



**ESA-MOST Dragon Cooperation**

中国科技部-欧洲空间局“龙计划”合作

# 2017 DRAGON 4 SYMPOSIUM

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# The Atmospheric Carbon Dioxide measurement over China from space

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Name	Characters
Orbit type	sun-synchronous
Altitude	705 km
Inclination	98°
Local time	13:30 $\pm$ 30min
Weight	500Kg

**Nadir mode**- Observation over land

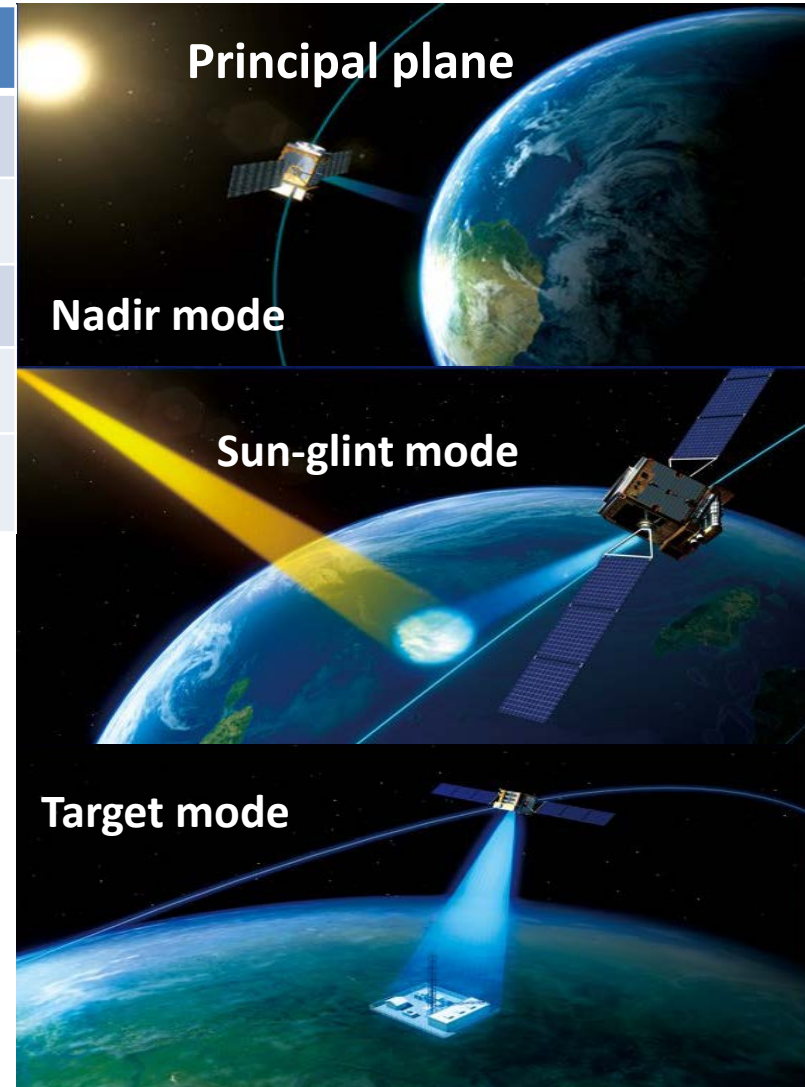
- Push broom
- Principle plane track

**Sun-glint mode**- Observation over ocean

- Sun glint track
- Principle plane track

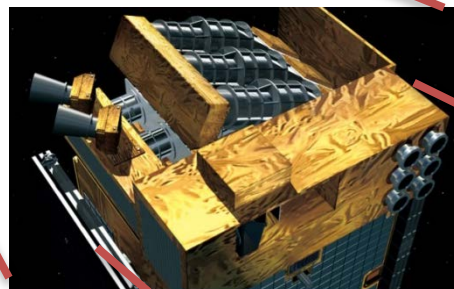
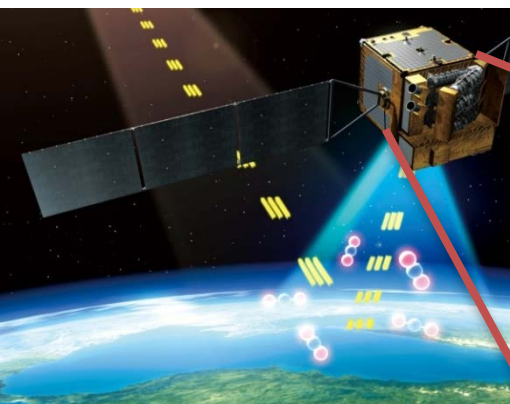
**Target mode**- Validation

- Surface target track
- Multi angles for one target





# Instrument onboard TanSat



## Carbon Dioxide Sensor

- 0.76  $\mu\text{m}$ , O<sub>2</sub> A-band
- 1.61 and 2.06  $\mu\text{m}$ , CO<sub>2</sub> bands

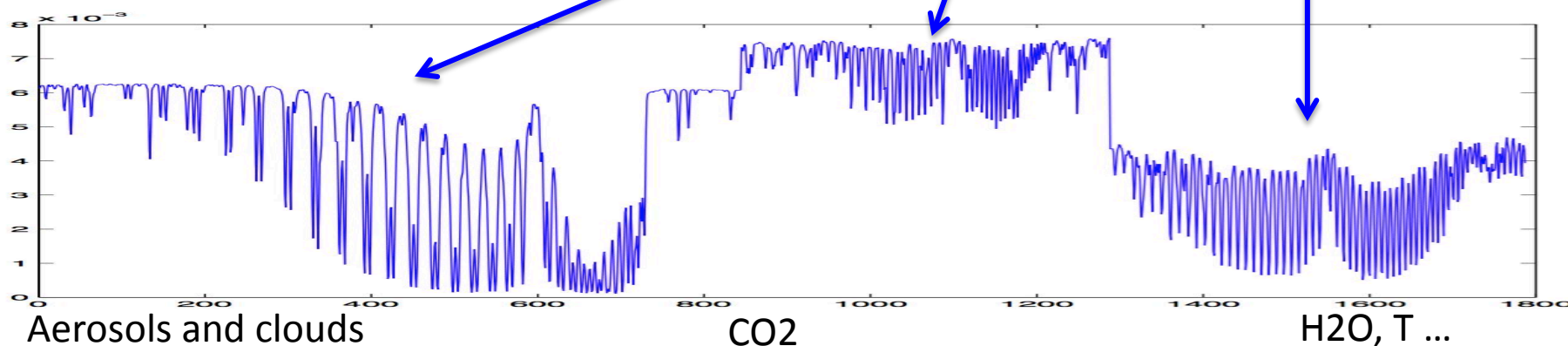
## Cloud and Aerosol Polarization Imager - CAPI

- A wide field of view moderate resolution imaging spectrometer with polarization channel
- Ultraviolet: 0.38 $\mu\text{m}$
- Visible: 0.67 $\mu\text{m}$
- Near infrared: 0.87, 1.375 and 1.64 $\mu\text{m}$
- **Polarization: 0.67 & 1.64  $\mu\text{m}$**



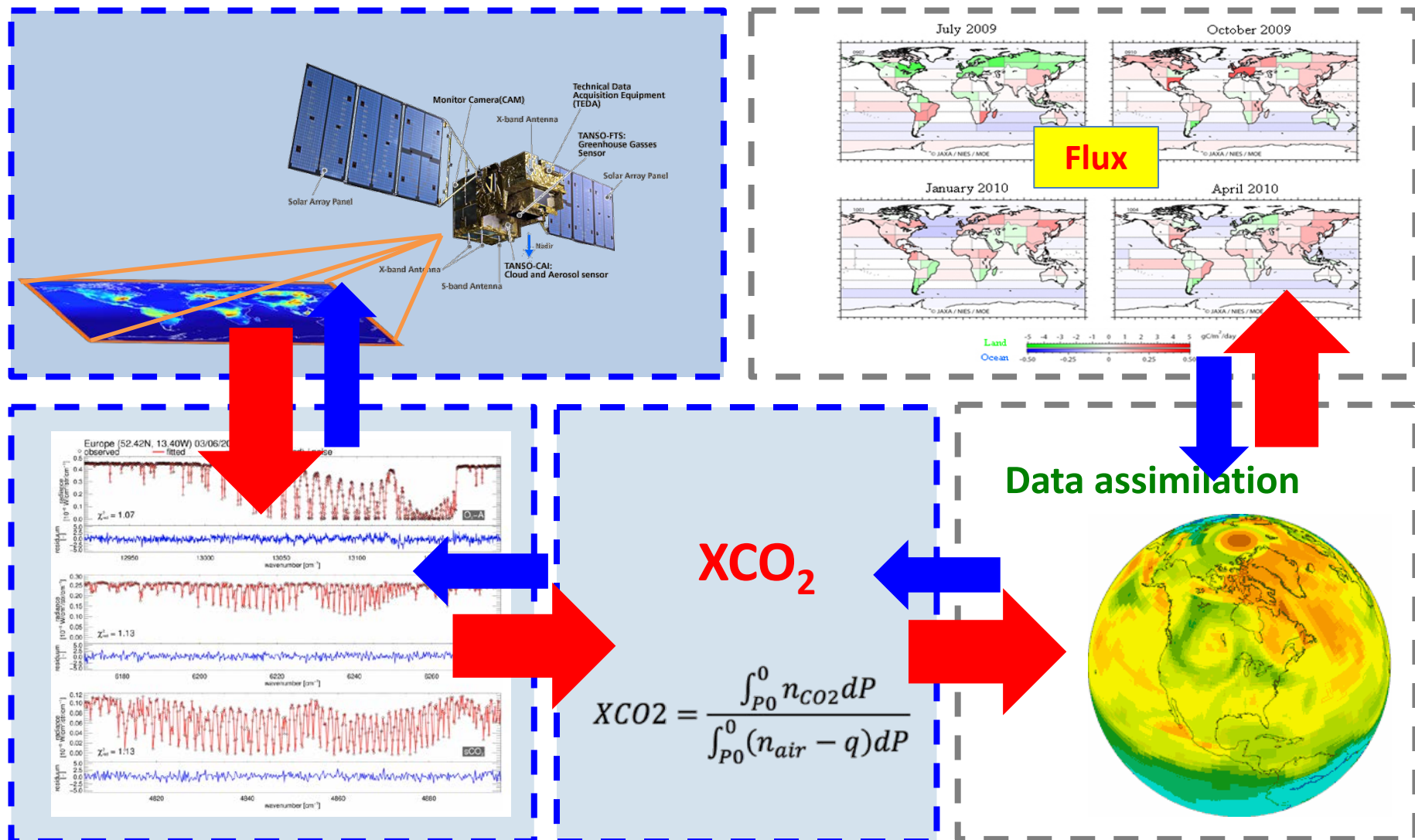


	O <sub>2</sub> A	CO <sub>2</sub> W	CO <sub>2</sub> S
Spectral coverage (nm)	758-778	1594-1624	2042-2082
Resolution mean (nm)	0.04	0.13	0.17
SNR	360	250	180

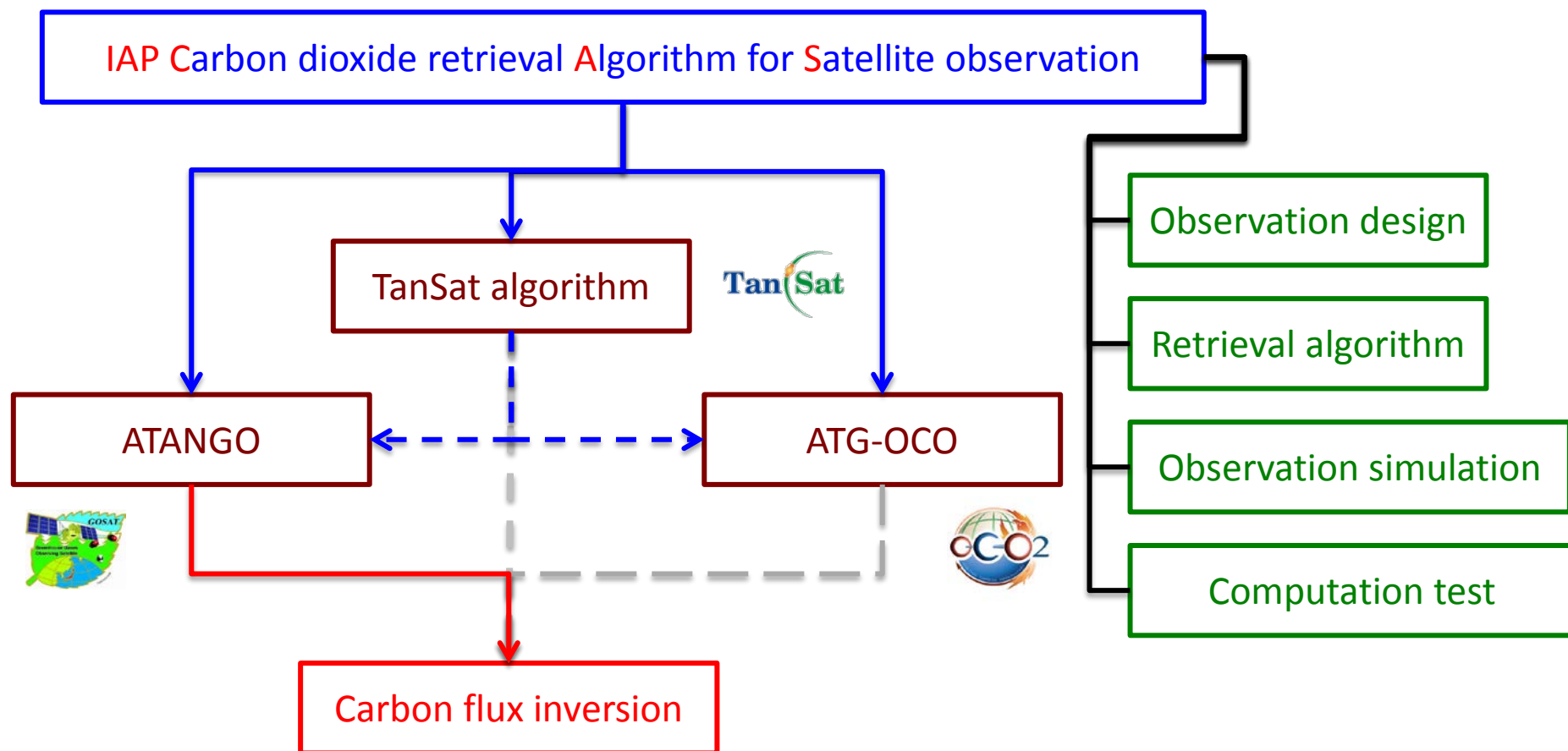




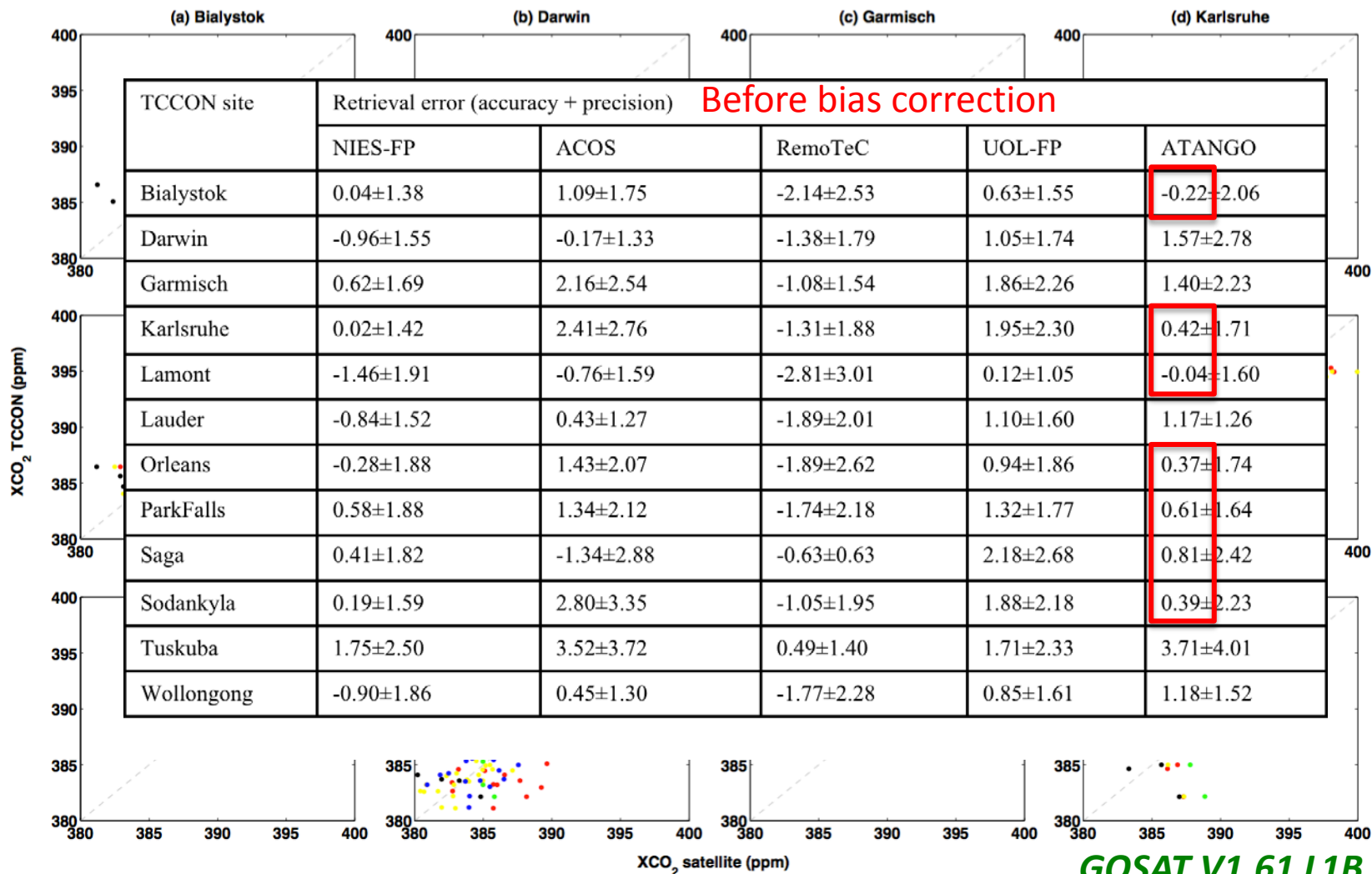
# Carbon monitoring from space: concept



# The Retrieval algorithm

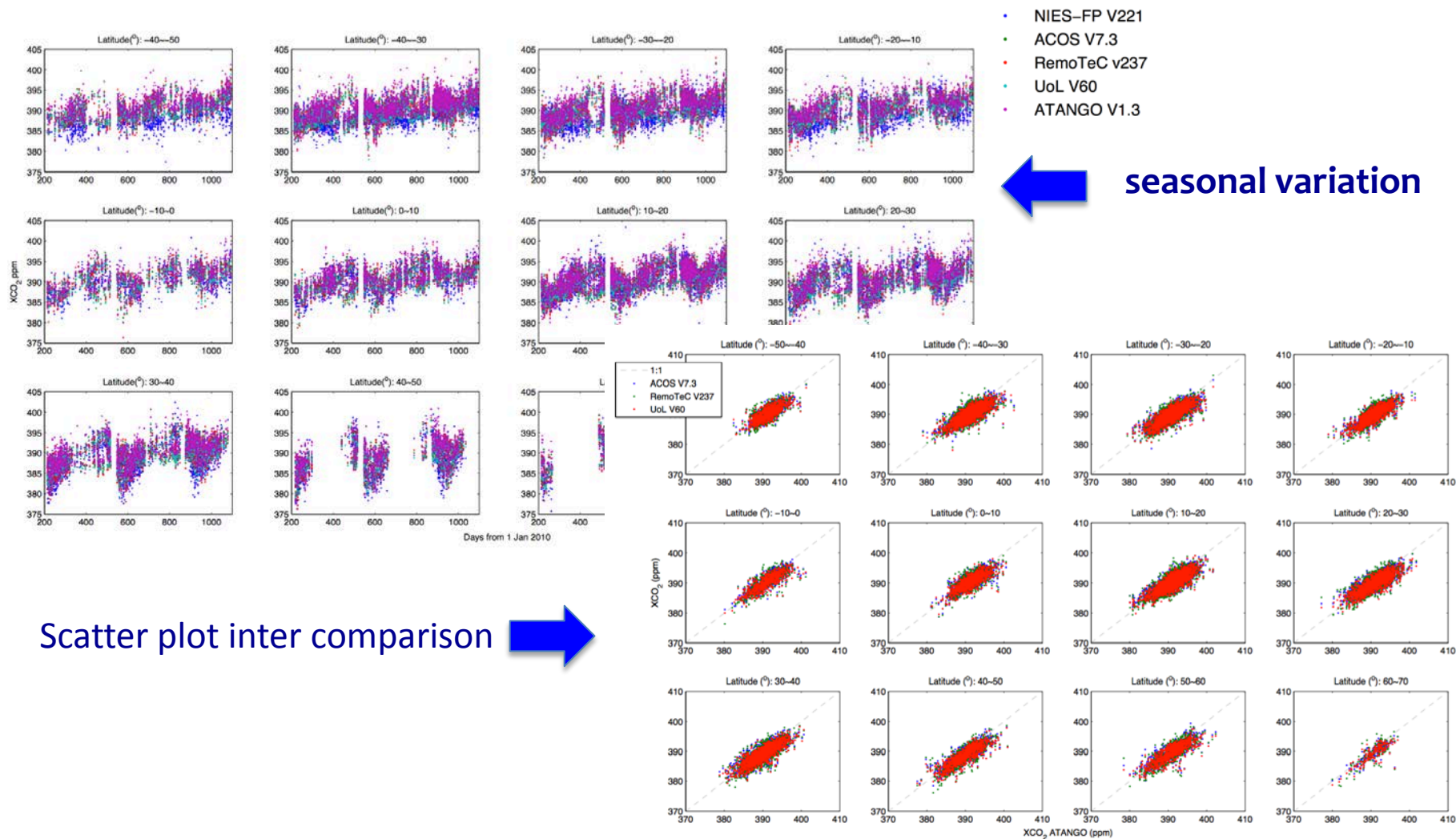


# Inter comparison: GOSAT retrieval

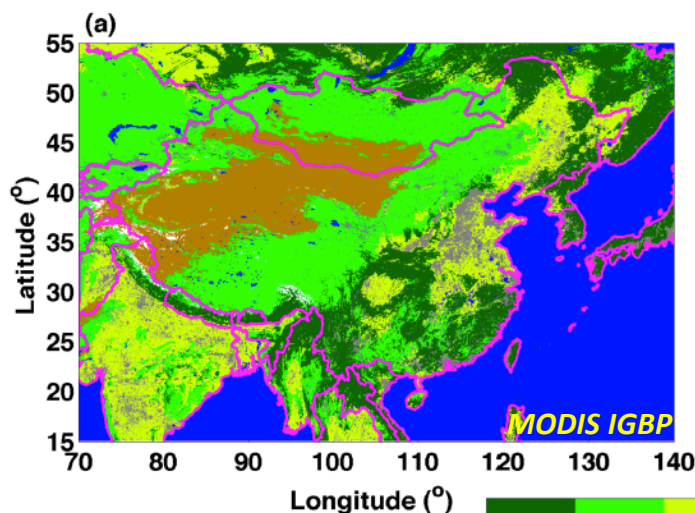




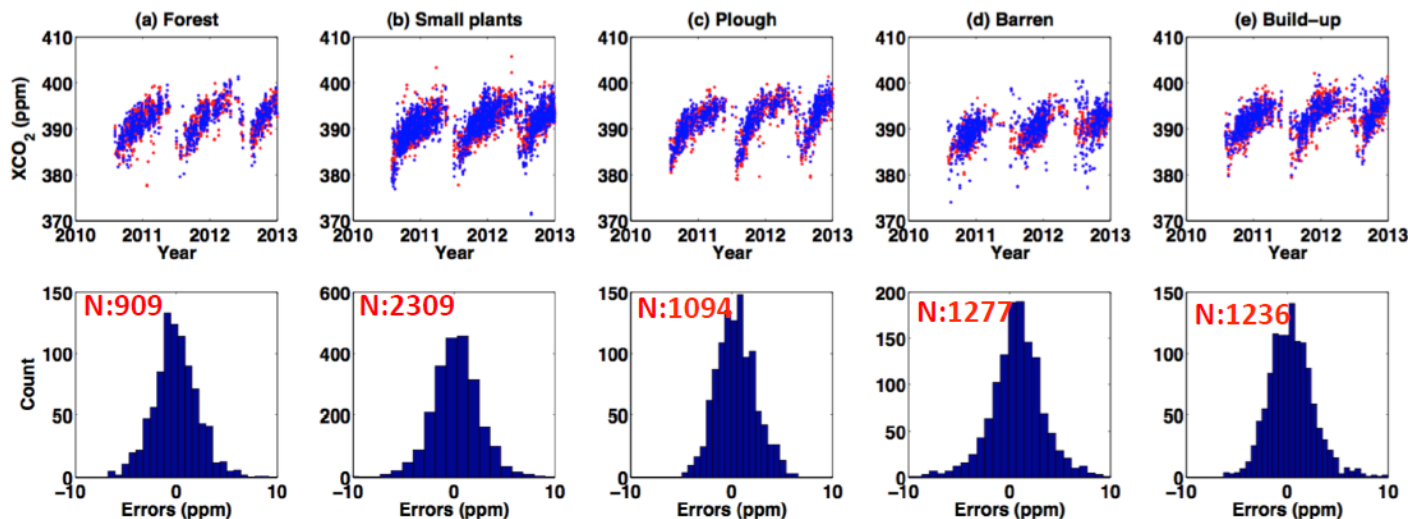
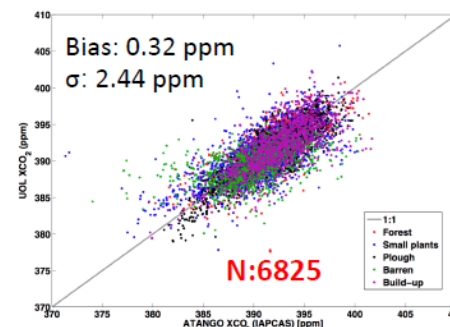
# Inter comparison: GOSAT retrieval



# Inter comparison: GOSAT retrieval – land cover



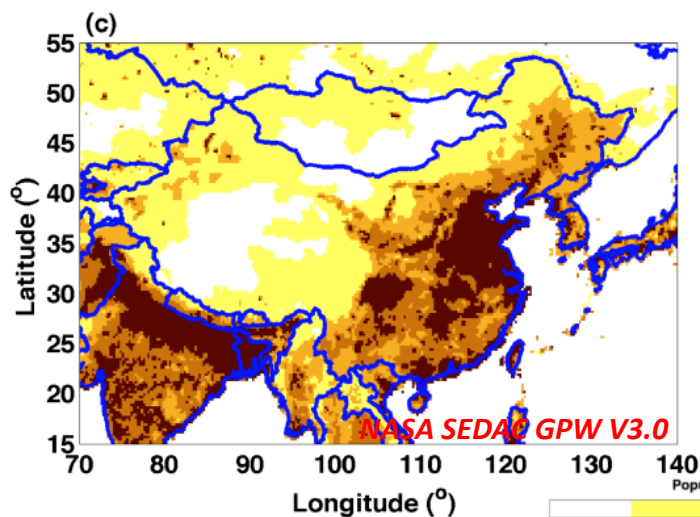
## The inter-comparison study land cover classification



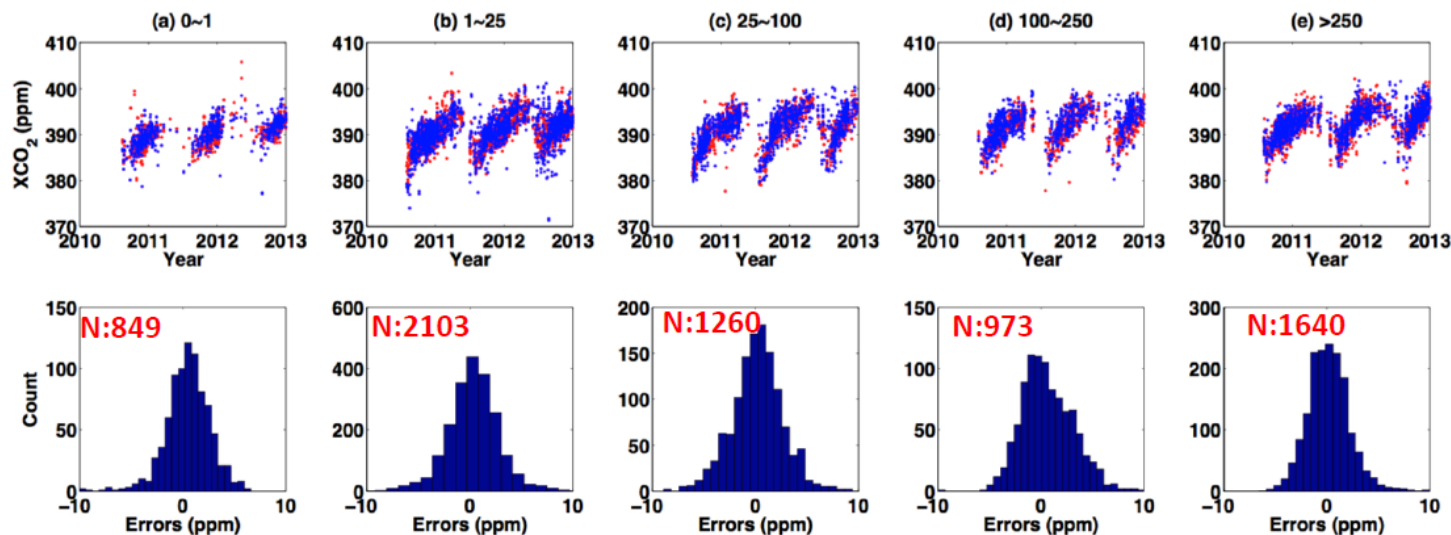
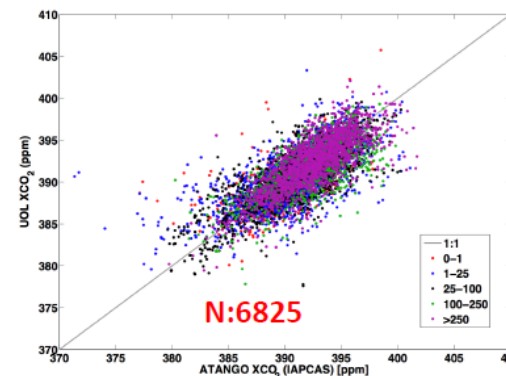
Inter comparison with UoL V60



# Inter comparison: GOSAT retrieval – population



## The inter-comparison study Population classification



Inter comparison with UoL V60

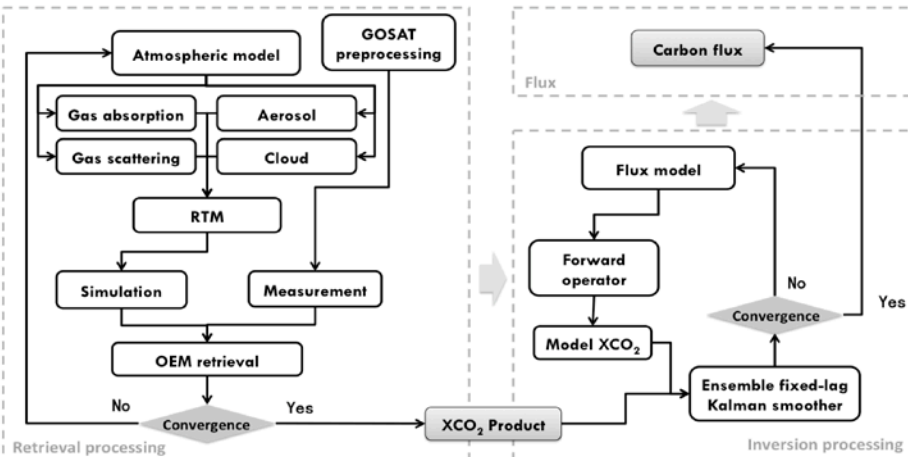
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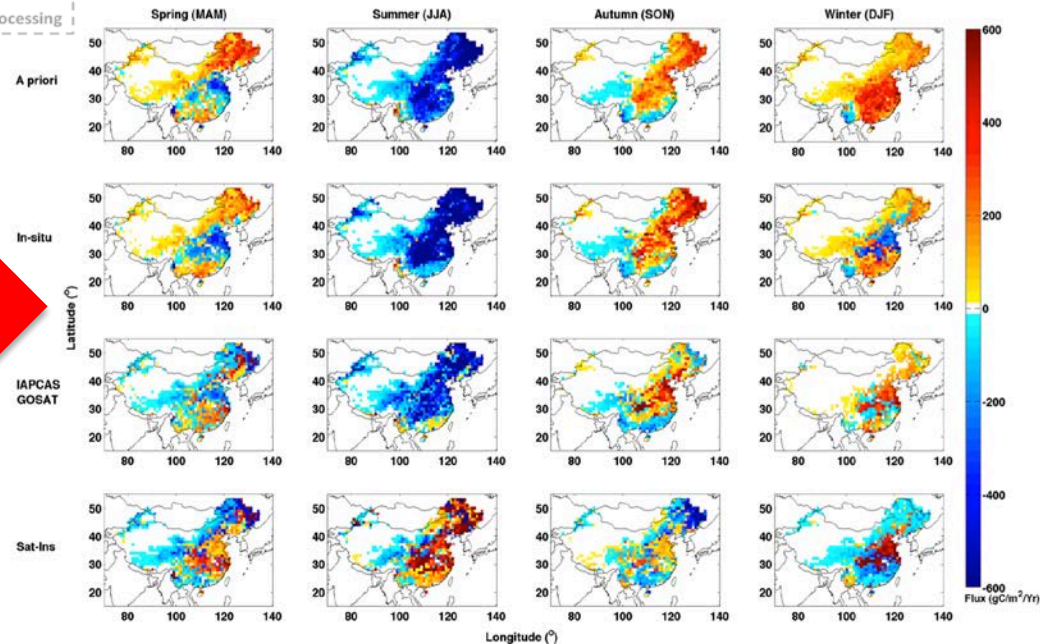
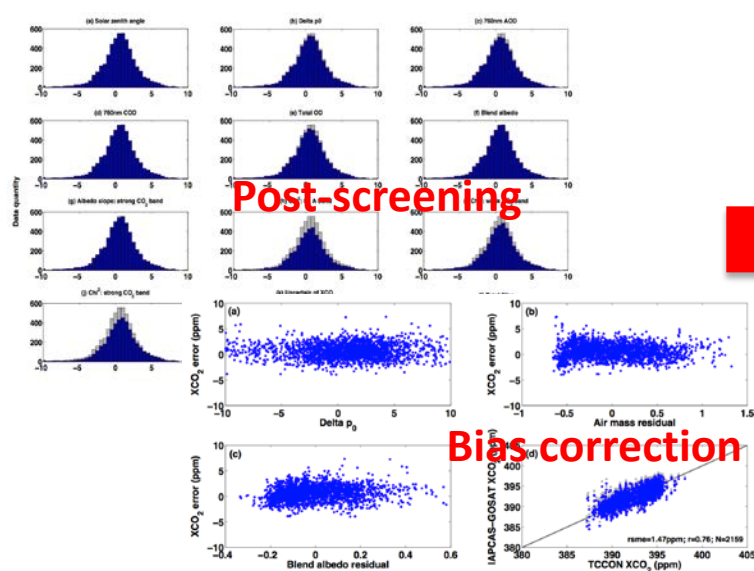
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# Application ATANGO retrieval in Carbon flux inversion

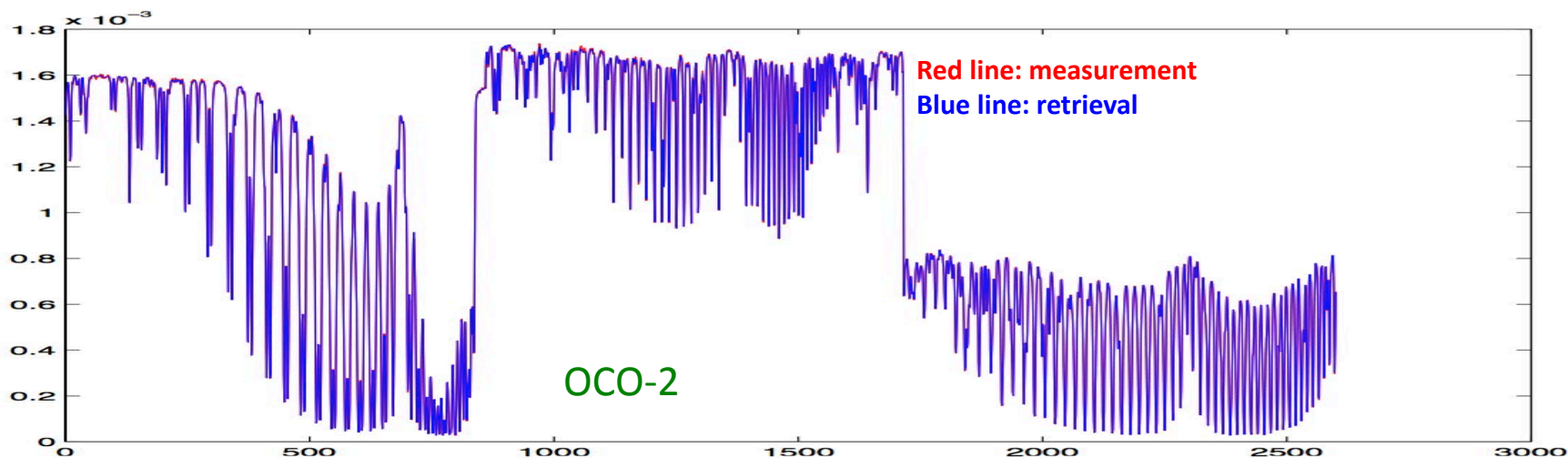
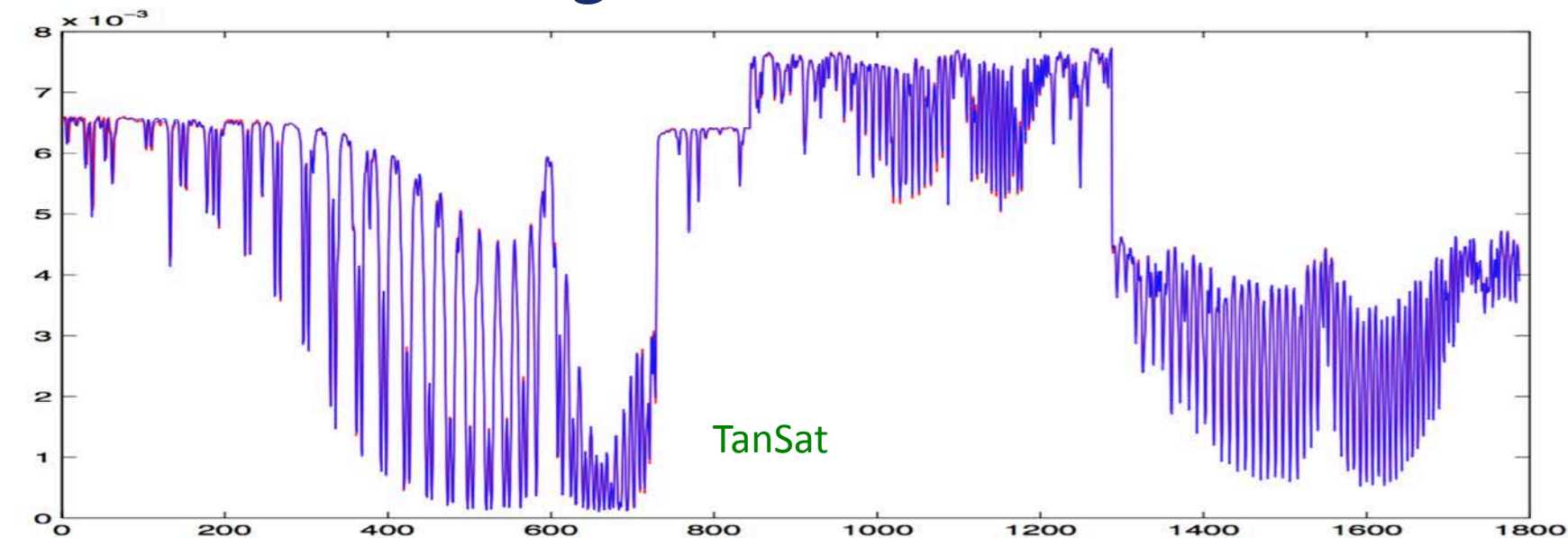


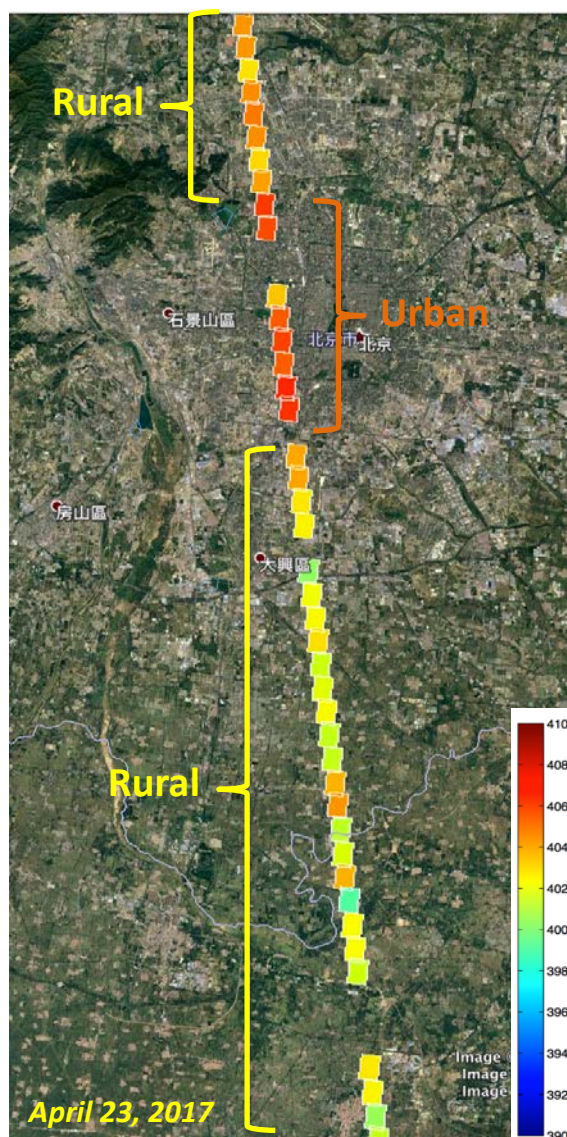
Simulation	CO <sub>2</sub> flux			Flux uncertainties		
	Prior flux (Pg C yr <sup>-1</sup> )	Post. flux (Pg C yr <sup>-1</sup> )	flux difference (Pg C yr <sup>-1</sup> )	Prior error (Pg C yr <sup>-1</sup> )	Post-error (Pg C yr <sup>-1</sup> )	Error reduction* Relative (%)
n-situ-only	-0.05	-0.51	0.46	0.49	0.38	22%
CAS-GOSAT	-0.05	-0.34	0.29	0.49	0.08	84%



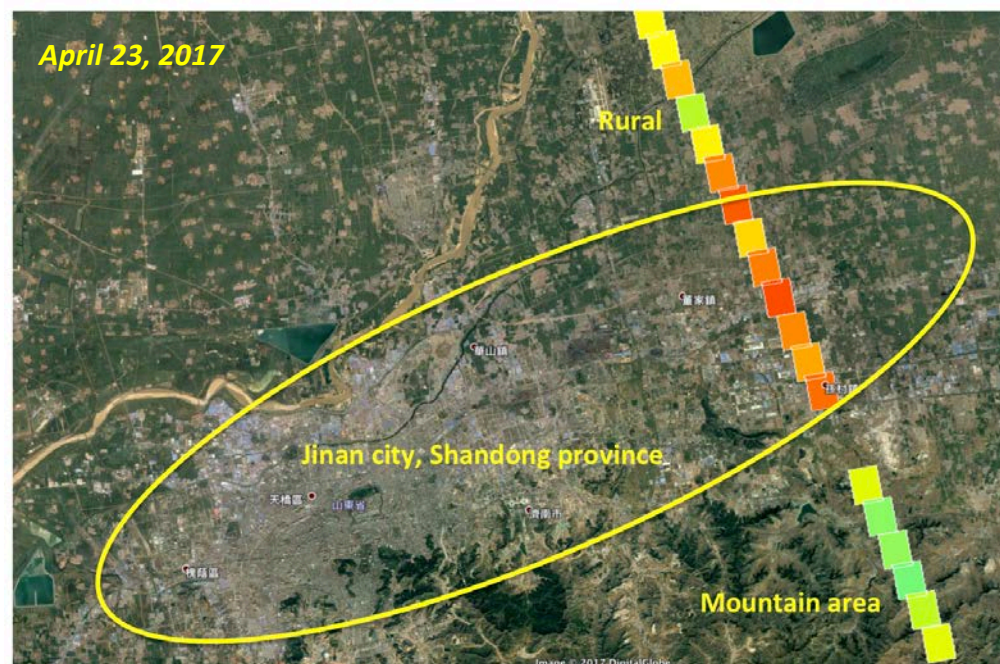


# Fitting residual of TanSat





## Preliminary result on TanSat retrieval





## Summary

- The algorithm that developed from IAPCAS platform has start to retrieve OCO-2 and TanSat measurement;
- The inter-comparison studied between ATANGO and UoL, NIES-FP, ACOS and RemoTeC indicate the consistent results on all algorithm;
- TanSat preliminary retrieval has been studied and more retrieval work will be started in future.

### *Acknowledgements*

*We would like to thank GOSAT and OCO-2 program and TCCON for providing the observation data.*

Thank You!