Preliminary Comments

Data End Uses:

2. Climate data analysis (detection and attribution)
3. Satellite algorithm testing
4. Climate model testing and improvement
5. Reanalysis

Typical method: optimal filtering

$$\alpha = \left(\underset{\sim}{s} \underset{\approx}{\Sigma}^{-1} \underset{\sim}{s}^{T} \right)^{-1} \underset{\sim}{s} \underset{\approx}{\Sigma}^{-1} \underset{\sim}{d}^{T}$$

Advantages of GRUAN record

2. Language of NMIs/ISO GUM: constrain type B uncertainty
3. Experimental physical science: systematic uncertainty
4. CDRs: structural uncertainty

QC/QA Product

Uncertainty Covariance:

	850 mb	700 mb	500 mb	…	100 mb
850 mb	δ_{11}	δ_{12}	δ_{13}	..	δ_{1n}
700 mb		δ_{22}	δ_{23}	..	δ_{2n}
500 mb			δ_{33}	…	δ_{3n}
…					
100 mb					δ_{nn}

How do we get there?

- Manufacturer data, LC experience, NMI input
- Calibration intercomparisons in lab
- Campaigns, past and new

Possible Benefits of NMI collaboration

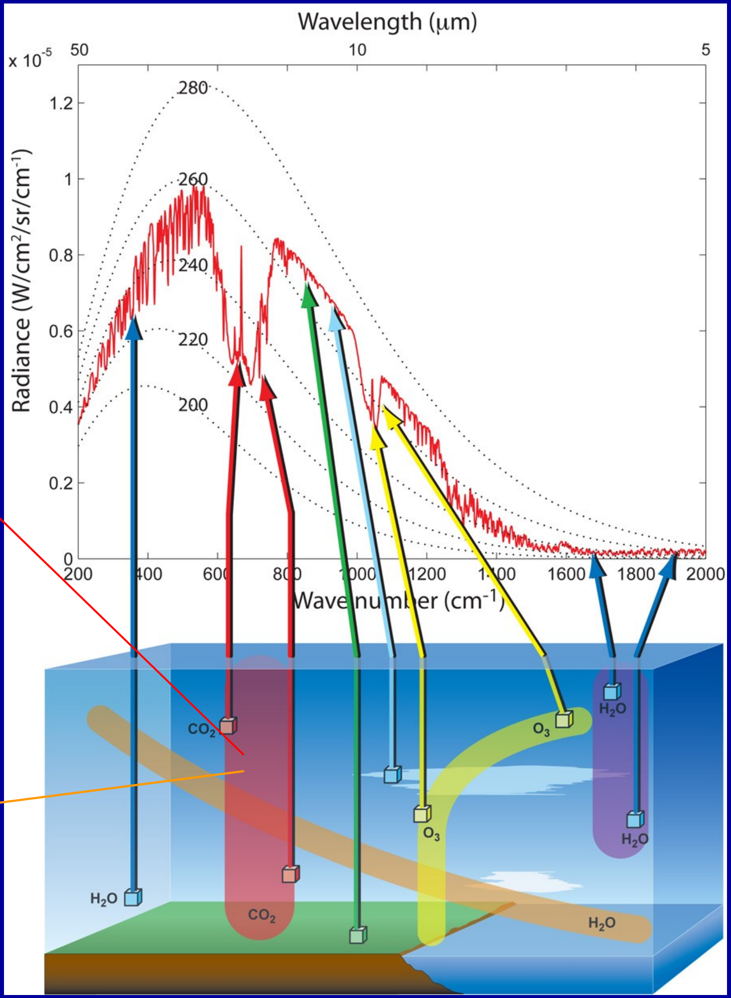
- Establishing radiation correction for sonde
- Experimental design to demonstrate that reference sonde is in fact reference quality
- Generating joint uncertainty estimate from redundant measurements

"SI-like" traceability to facility remote and *in situ* measurements

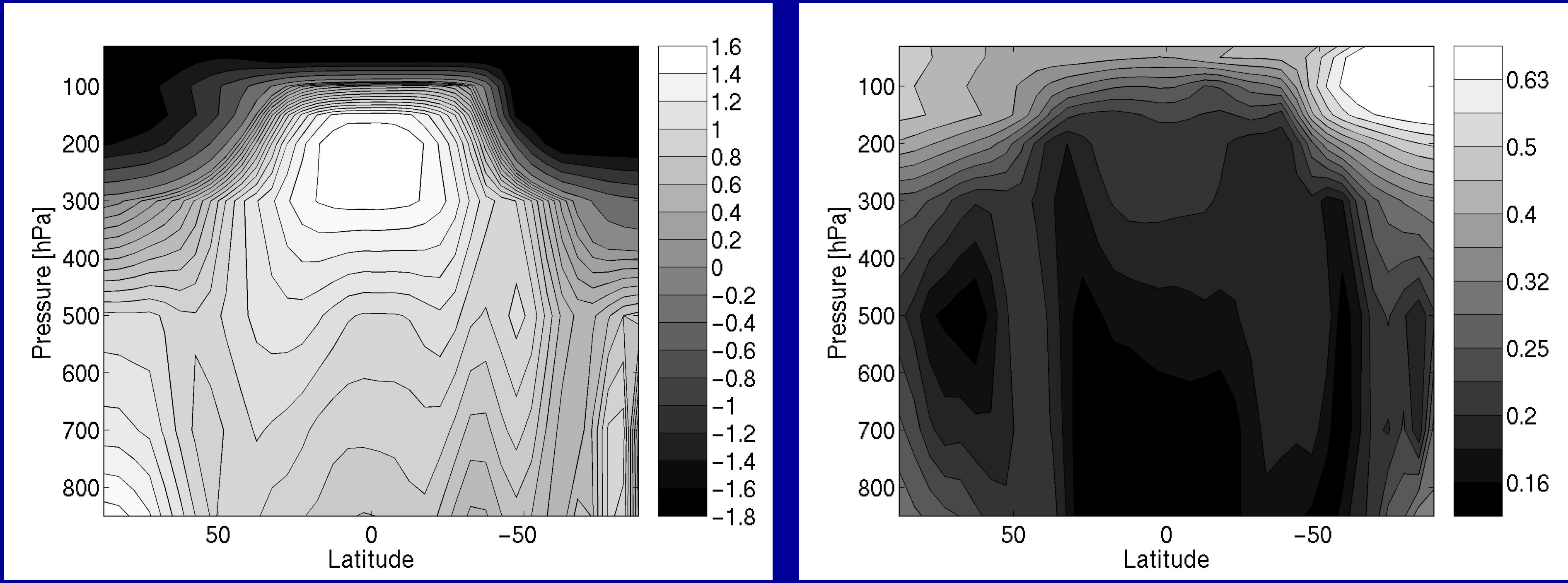
$$I_{\lambda}^{\uparrow}(z^{*})\tau(z^{*},z)+$$
$$\int_{z^{*}}^{z}B_{\lambda}(z',T)W_{\lambda}(z',z)dz'$$

Remote measurement related to SI temperature

Establish radiation correction to put *in situ* measurement on comparable scale



Upper Air Optimal Detection (1970-1999): an Example with a Familiar Data Type



$$\underset{\sim}{d} = \alpha\,\underset{\sim}{s} + \underset{\sim}{n}$$