



The potential role of IAGOS-ERI in Aviation Meteorology

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Scope of presentation

- The difficult way to define a requirement for aviation meteorology
- What can current observations do for AEM?
- How will the data need evolve ?
- Long – term perspective: How could research be transferred to operational information?

How to establish a formal requirement for aeronautical met information

- All requirements for services to international civil aviation are regulated in Annexes to the Convention of ICAO
- MET requirements to be found in Annex 3
- Environmental issues regulated by CAEP
- WMO cooperates in all relevant working and study groups that prepare changes or additions to Annex 3

Aviation and Climate Change

- The impact on Climate Change by aviation is relying on a basic understanding of the role of all effects of CO₂ , Ozone precursors etc and Cirrus/Contrails
- In-Situ measurements by research and in-service aircraft will improve our understanding of the role of contrails/Cirrus
- After establishing the facts, transfer to operations may be helpful in avoidance/mitigation strategies
- Complex issues of trade-offs

Initial analysis of the situation

CO₂ , NO_x , Cirrus affect different time scales

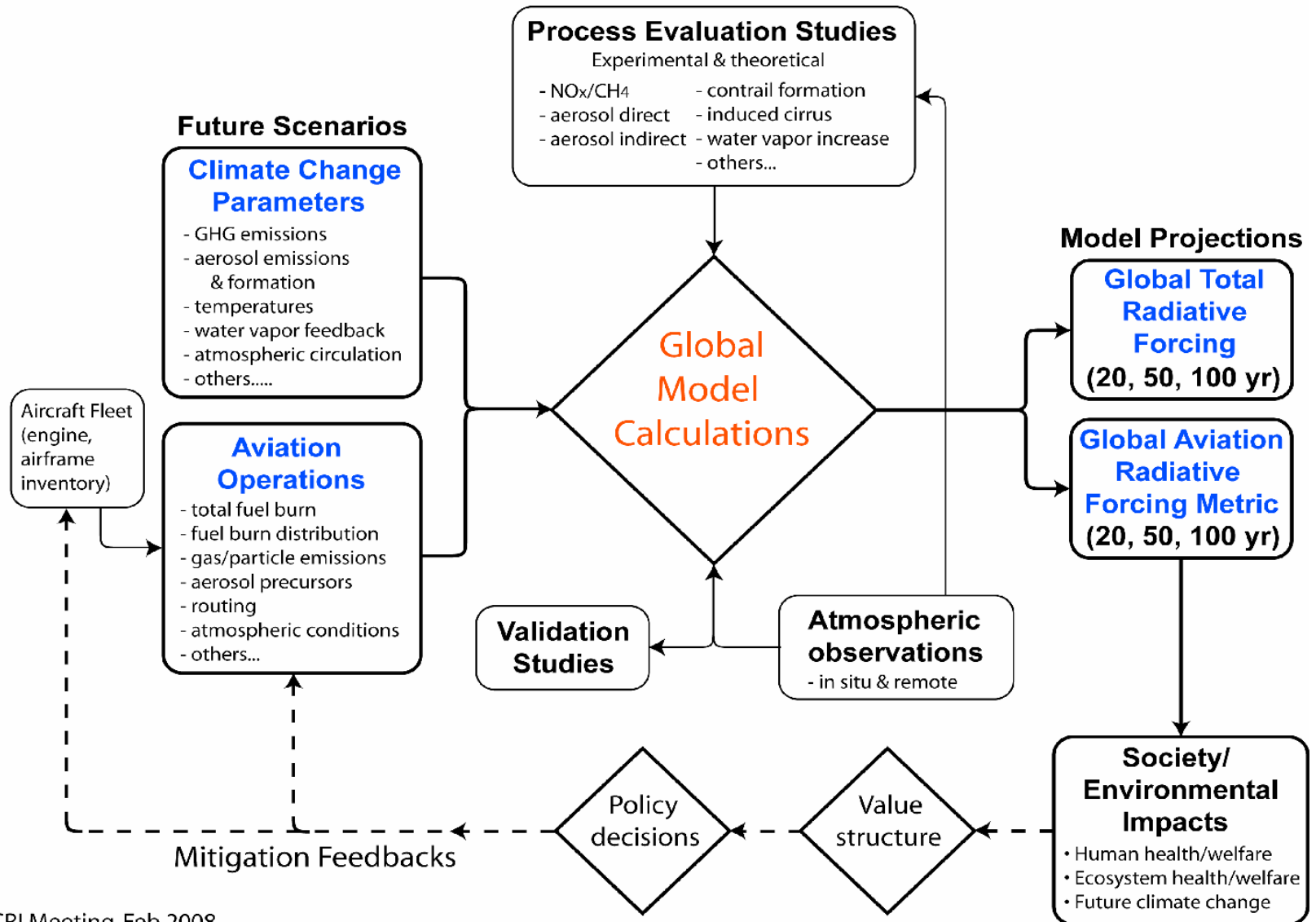
- Operational measures hold considerable potential, require optimized use of meteorological and climatological information including chemical composition

The Aviation GHG Scenario

- Overall impact on climate change extremely complex:
 - CO₂ directly linked to fuel burn
 - NO_x depending on engine characteristics, temperature, may increase with more fuel-efficiency (potential trade-off)
 - Complex interaction with Ozone
 - Reduction of (non-aviation) methane
 - Contrails & Cirrus formation & lifetime dependent on environmental conditions, NO_x, and soot

FAA-Assessment

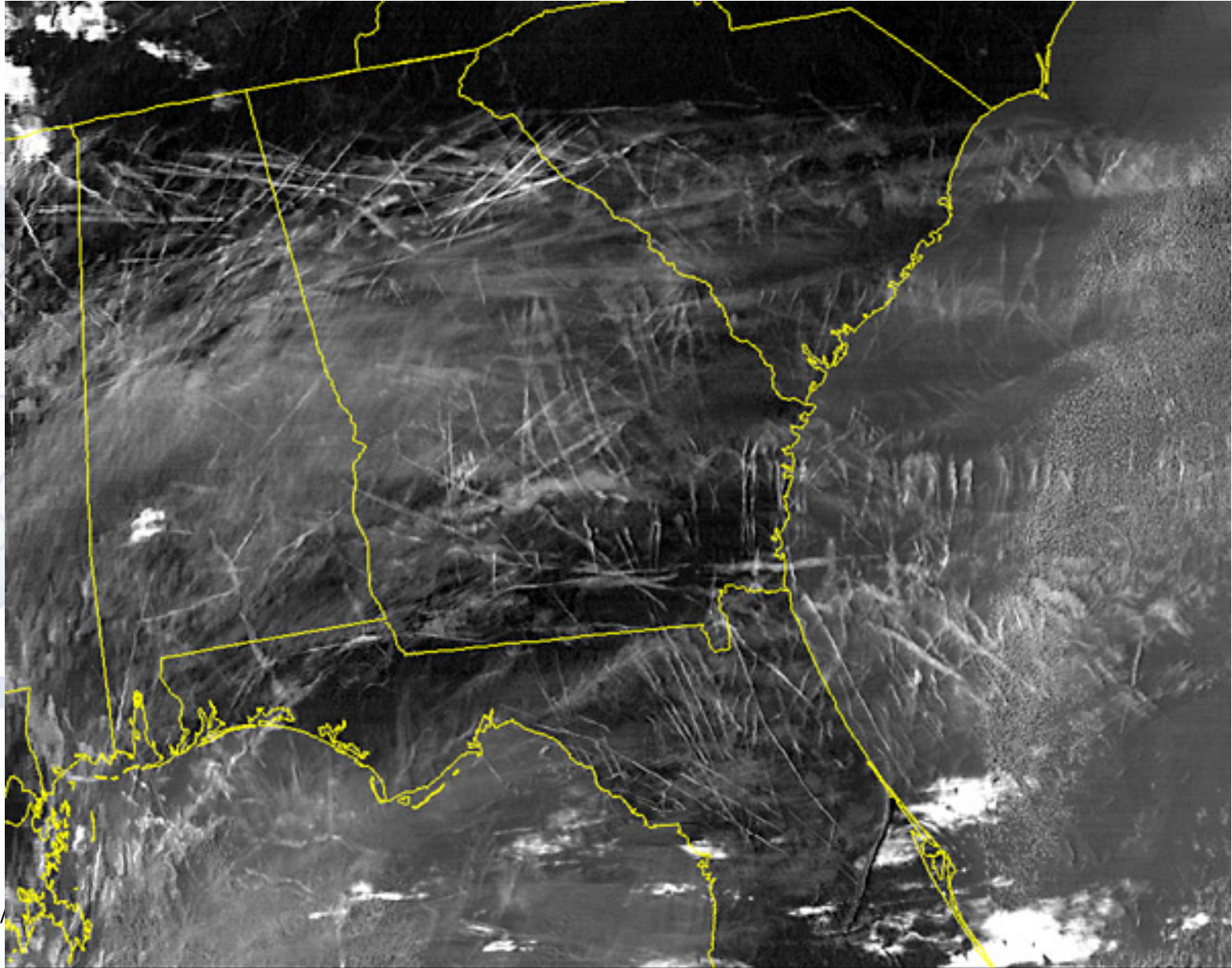
Assessment of Aviation Radiative Forcing



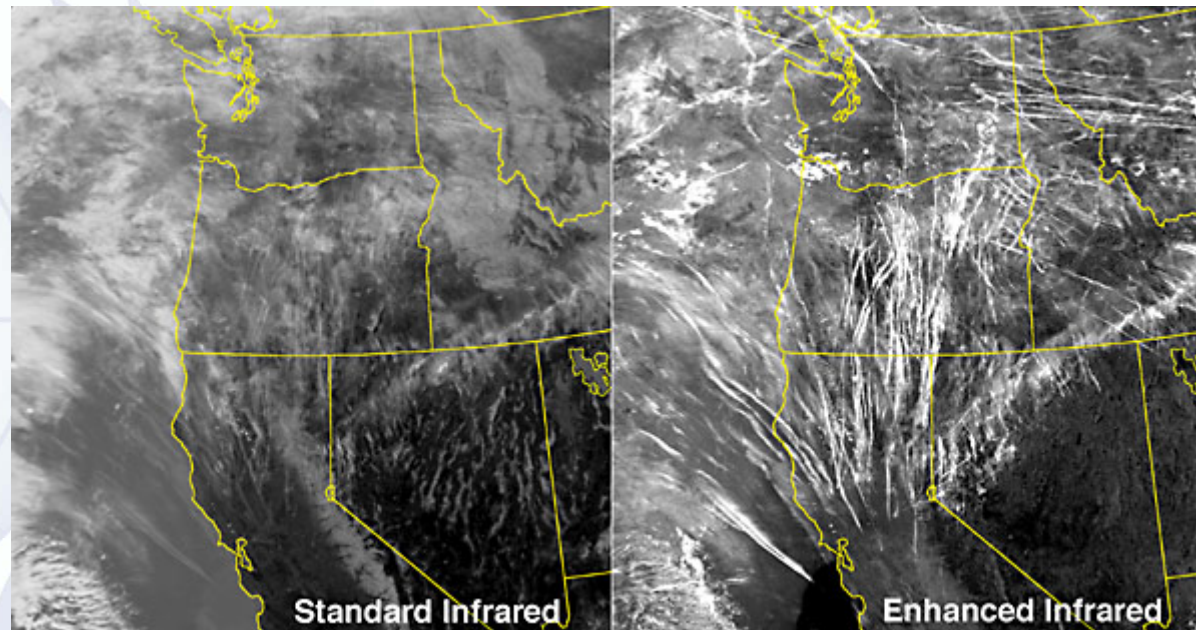
Current scenarios and aviation relevance

- Regional climate predictions may require « local forcing function »
- Climate feedback effects poorly understood yet – World Climate Conference 3 in 2009 addressing question of « climate services »
- Some regional trends require in-depth studies!

US Contrails



And more...



Mitigation of aviation impact:

- Enhanced co-operation with ATC/ATM: (NGATS, SESAR.....)
- Avoidance of highly supersaturated layers possible (typically very shallow)
- Highest « avoidance potential » during nighttime –when traffic density minimum
- Need for increased environmental monitoring by aircraft, satellite, ground-based
- ATM role crucial in avoiding trade-offs (higher fuel burn!)

Volcanic Ash

- Elevated to top priority by Eyjafjallajökull – eruption in April /May 2010
- Need for composite observing systems with calibration through in-situ measurements
- Space-based and ground based give good areal coverage, less vertical resolution and « real » aerosol content
- Need for FULL particle spectrum!

Is there more than just ash to worry about?

- Evidence from dismantled aircraft engines point to possible role of acids (Sulphuric, HCl, Fluorides)
- SO₂ again well identified by satellite imagery, other gases???
- Awaiting more information from OEM's as part of the IVATF!

Local air quality issues

- Some airports approaching limits of some pollutants
- Difficulty to discern between locally generated and advected aerosols/Gases
- Aircraft data may be useful complement surface networks

Note: Aviation induced Cirrus!

THANK YOUR FOR YOUR ATTENTION!

