ITCT Lagrangian 2k4
An IGAC activity, including:

INTEX-A
NEAQS-ITCT
ITOP
2k4 Quasi-Lagrangian Objectives

• Assess the photochemical oxidant and aerosol formation potential of air parcels (pollution) leaving North America
• Assess the contribution of these to the background and to the European boundary layer
• Study chemical transformation and removal during intercontinental transport
• Study dynamical processes responsible for transport and mixing
Coordinated Lagrangian Activities

• Instrument Intercomparison
• Flight Coordination (by Daily Telecon)
• Post-deployment Analysis
ICARTT Summer 2004 - Flight tracks of major aircraft

FAAM BAe146, based in Faial, Azores, flew 13 science flights ~70 hours including intercomparison flights with DLR Falcon and NASA DC8

Slide: M Evans, Leeds
Other Platforms/Measurements

- COBRA King Air
- J-31 (AATS/14)
- Ron H. Brown
- Surface Stations: Appledore, Boston, Castle Springs, Cheboque, Mace Head, Martha’s Vinyard, Mt. Washington, Pico, Thompson Farm
- Lidars: Potenza, Leipzig, Cheboque Point
Goal: Multiple, Sequential Sampling Flights into the Same Air Mass

- Photochemical transformation and aerosol formation happens while air mass is transported
- Largest uncertainty is mixing
- Exact vertical match is difficult
- Tracer change must be larger than instrument error and variability in air mass of origin
- “Sameness” of air mass needs to be determined by tracer correlations as well as by careful met analysis
Prevailing Winds
Overview movies of the CO tracer coming into Europe

Total column of species 1 for age class all
Forecast start 20040718.150000  Actual time 20040715.150000
Mean value 0.237E+02
Maximum value 0.735E+03
Minimum value 0.000E+00
3 Major Cross-Atlantic Features Sampled:

- Alaskan/Canadian Fire Plume (07/18-07/22/2004)
- Pre-frontal transport (warm conveyor belt 07/27-08/01/2004)
<table>
<thead>
<tr>
<th>Date</th>
<th>DC8 (NASA)</th>
<th>P3 (NOAA)</th>
<th>BAe-146 (UK)</th>
<th>Falcon (DLR)</th>
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<tbody>
<tr>
<td>05/07/04</td>
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<td>Transit</td>
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<td>06/07/04</td>
<td>INTEX 2: transit to St Louis</td>
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<td>Boston and Canadian fires</td>
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<td>Boston at night</td>
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<td>B028: Transit (Alaskan plume)</td>
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<td>New York plume (1) and meet with Balloons</td>
<td>B029: Low level and fires</td>
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<td>New York City (3) and comparison</td>
<td>B033: Low level pollution and ENVISAT underpass</td>
<td>New York plume (3) (West of Portugal) Fire plume and low level</td>
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<td>Montour power plant</td>
<td>B034: Out of Africa</td>
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<td>Warm conveyor belt (1) and thunderstorms</td>
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<td>New York City (4) (West of Ireland) New York City (5) (English Channel)</td>
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<td>INTEX 12: Comparison and Bermuda High</td>
<td>Comparison and New York City at night</td>
<td>B037: Low level warm conveyor belt (1) Upper level warm conveyor belt (3)</td>
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<td>New England at night</td>
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Flight 9 on July 18, 2004: DC-8 Ozone, CO, Dewpoint and T data
Sachse, Avery, Barrick

Alaskan Fire Smoke

Asian Outflow, Convective and Stratospheric Influenc
Forward trajectories from DC-8 flight on 18 July 04 from flight segment 19.00 - 19.25 UT (high CO)

DC-8
18 July

DLR Falcon
22 & 23 July

CO (ppbv)

Courtesy: John Methven, Glenn Sachse, Elsa Real
British Lagrangian flight 3

NASA flight on July 18th

UK flight on July 20th

[Graph showing CO concentration over latitude]
**CO & O₃ observations from DLR Falcon**

22 July

- **Creil to Santiago**

  CO quicklook data
  ITOP flight T040722a
  preliminary data to be used only for quicklook purposes

  Polluted air observed off Spain/Portugal

- **Santiago to Creil**

  CO quicklook data
  ITOP flight T040722b
  preliminary data to be used only for quicklook purposes

  "Alaskan" BB plumes??

- **Creil to Shannon**

  Co quicklook data
  ITOP flight T040722a
  preliminary data to be used only for quicklook purposes

  Data courtesy Hans Schlager
Next Steps…

• Meeting in Austria at the EGU this April to discuss analysis and share notes

• Trajectory and dispersion model matches available to all ICARTT science teams

• Tracer/tracer correlations and analysis of whole air samples and other “signature” tracers

• Many potential cases exist – plenty of data to look at!