and support in accordance with the relevant provisions of this Agreement, as well as in enhancing international cooperation for climate action.



## 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

6.10 Verification .....	6.9
6.10.1 Comparisons of national estimates .....	6.9
6.10.2 Comparisons with atmospheric measurements.....	6.11



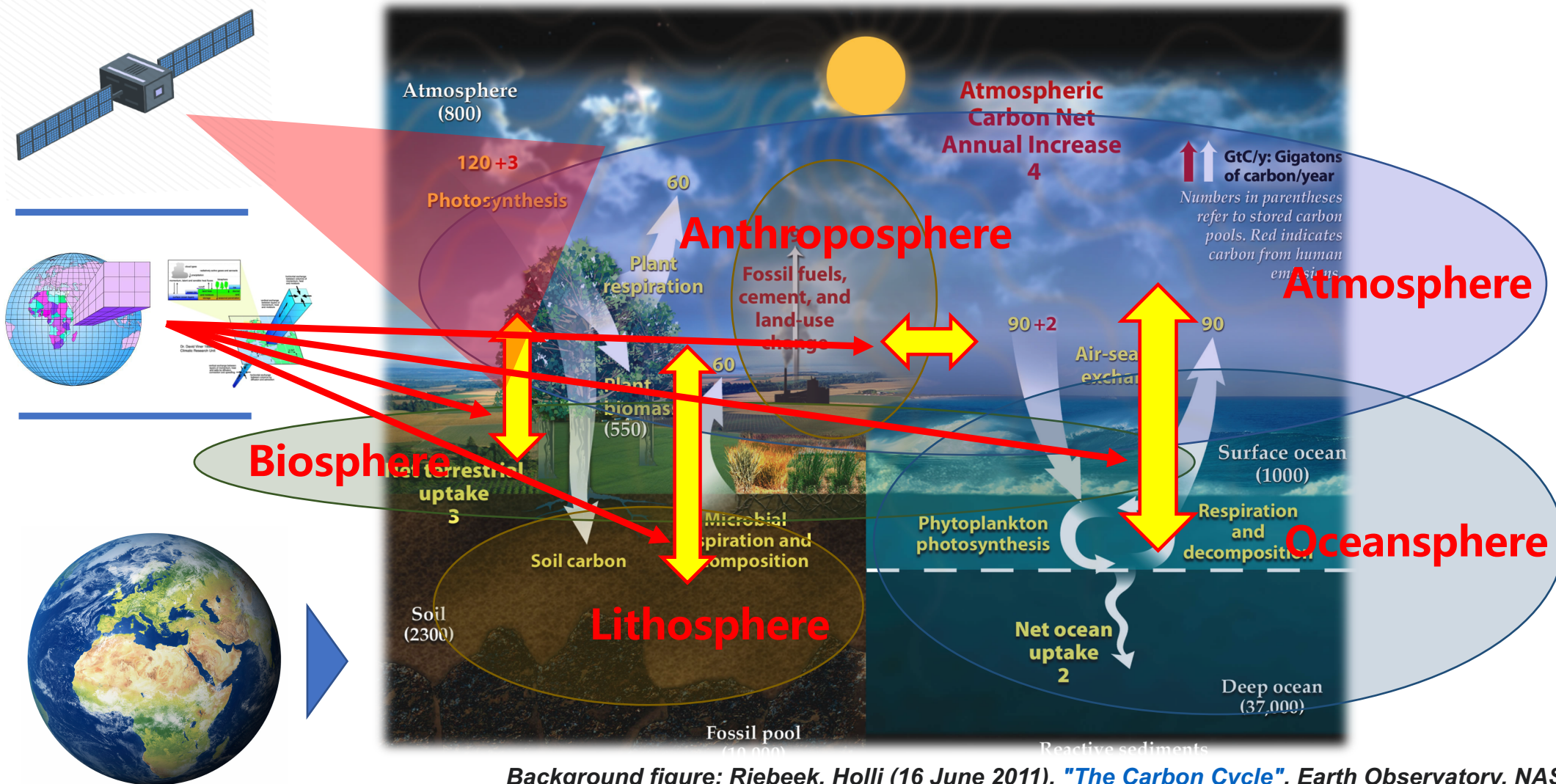
UNITED NATIONS  
2015

# China pledges carbon neutrality by 2060



China aim to have CO<sub>2</sub> emissions peak before 2030 and achieve carbon neutrality by 2060. We call on all countries to pursue innovative, coordinated, green and open development for all

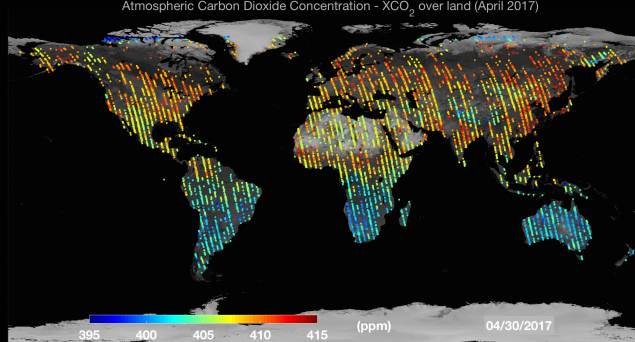
# Satellite contribution on global carbon monitoring



Background figure: Riebeek, Holli (16 June 2011). ["The Carbon Cycle"](#). Earth Observatory. NASA

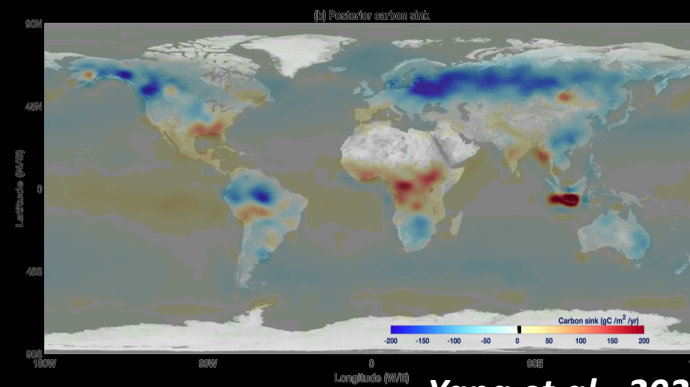
## Global CO2 map and data

Chinese Carbon Dioxide Observation Satellite - TanSat  
Atmospheric Carbon Dioxide Concentration - XCO<sub>2</sub> over land (April 2017)



*Yang et al., 2018*

## Global carbon flux map and data

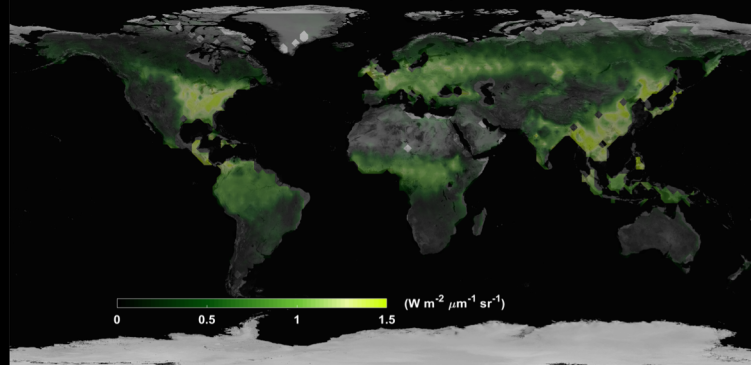


*Yang et al., 2021*

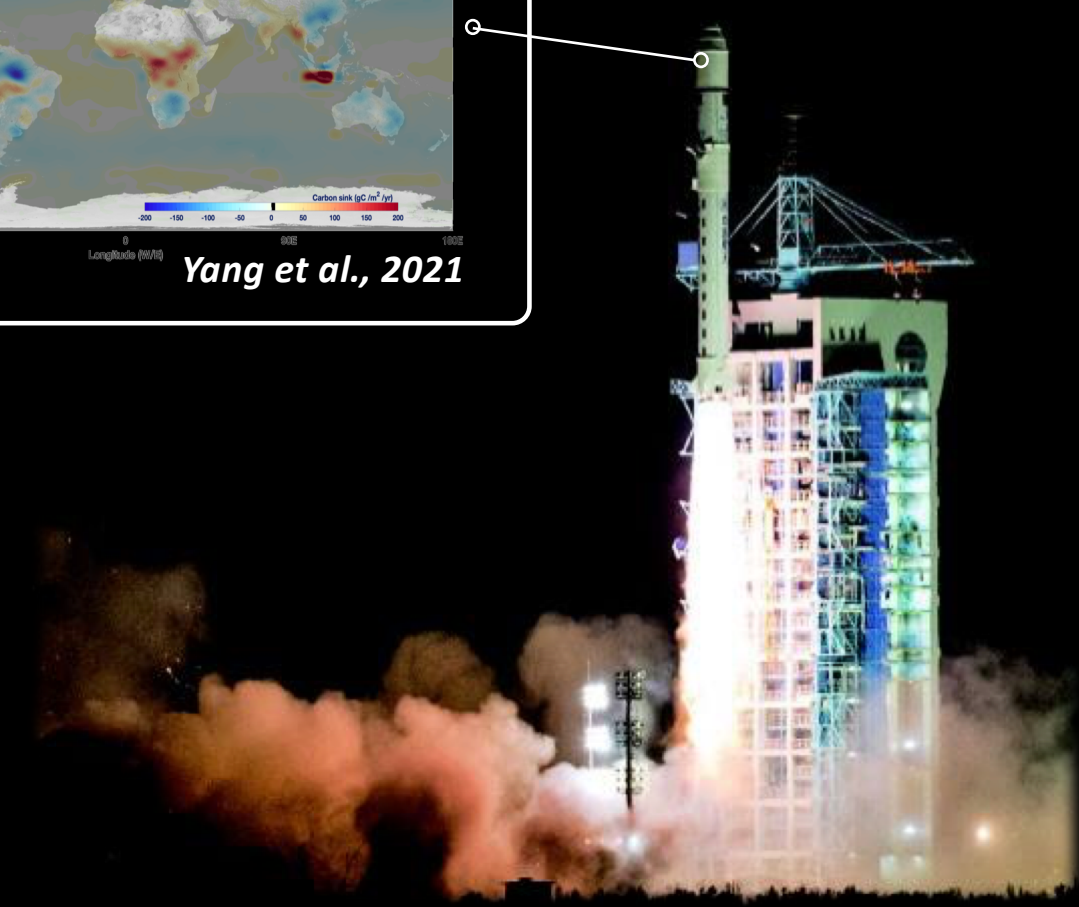


## Global SIF map and data

Chinese Carbon Dioxide Observation Satellite - TanSat  
Solar-Induced chlorophyll Fluorescence (JJA 2017)

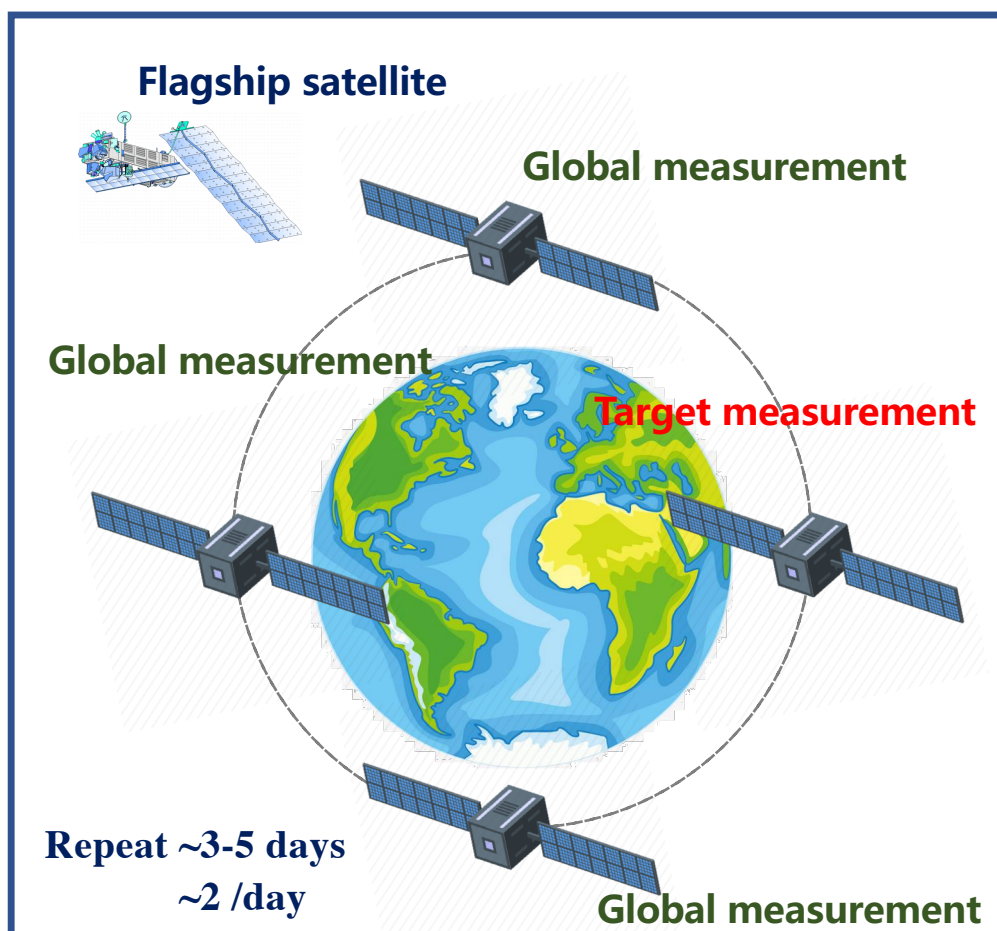


*Yao et al., 2020*

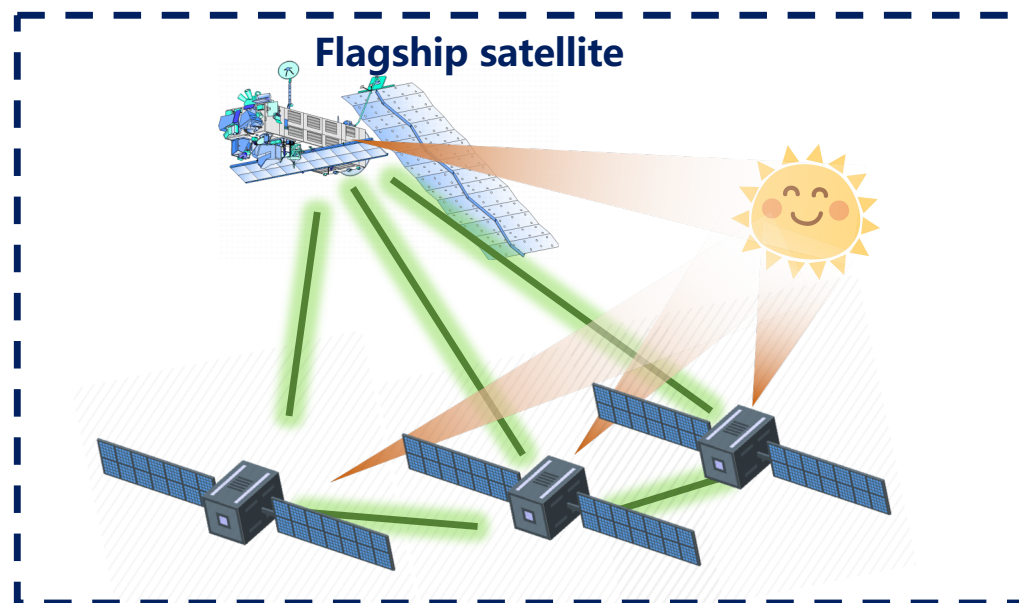


# The next generation TanSat concept

## Multi-mode measurement



## In-flight calibration

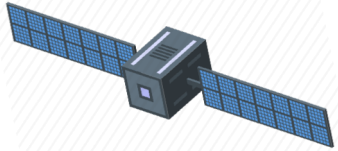


**(LR)<sup>2</sup>**

**Long live, Low risk, Revolution, ROI**

# Instrument capability

## TanSat-2 Compound eye unit

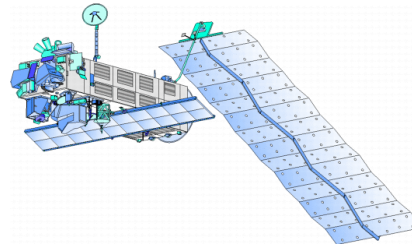


- NIR/SWIR: 0.76, 1.24, 1.6, 2.3  $\mu\text{m}$  band with hyperspectral measurement
- UV & visible: 0.4  $\mu\text{m}$  band for  $\text{NO}_2$  measurement
- Aerosol instrument: Multiple angles polarization measurement
- Inter-satellite calibration: whole spectrum calibration capability

$\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{NO}_2$  and  $\text{CO}$

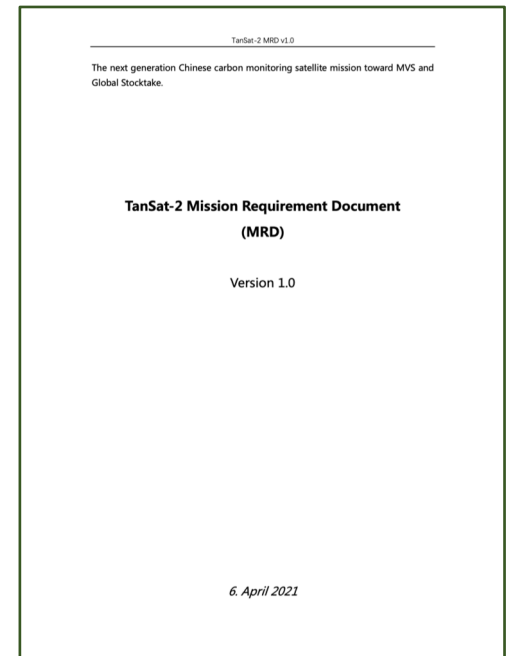
- NIR/SWIR, UV & visible and aerosol : super measurement capability
- Active measurement:  $\text{CO}_2$  lidar system
- Inter-satellite calibration: whole spectrum calibration capability

## TanSat-2 flagship unit



TBD

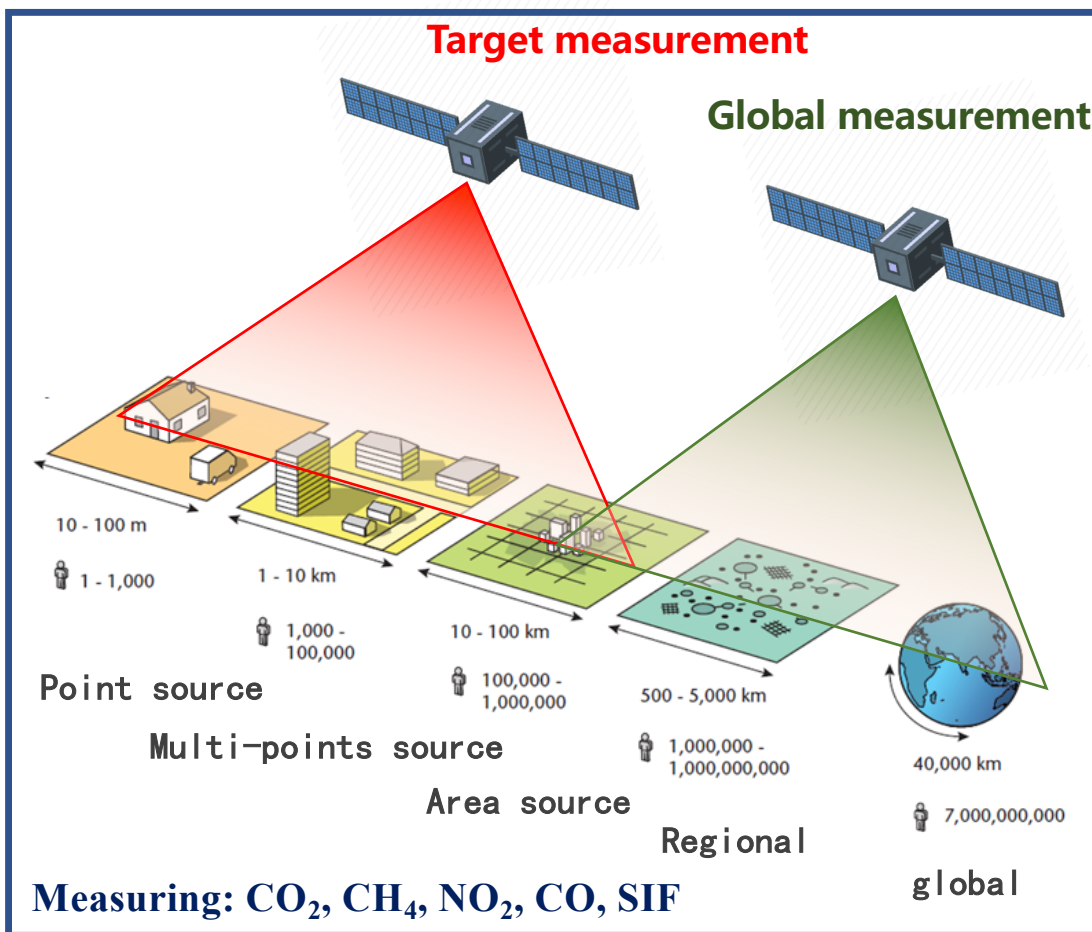
The Compound eye unit and flagship unit composite to the whole system, but the Compound eye unit will be weak dependent on flagship unit in-flight



*We use Envisat ico: in memory of ghg swir path finder SCIAMACHY*

# The next generation TanSat concept

## Multi-scale measurement



## Multi-sate target measurement

Multi-satellite flight in target measurement in different orbit to monitoring city and point source in a day

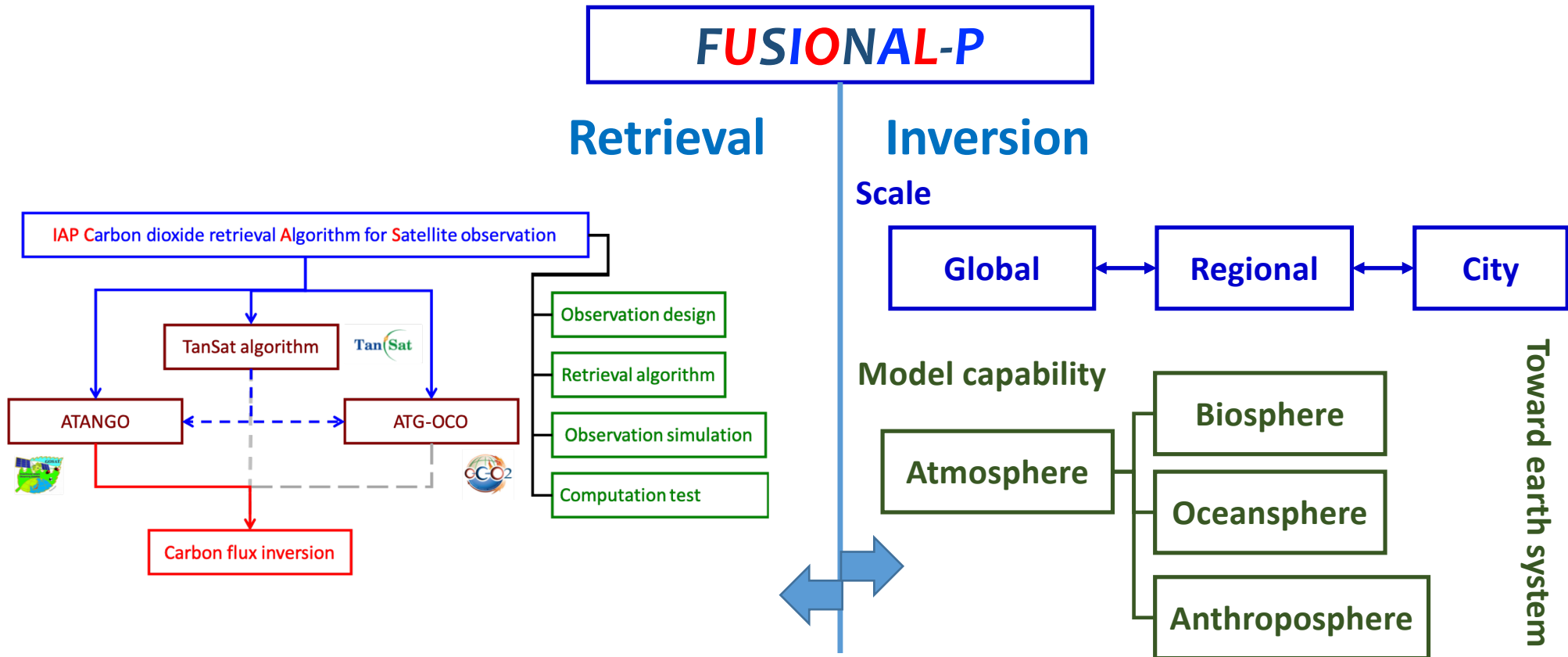




# Retrieval and inversion system

Flexible and Unified Spectral InversiON ALgorithm Platform - *FUSIONAL-P*

Toward next-generation greenhouse gas measurement from space and retrieval algorithm design, we developed FUSIONALP which is a new framework to managing modules of a forward model and inverse method in order to allow fast and effective development and implementation of a new retrieval strategy and algorithm.



# Tan<sub>2</sub>Sat: Open platform to international

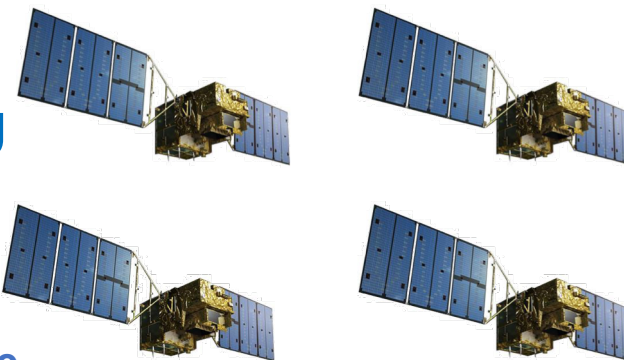
China government funding



Local government funding

Private funding

International funding



Satellite



Researches



Applications

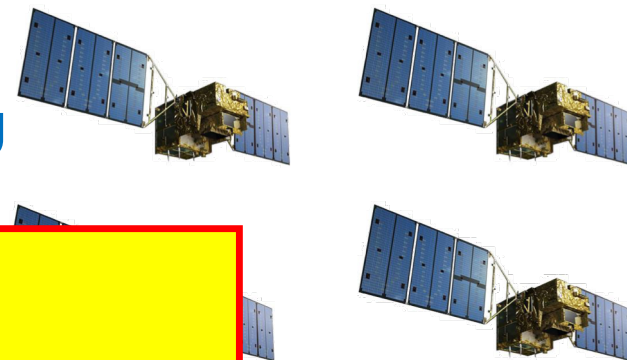
# Tan<sub>2</sub>Sat: Open platform to international

China government funding

Local government funding

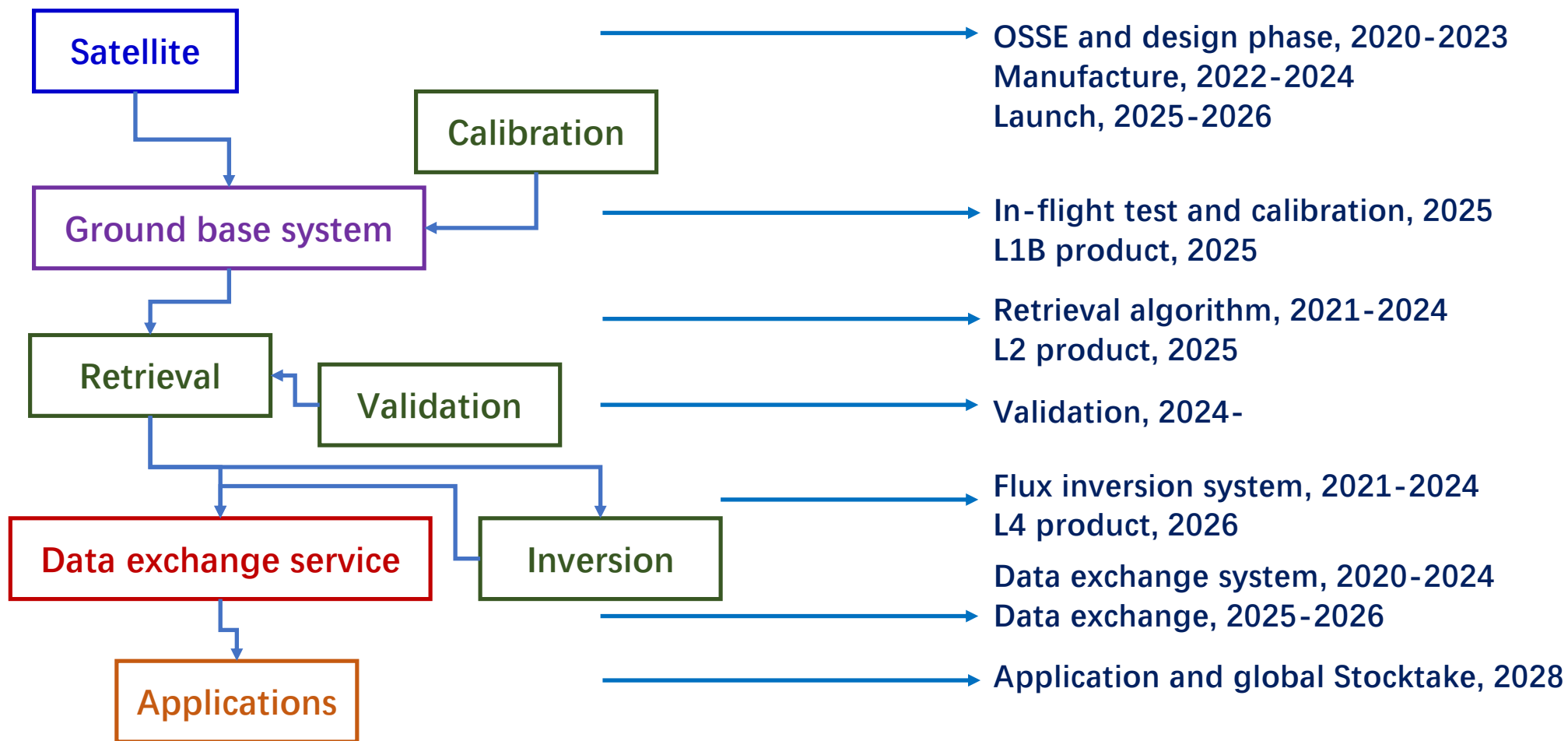
TanSat  
neutral  
next generation  
Tan<sub>2</sub>Sat

International funding



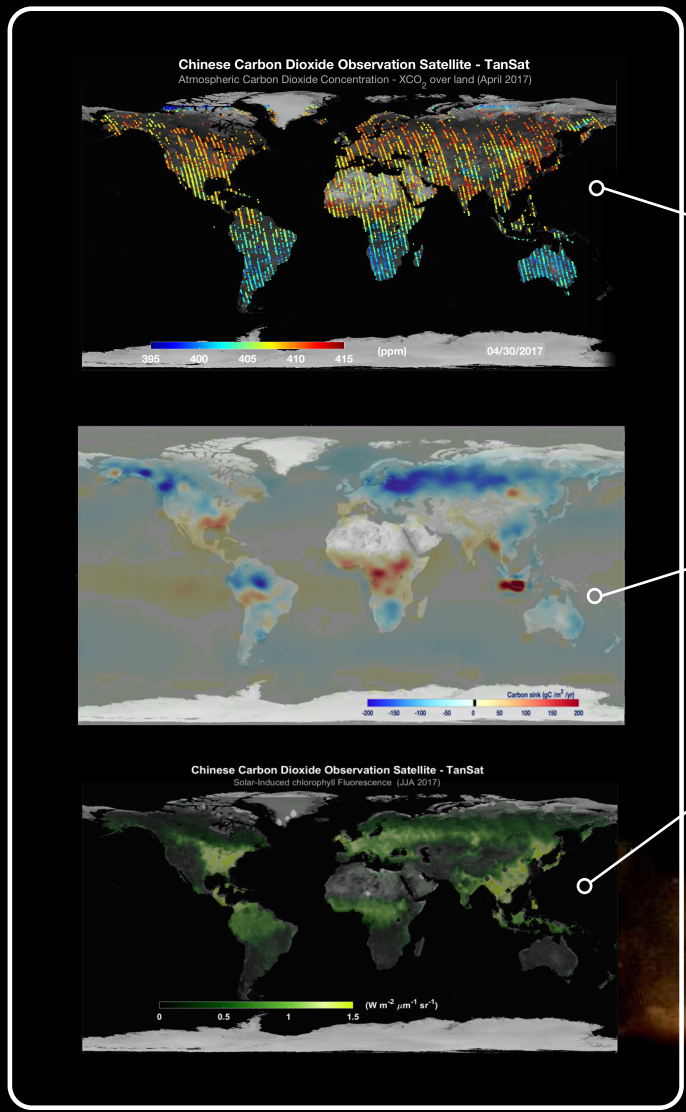
Applications

# The mission system and route map





**Thank you!**



**22 Dec. 2016**

