Aerosol Assimilation/Forecasting in Japan

I want to answer the guidance through talking about the current status and future plans of our system

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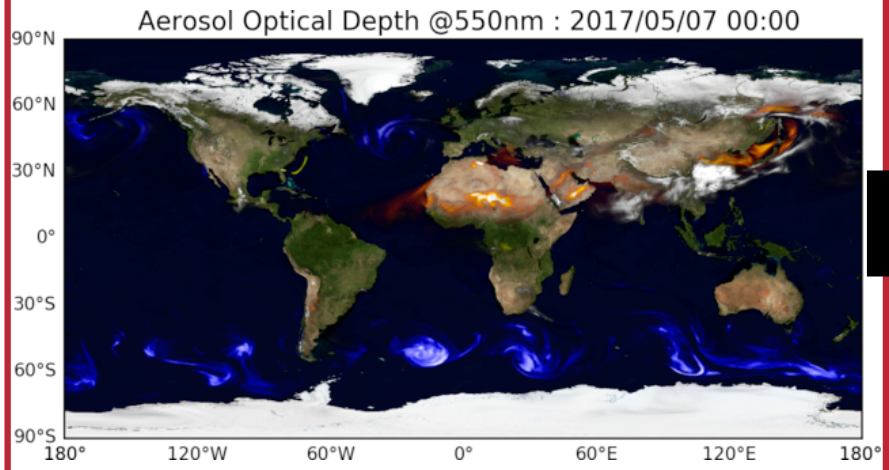
Aerosol Assimilation/Forecasting system

[Pilot system]

(Dust, sea salt, BC, OC, sulfate)



New version of model and DA method
New observation data for DA

(Research use)

[JAXA Himawari monitor]

Monitoring and data archive

[ICAP* *International Cooperative for Aerosol Prediction**]**

Monitoring and inter-comparison

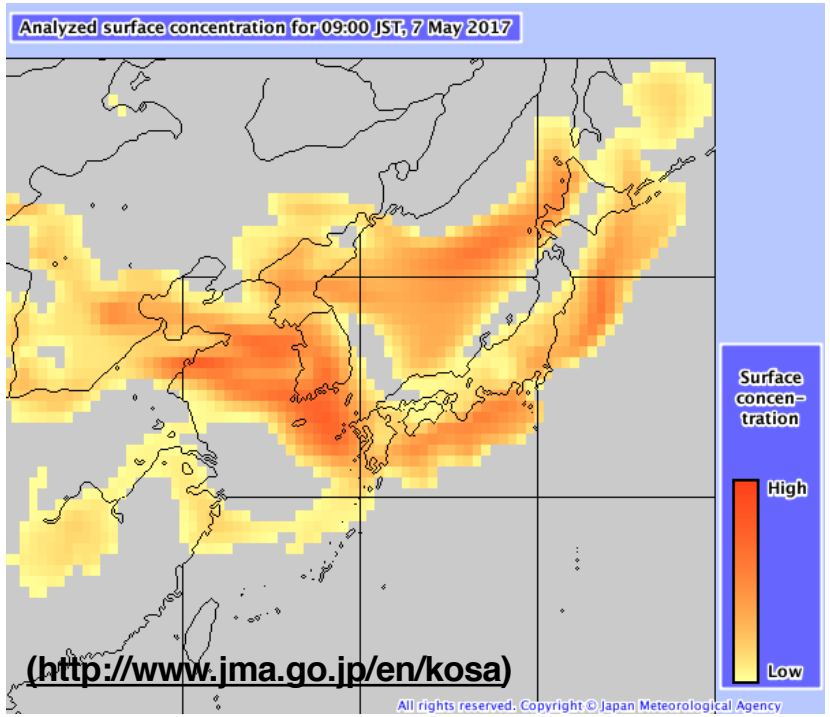
[JRAero]

Japanese Reanalysis for Aerosol

[Operational system]

(Asian dust only)

Asian aeolian dust prediction by JMA



(Public use)

[Aeolian dust advisory]

[WMO SDS-WAS Asian Node]

The prediction results are also provided for private weather services and local government via the Japan Meteorological Business Support Center (JMBSC) in GRIB2 format.

Aerosol DA system: Current status

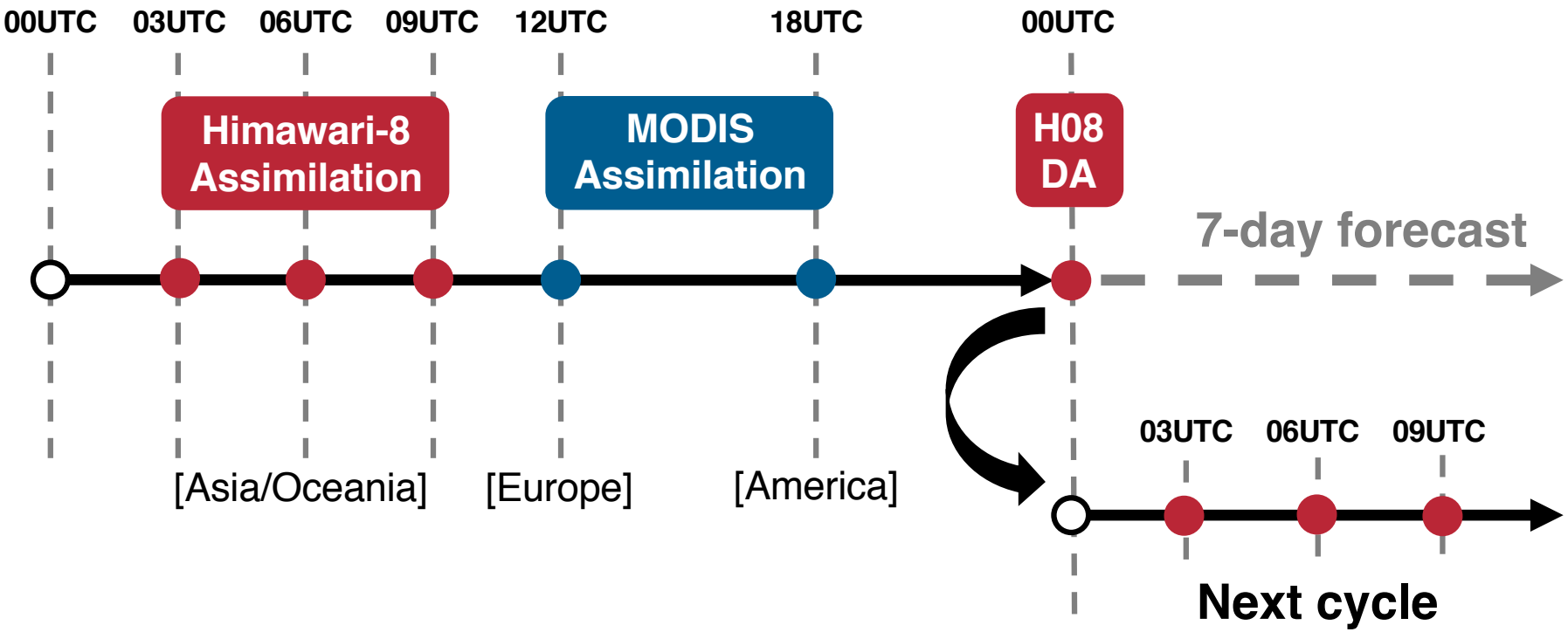
Himawari-8/MODIS AOD hybrid assimilation system

Model: **Global model (MASINGAR mk-2*)**

DA method: **2D-Var$**

DA data: **Himawari-8 AOD (JAXA), MODIS AOD (NASA)**

(Provided by LANCE-MODIS)

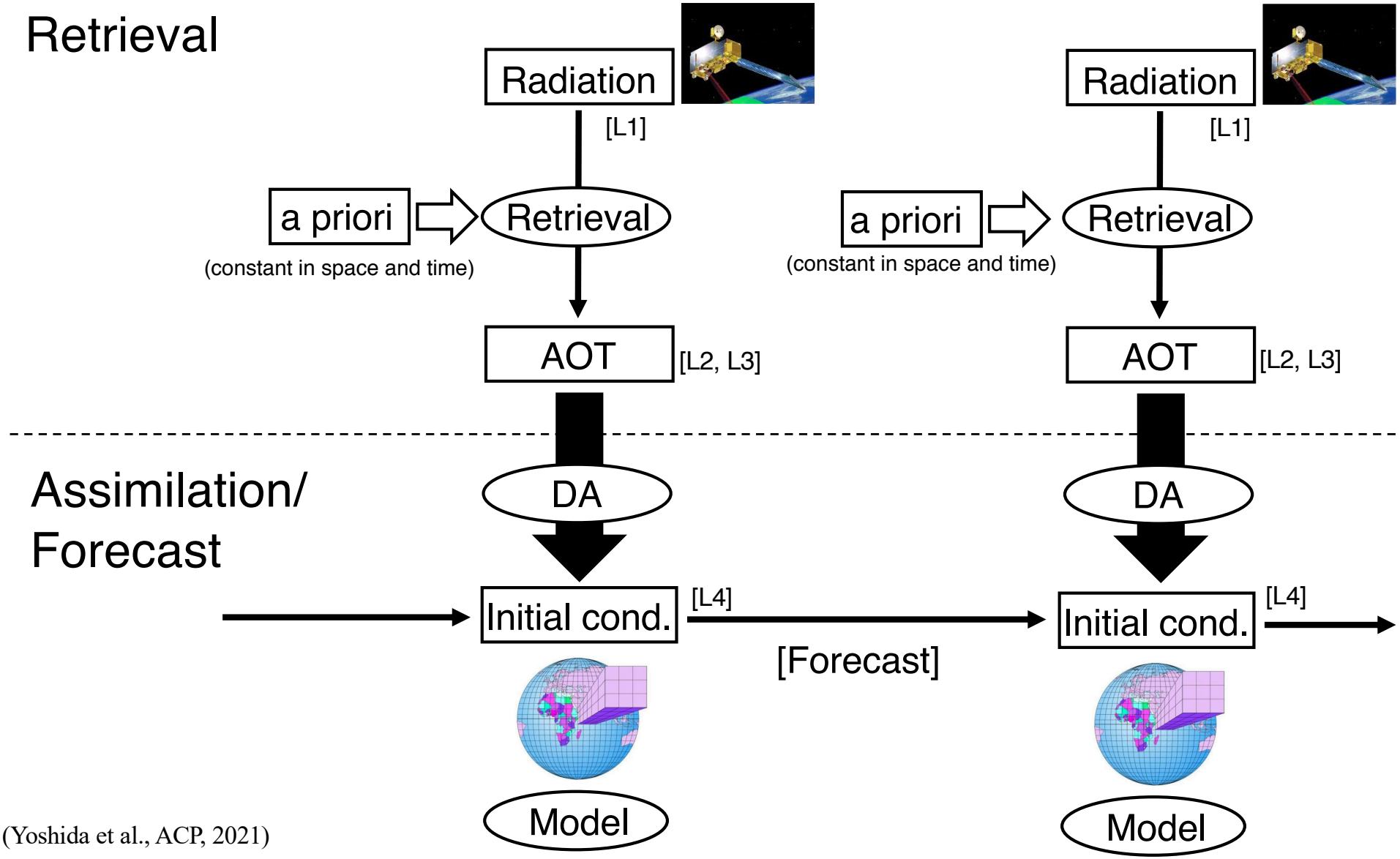


H08 AOD covers Asia/Oceania region **four times**.

MODIS AOD covers Europe/America regions where H08 cannot cover.

(*Tanaka et al., 2003, $Yumimoto et al., 2017)

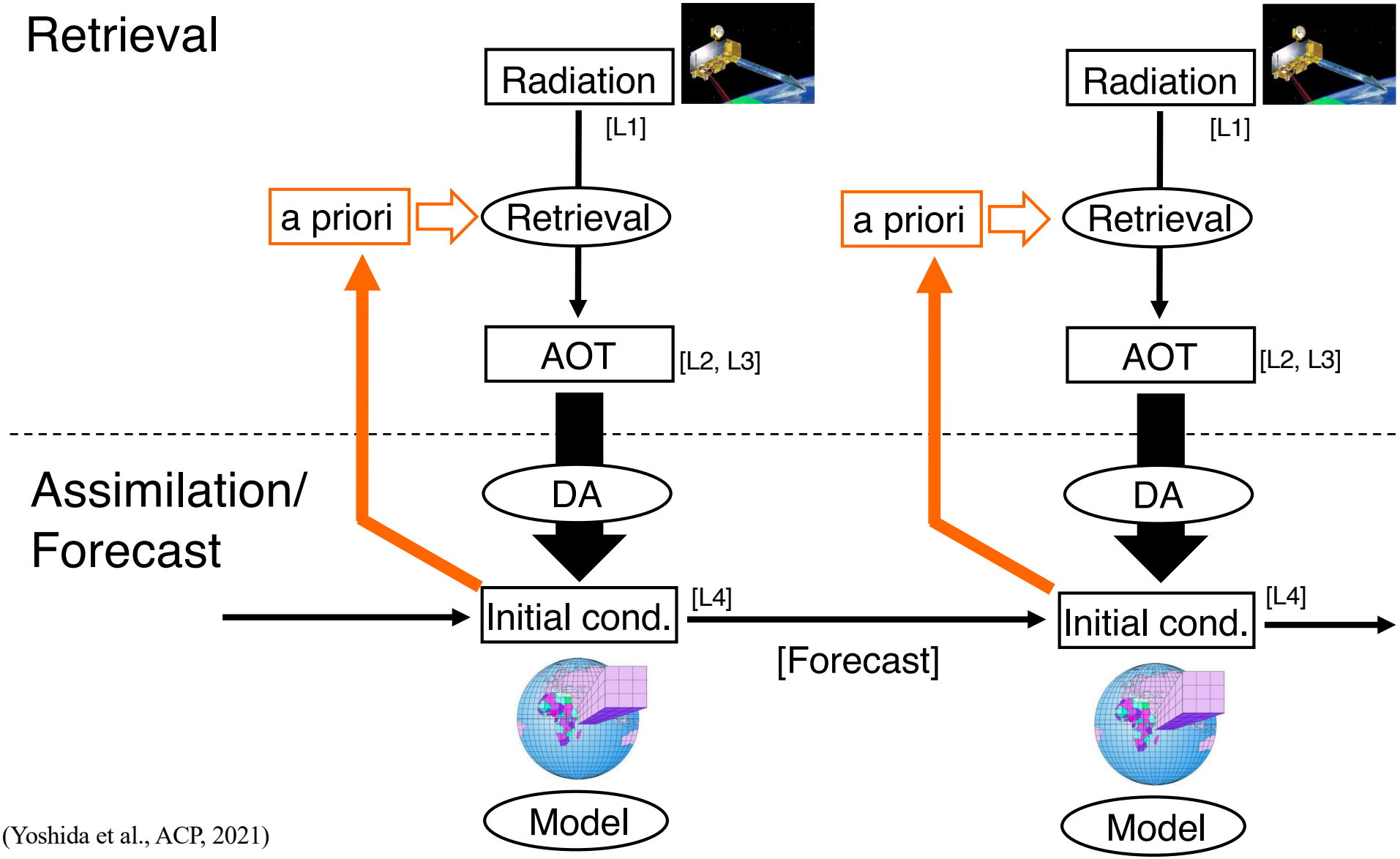
Unified system for retrieval, DA and FC (1)



(Yoshida et al., ACP, 2021)

"Retrieval" and "Assimilation" are completely separated in process.

Unified system for retrieval, DA and FC (2)

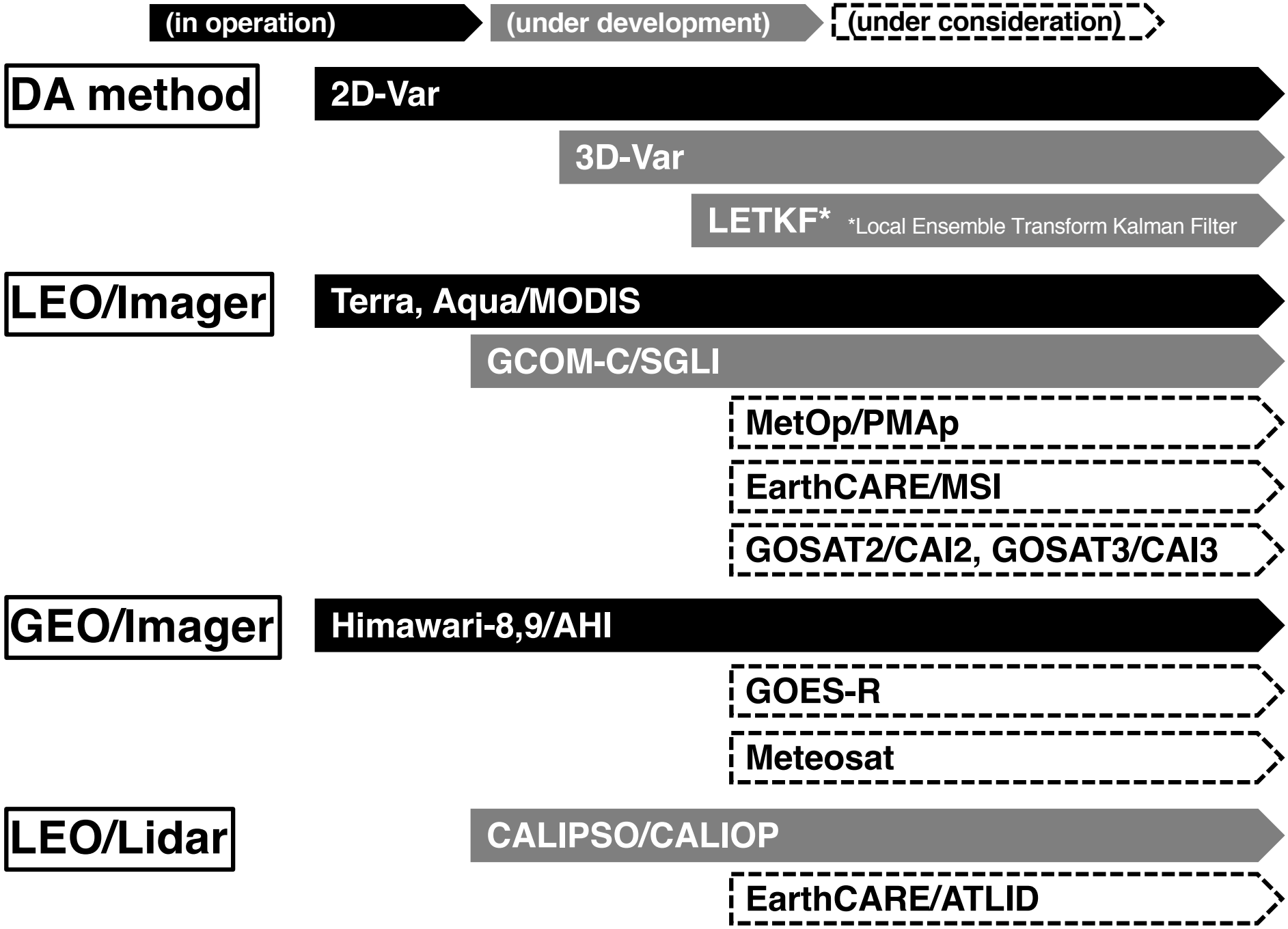


(Yoshida et al., ACP, 2021)

- Retrieval can use realistic a priori AOT instead of climate (constant) AOT value.
- Observed information can be propagated to future retrieval through DA/FC.

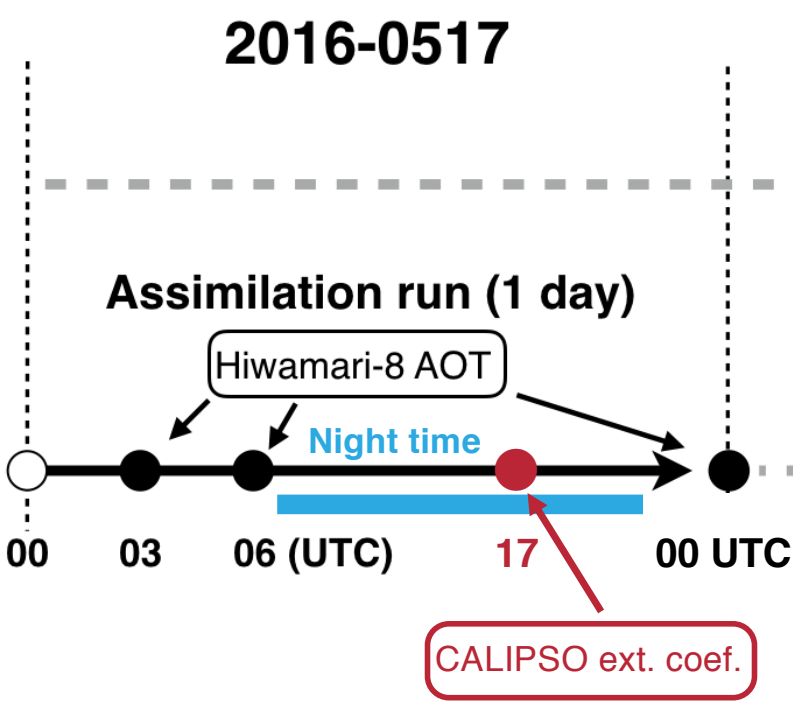
→ Better accuracy in both retrieval and forecast.

Aerosol DA system: Future plans

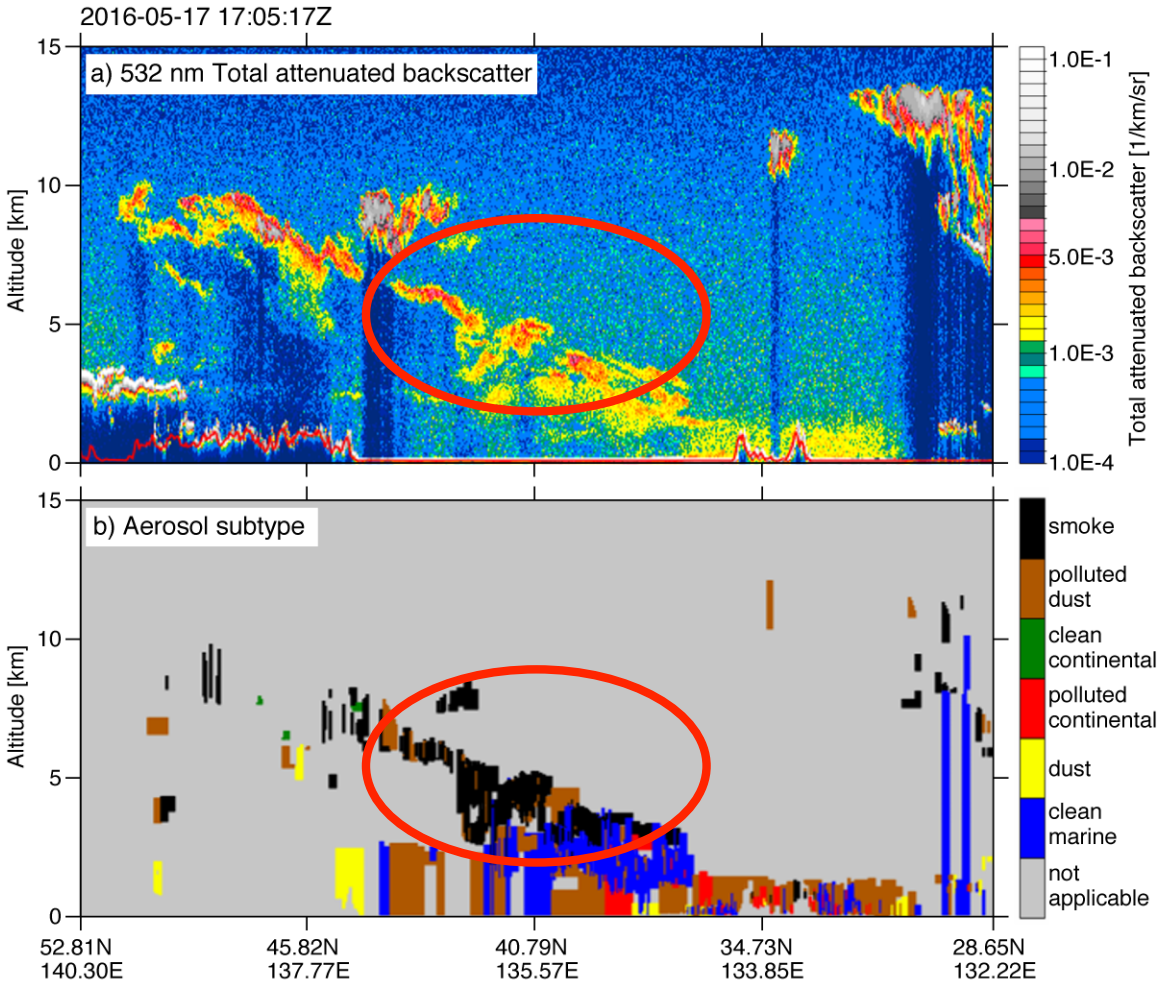


DA with Lidar (CALIPSO, EarthCARE)

Himawari-8/CALIPSO hybrid DA for Siberian forest fire smoke

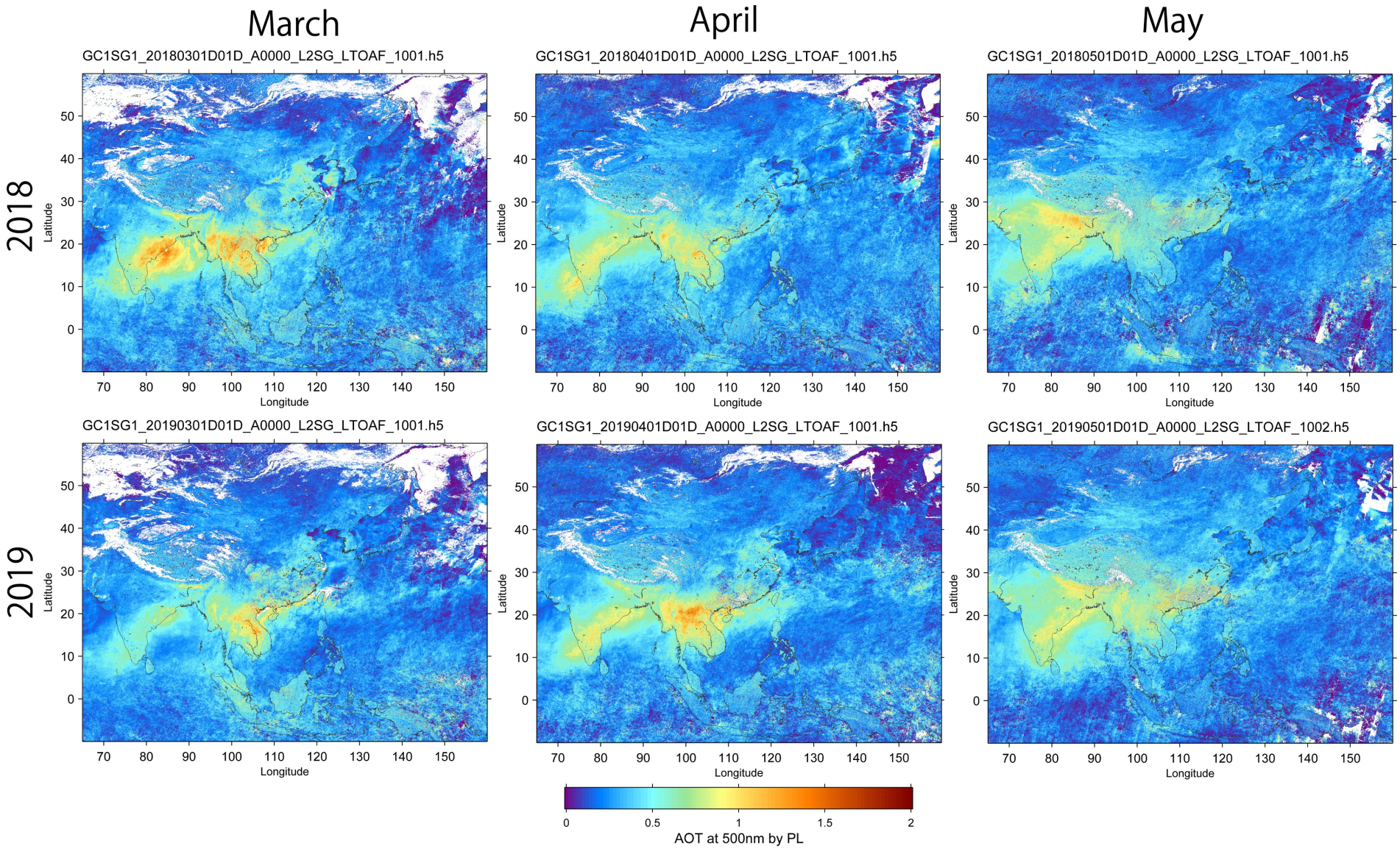


Assimilated with 3D-Var!



Lidar can provide not only vertical profiles during nighttime that Himawari-8 (imagers) cannot capture.

AOT500 by polarization (GCOM-C/SGLI)



GCOM-C/SGLI polarimetry shows good possibility to improve estimation of the **fine mode aerosols** and **better coverage over the land**.

(Hiroshi MURAKAMI @ JAXA/EORC)

Unified retrieval algorithm for GEO/LEO imagers

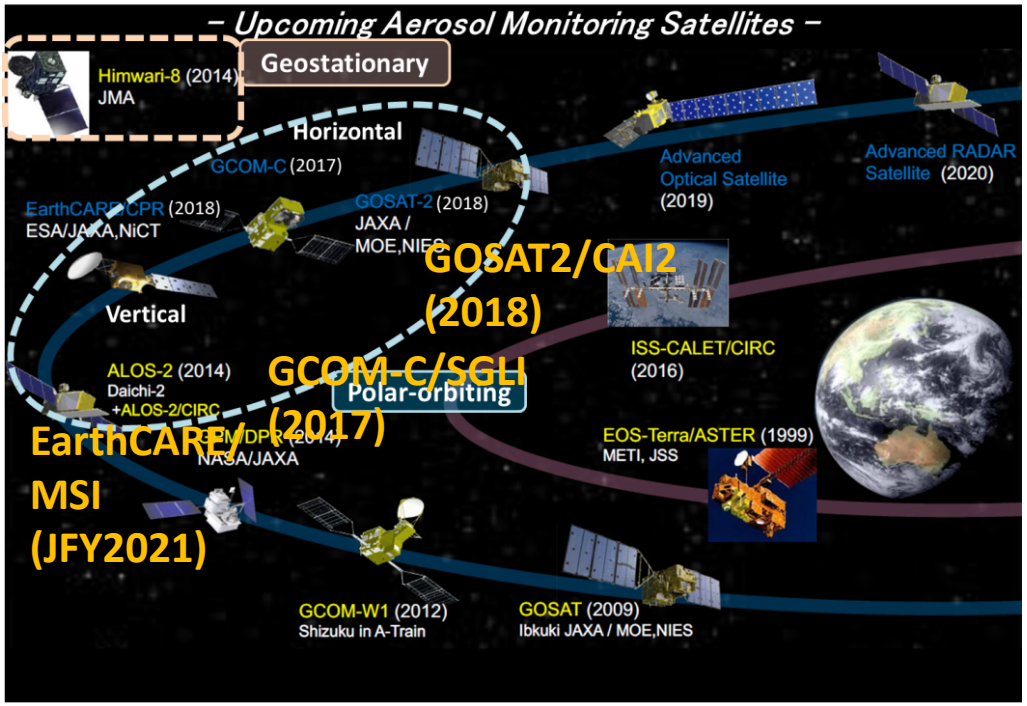
Our final goal

- produce synergistic global aerosol data set
  - using **JAXA Polar-orbiting** and **geostationary** satellites
  - Provided in near real time

This study

- A **common aerosol retrieval algorithm** is developed
  - for various satellite imaging sensors
  - over both land and ocean

Current and Upcoming Aerosol Monitoring Satellite



Target sensors

Geostationary:
Himawari-8/AHI, GOES-R, Meteosat
Polar-orbiting:
Aqua,Terra/MODIS, **GCOM-C/SGLI**, GOSAT2/CAI2, EarthCARE/MSI

(Mayumi YOSHIDA @ JAXA/EORC)