Met. Support Group

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- Lenny Pfister (NASA/ARC)
- Rennie Selkirk (SPRI/ARC)

I. Products
  1. Met data/flight planning support
  2. Exchange files (met curtains, trajectories)

II. Science
  1. Comparisons
     a. Coincident
     b. Non-coincident (PV-theta)
  2. Ozone loss
  3. Ames activities

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**Products**

Main service: flight planning aids

  Look for interesting air to fly in (or places to avoid)

Forecasts, Analyses: NCEP, GSFC DAO

  Plots (http://code916.gsfc.nasa.gov/Missions/SOLVE2/)
  Exchange files (data curtains of T,U, V, EPV, Z)
  Automailer (plots, data curtains, etc.)

Ames Products:

  Rel. Humidity forecasts/analyses
  Trajectory-based calculation of Rel.Humidity
  Comparison w/ AVHRR satellite imagery

Trajectories: GSFC

  Exchange files
  Automailer (http://code916.gsfc.nasa.gov/Data_services/automailer/) (user: "Ertel", password:"geostrophic")
Science Goals

• use met data to characterize & compare measurements
• work with AROT*L & other groups to intercompare measurements
  • coincident comparisons
  • non-coincident comparisons
• examine long-term met statistics (e.g., was anything unusual about Jan. 2003?)

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Coincident comparisons

Compare  Temperature, Ozone  data from  AROTEL, Sondes

Look at:  Overall mean, std. dev., PDFs within altitude bins

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Non-coincident Cmp.

I. Probability Distribution Functions (PDFs)
- Histograms of constituent amounts
- Analyses at different theta levels
- 2-D PDFs in PV-theta space
- (account for sampling differences)

II. PV-theta analysis
- Map one instrument’s data onto another instrument’s locations
- Directly compare PV-theta composites
- Construct & compare stats in PV-theta space

III. Trajectory Mapping
- Trace measured parcels
- Accumulate parcels until field is filled-in

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PV-Theta Analysis

1. Raw data
2. Data in PV-theta coords
3. Combine data into composite in PV-theta space
4. Use gridded met fields to look up constituent value in PV-theta space
5. Map constituent value into real space

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PV-theta Examples

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Ozone Loss

- Determine O3 change rate in PV-theta space
- Correct for diabatic effects
- How accurate over one month?

Measurements are weighted by instrument uncertainty, distance from PV-theta point, and an inter-instrument factor.

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Ames Activities

I. Flight level info (~3 day forecast)
   A. Motivation
      1. Cloud effect on lidar ops (flights below trop)
      2. Science issues: water vapor, clouds, & dehydration in the tropopause region
   B. Products
      1. Analyses/forecasts of Rel.Humidity & tropopause
      2. Trajectory-based calculations of Rel.Humidity
         (removes water vapor exceeding parcel saturation)
      3. Comparison w/ AVHRR satellite imagery

II. Surface Weather updates for science team (~3 day forecast)
   A. Generally not a problem (no SOLVE-1 weather scrubs)
   B. Alert if low ceilings/low visibility/strong winds expected
Ames Activities (cont.)

Note:

- Regions near Kiruna below trop
- Some of these regions have high R.H. & may be cloudy
- Both model & traj calc show high R.H. where sat shows high cloud

Trajectory-based RH at ~FL3 70

12 UTC on 6 December, 2002 on the 217.0 mb surface

AVHRR channel 5 (12 μm) – 6 Dec 1149 UT

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Summary

• The Goddard/Ames group will provide numerous products to aid in data interpretation and flight planning

• Goddard will help the AROTEL team (and any other interested groups) to compare measurements
  • Coincident data
  • Non-coincident data

• Ames will calculate and verify potential for cloudiness affecting lidar operations