

Session 15

Working Group on AeroSat Experiments

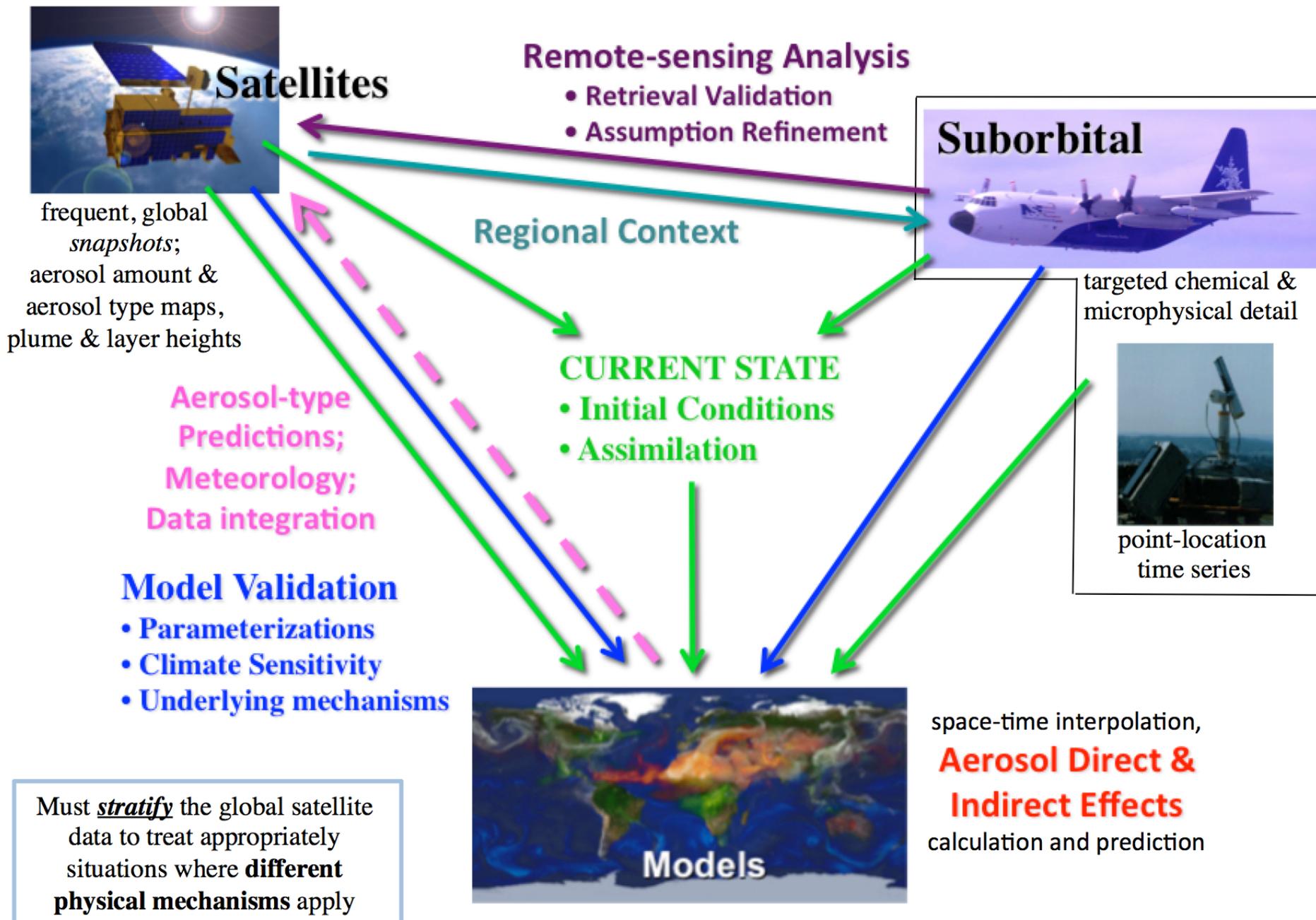
Chair: *Ralph Kahn* / NASA-GSFC

Notes: *Olga Kalashnikova* / JPL-Caltech

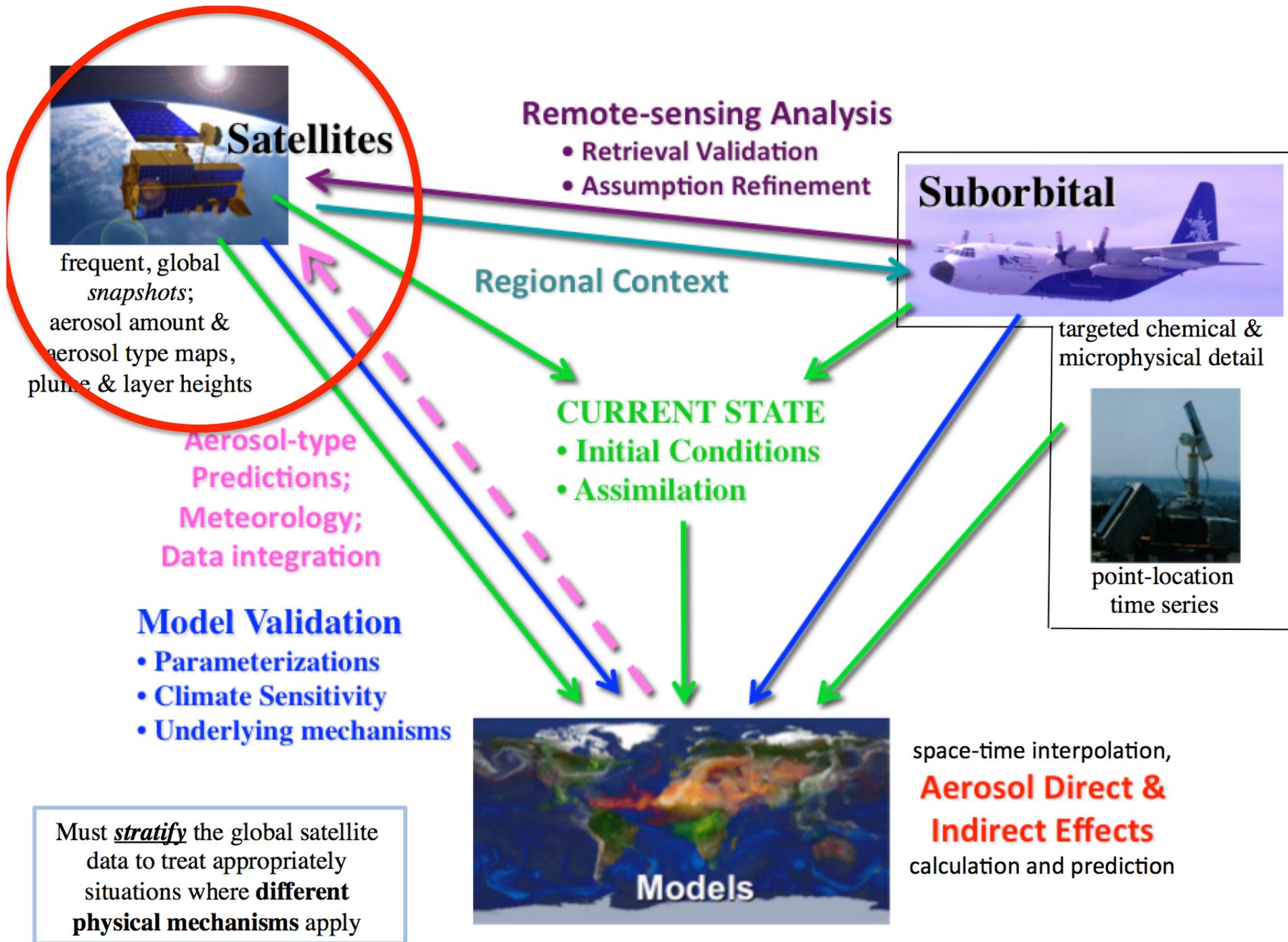
Objective: Identify Possible AeroSat Experiments

- Studies *Among Aerosol Products*
- Studies About *Using Satellite Data* to
Constrain and/or Validate Models
- Studies About *Using Models* to Add Value
to Satellite Data

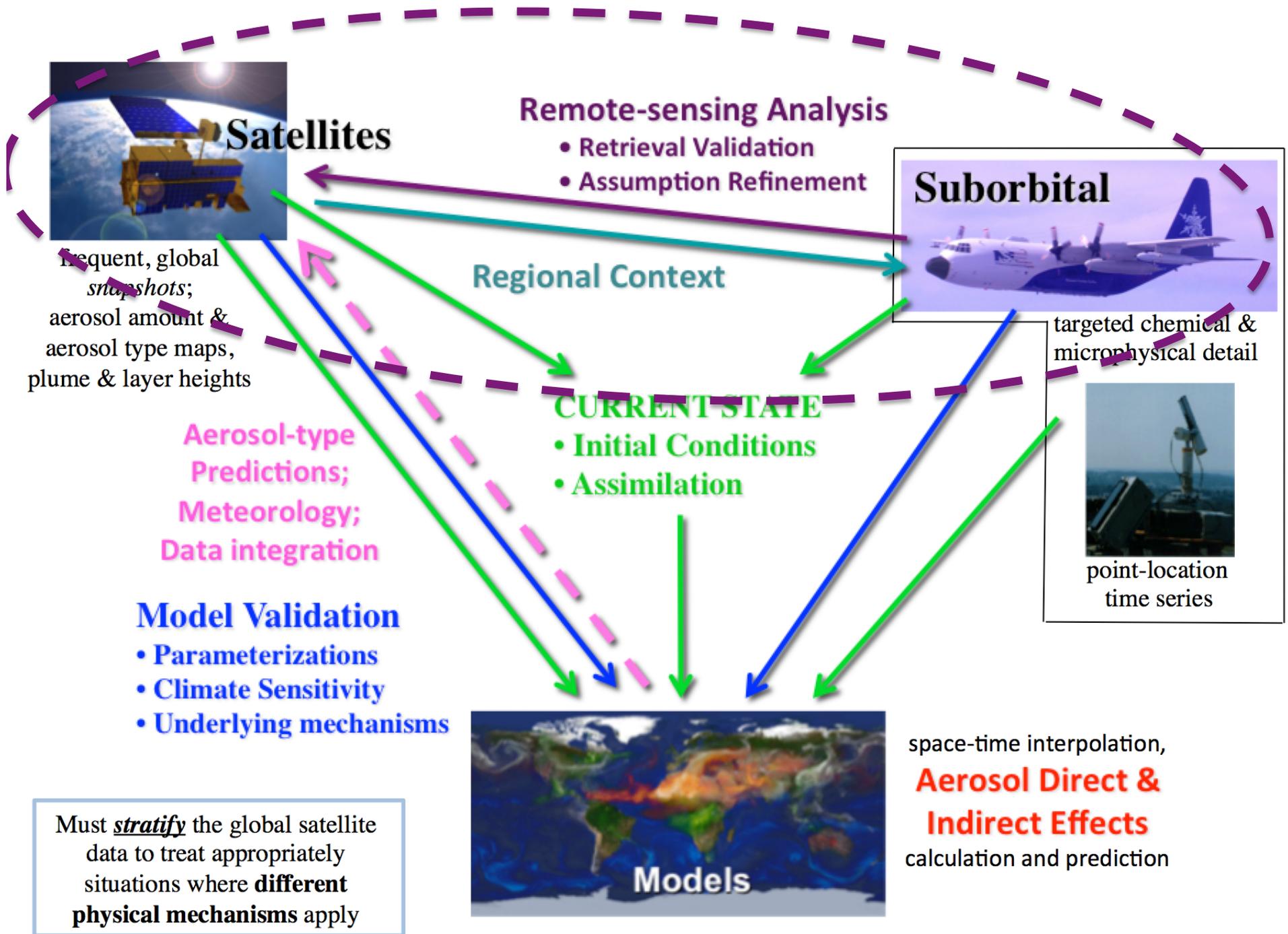
Could be small (bilateral) or larger (multi-lateral) efforts



Adapted from: Kahn, Survy. *Geophys.* 2012



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SAM-CAAM

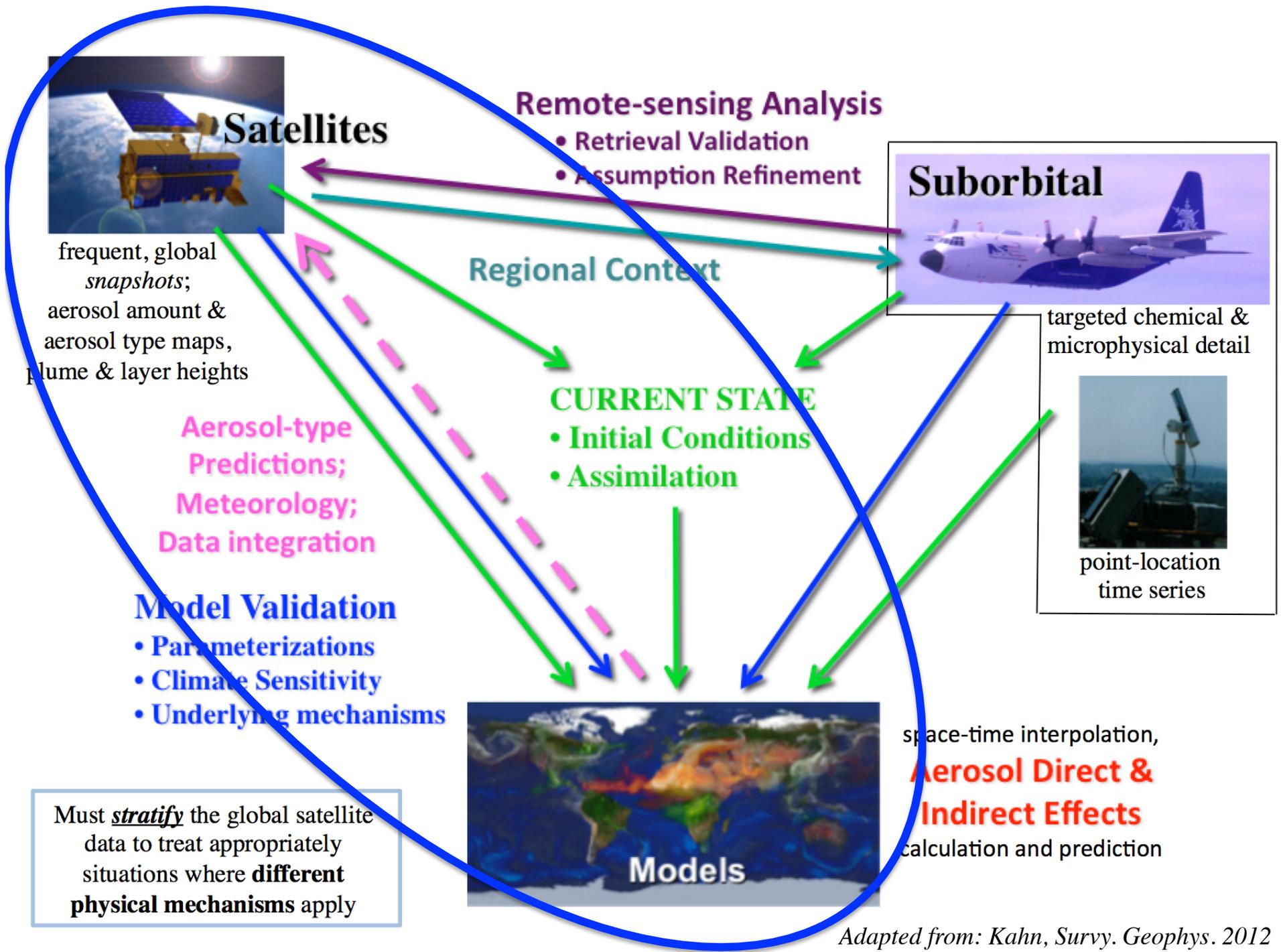
[Systematic Aircraft Measurements to Characterize Aerosol Air Masses]



[This is currently a *concept-development effort*, not yet a project]

Primary Objectives:

- Interpret and *enhance ~17 years of satellite aerosol retrieval* products
- *Characterize statistically particle properties* for major aerosol types globally, to provide detail unobtainable from space, but needed to *improve*:
 - Satellite aerosol *retrieval algorithms*
 - The *translation between satellite-retrieved aerosol optical properties and species-specific aerosol mass and size tracked in aerosol transport & climate models*



Adapted from: Kahn, Survy. *Geophys.* 2012

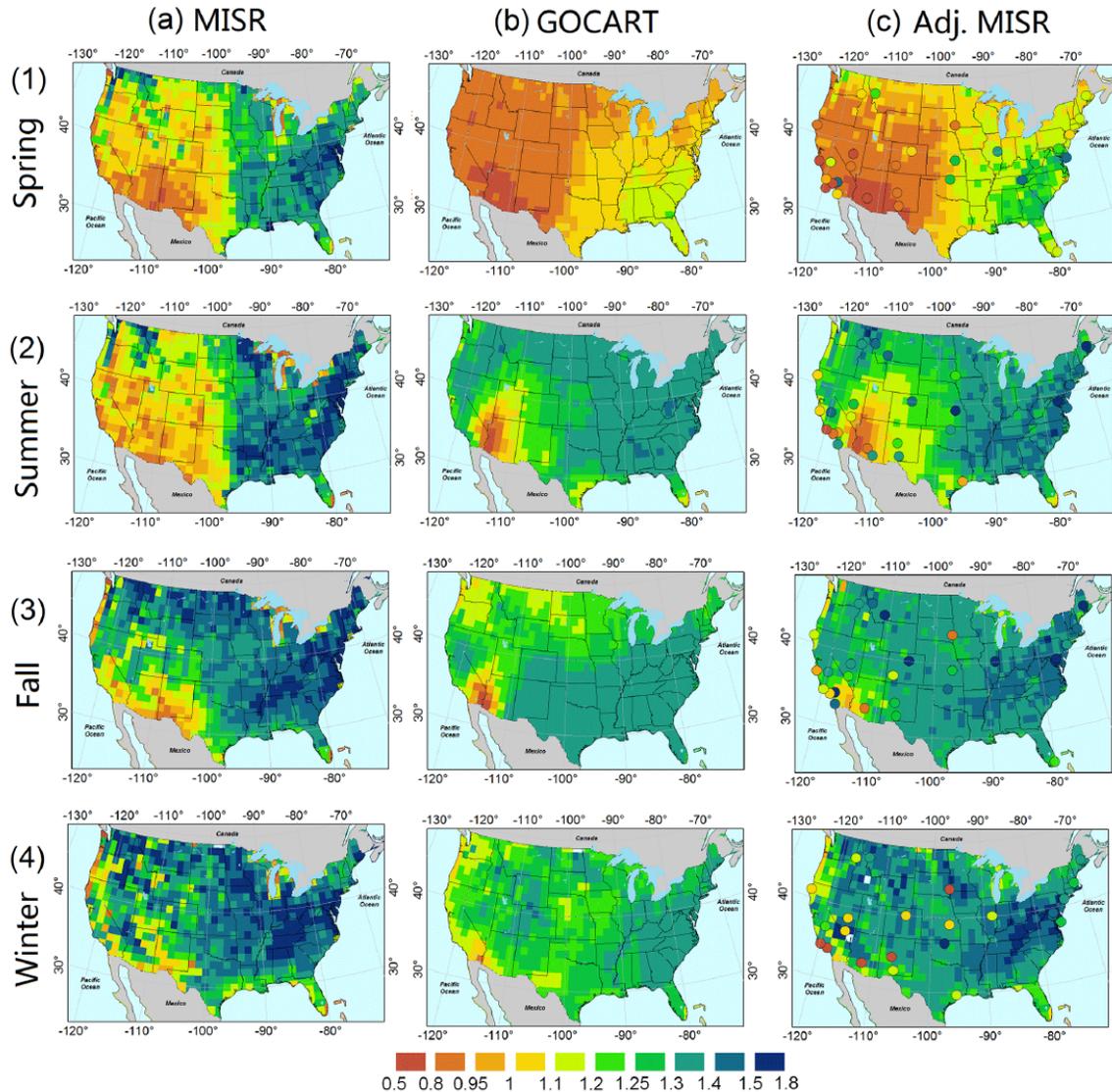
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Some Initial Ideas

- A general *Aerosol Retrieval Comparison* for a recent year (e.g. 2016 and 2017) [AOD; AOD & AAOD by size mode; dust as a component, maybe smoke; *Chin; Kinne* – requests gridded, daily data in netcdf or ascii]
- *Joint Remote-Sensing AOD and Type* products (e.g., IASI + POLDER; MISR + OMI AAOD, etc.) [*Kinne, others*]
- Aerosol retrievals over the *Congo Region* in the absence of AERONET [*Kinne, Dubovik, Lang*]
- Connecting retrieved optical constraints (*Aerosol Type*) with *Inferred Composition* [*Mona, Kahn*]
- Constraining *Aerosol Vertical Distribution* [MISR upwind, CALIPSO downwind, model between; *Kahn*]
- Use *Model to Constrain Type* in satellite product (e.g., when AOD is low)
- *Level 3 Pixel-level uncertainties* (Counts, STD, + Sampling: Diurnal?, Day-to-day?, Within grid-box?; Aggregated?)

MISR ANG, AAOD Results *Constrained by GoCART Model*



ANG

$$\text{Diff}_{\text{ANG}} = |\alpha_{\text{MISR}} - \alpha_{\text{GOCART}}| \leq \varepsilon_{\text{ANG}}$$

$$\text{Diff}_{\text{AAOD}} = \left| \text{Fraction}_{\text{MISR_AAOD}} - \text{Fraction}_{\text{GOCART_AAOD}} \right| \leq \varepsilon_{\text{AAOD}}$$

Four years of data (2006-2009)
Seasonally averaged

Shenshen Li et al. AMT 2015

Where remote-sensing data are ambiguous, can *use a model to weights the options*

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AEROSAT experiments template

Version 2, 20 July 2017 (Thomas Popp and Ralph Kahn)

AEROSAT experiments aim at strengthening the use of aerosol satellite data for climate research. They can either inter-compare data records, assess algorithm sensitivities or analyze a scientific problem with significant use of satellite data.

To be accepted in AEROSAT, an experiment needs

- a) a clear question or objective and a detailed description of steps to be taken
- b) support by at least 3 independent satellite groups with independent satellite datasets / algorithms (may be for the same set of sensors)
- c) interest and/or direct involvement of a user or user group (e.g. modelers; *in situ* measurement teams; surface networks)

The roles of participants should be identified at the beginning (independent work, if appropriate) inter-comparisons, evaluation or analysis of results. The intended outcome of an experiment should be a study paper to be submitted to the scientific literature to share the findings with the community.

An AEROSAT experiment should be presented to AEROSAT (at annual meetings) and should be open for further participants; its status / results should be summarized at subsequent AEROSAT meetings. AEROSAT will grow in substance with such concrete activities and therefore experiment suggestions are encouraged. "Formal" acceptance by AeroSat will be based on community interest after the brief pitch at the annual meeting, and the degree to which conditions a) – c) are met.

Name of experiment		
Objective of experiment		
Type of experiment	Retrieval inter-comparison	
	Retrieval sensitivity	
	Scientific problem; other	
Size of experiment	Case study	
	Large-scale study	
	other	
Responsible coordinator / presenter		
Satellite groups who commit to participate	Group / contact name	Dataset / algorithm contribution
User (group) involvement	Group / contact name	Role
<u>AeroSat</u> evaluation		
Parameters / variables needed		
Reference data needed		
Region, period, resolution		
Any other comments		