Working Group Reports

2004 Planning Meeting
April 23 & 24, 2003
University of New Hampshire

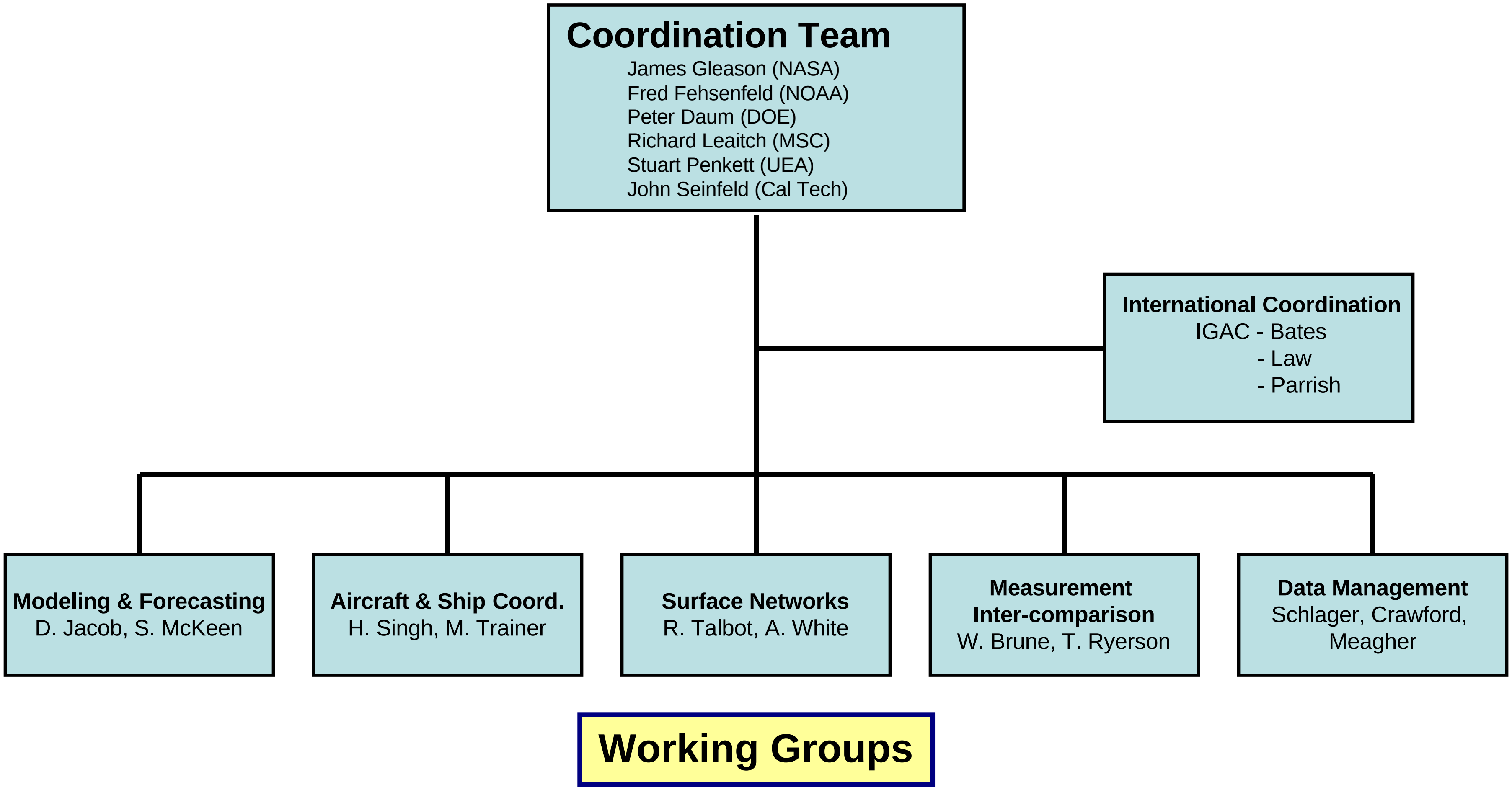
- **Overview**
- **Aircraft and Ship Coordination**
- **Surface Networks**
- **Measurement Comparison**
- **Modeling and Forecasting**
- **International Coordination**

Overview

Planning Timeline

- **April 2003 - Planning Meeting**
- **April - June 2003 Individual science plans developed**
- **September/ October 2003 - Project Management Team Meeting**
- **November /December 2003 - Implementation plan for field study collaboration**
- **February / March 2004 - Gathering of the Clans**
- **May 2004 - Project Management Team Meeting**
- **July / August 2004 - FIELD STUDY**
- **February 2005 - First Look Data**
- **April 2005 - Data workshop**

2004 Study Planning Team



Breakout Sessions

- ***Decide some issues***
- ***Set some ground rules***
- ***Develop a plan and timeline for planning***

Modeling

Jacob/McKeen

- *Catalog of forecast products*
- *Common modeling needs*
- *Expectations from the forecasts*
- *Forecast evaluation*
- *Access to data in the field*
- *Pre-mission planning meeting for LS models*
- *Other issues*

Aircraft/Ship Coordination

Singh/Trainer

- ***Overlap and timing (any adjustments)***
- ***Forecasts and aircraft coordination***
- ***Flight planning process (for coordinated flights)***
- ***Intercomparisons (which platforms to pair)***
- ***Data sharing protocol***
- ***Other issues***

Surface Networks

Talbot/White

- ***Science Objectives***
- ***What's Being Measured and Where***
- ***Coordination***
- ***Data Access***
- ***Timing***
- ***Measurement Locations***
- ***Logistics***
- ***Other issues***

Measurement intercomparisons

Brune/Ryerson

- *Which intercomparisons*
- *Which species*
- *How many flight segments*
- *What conditions*
- *How formal*
- *How to organize*
- *Other issues*

Aircraft and Ship Coordination

Overlap Timing

- **1 July - 15 August 2004**
- **Transatlantic 15 July - 15 August 2004**
- **ITOP 12 July - 4 August 2004**

Activity Name		Start Date	Finish Date
ITOP BAE 146		7/12/04	8/4/04
DLR Falcon	3 weeks	6/15/04	8/1/04
CNRS Falcon	3 weeks	7/1/04	7/31/04
NASA DC-8	St. Louis	7/1/04	7/14/04
	Pease	7/15/04	8/8/04
NASA P-3B	St. Louis	7/1/04	7/14/04
	Wallops	7/15/04	8/8/04
NOAA Ron Brown		7/6/04	8/13/04
NOAA WP-3D		7/1/04	8/15/04
DOE G-1	4-6 weeks	6/1/04	8/31/04
MSC Twin Otter	4 weeks	7/15/04	8/15/04
ONR CIRPAS Twin Otter		8/2/04	8/20/04
COBRA		7/1/04	8/31/04
UMD Aztec(?)		5/15/04	9/30/04

Forecast/Aircraft Coordination

- **Lagrangian flights - Major objective for European groups**
    - **Andreas Stohl calls for best opportunities**
- **Look at past experience of best opportunities (homework)**
- **All forecasts on the web**
- **Communications/model features/disagreements**
- **Modelers to point out main opportunities**

Flight Planning Process (Standard)

- File day before
- File at least two flight plans
- ATC coordination

Intercomparisons

- **Multiple levels**
- **No fully dedicated flights**

- **DC-8 and P-3B**
- **DC-8 and WP-3**
- **P3-B and WP-3**
- **DC-8 (?) and BAe156 (transit to U.S.)**
- **Europeans intercompare with Europeans**
- **Canister/Standard exchange**

Shared Protocol

- NASA Ames is the preferred format
- Time line:
    - Final data 9 months after mission
    - Workshop 10 months after mission
    - Publications 18 months after mission
- Selected quick-look data (graphical form) in field
- Everyone is agreeable to a single protocol
- Data to be centrally archived/shared by all Science Team members (password-protected as necessary)

Augmentation

- In-flight web access for NASA
- Aircraft-to-aircraft communication for all
- Falcon - 20 NMHC (tentative solution)
- Ship overfly - only P-3
- ‘Optical depth’ on P-3
- Indirect forcing studies - CIRPAS Twin Otter/ Convair/Ship/NOAA P-3
    - Others concerned with direct forcing only
- Communicate regularly between now and campaign

Surface Networks

Chemical Sampling

States of New England provided by EPA - Beloin

Airmap provide by UNH - Talbot

Ozone monitor on ferry – Mid April through September
Scotia Prince from Portland to Novia Scotia
Over and back each day with ozone and position coordinates – Emery

Ground winds – Dors
Wind profiling – 45 degree pointing angle -horizontal up to 18 km
Aerosol optical properties (not validated yet) – aerosol backscatter, extinction
Profile, perhaps temp profiling by 2004

EPA Mapping program – ozone and PM2.5 (2-hour delay). Currently the data are available from NOAA/FSL through Sonoma Technology.
Hopefully 35 PM reporting stations by 2004

All NH data will be shared with UNH - Underhill

IMPROVE sites in NE – about 15 – speciated areosols every 3rd day- Beloin

NADP – acid rain network throughout New England (6 in ME)
+ Mercury Network – CSU web site (Beloin)

National Park Service monitoring in Acadia

Canadian monitoring program goes in EPA Mapping Program
EPA will add PM data from Canadian sites

Isles of Shoals ferry (ozone and possibly CO)

WHOI will deploy 1 or 2 buoys off New Hampshire (ozone, meteorology, possibly CO).

MA runs three monitoring sites that include NOy as part of PM networks

Whiteface MT. and Pinnacles – Ken D (SUNYA)

Possible additional ground site for aerosols in ME or Nova Scotia

Appledore Is. – ozone, CO, possibly DOAS system from UCLA

Mt. Manadnock – More room for additional measurements (Underhill)

Rye ozone monitor slated to shut down in 2004- This year Rye and Odiorne (?) will be compared.

Unattended ozone lidars at two sites (perhaps TF and upwind site). Micropulse aerosol lidar will also be deployed at TF.

Harvard Forrest – chance for aerosols, $CO2$ flux, energy flux, CO, NO, $NO2$, NOy, PAN and Halocarbons

Holland, ME - tall tower added with CO and $CO2$, met. , Doppler acoustic sounder, surface energy balance fluxes, CASTnet – Munger

MANE-VU upgrades (G. Allen)

Meteorological Sampling

Profiler network – wind and temperature profiles, surface met. – White

CRN at TF, and Kingman Farm (also in Durham), URI (southern NE)

Mesoscale network (15 stations – WS, Dir., Temp, RH) - Contorno

AIRMAP stations (surface met.)

NH Fire towers through DES – partial surface met.

Plymouth SC will get a portable met station with radiation, and a portable GPS rawinsonde system (100 sondes)

Mt. Washington - string of Temp sensors at 500 ft intervals along auto road

NWS modernizing COOP network in NE (temp and precip) - may not be available by 2004.

NOS has Ports system in Narragansett Bay for tidal weather

GPS Sondes (2 to 4 daily) from Bartlett

NWS coordination will involve telemetry of sites that are not already available and modernization of existing networks

NOAA energy and radiation fluxes at selected site

Other agency profilers (5)

Archiving of ASOS sites – Plymouth SC

Logistics

NOAA needs to establish 4 new profiler sites

Housing for personnel for Plymouth SC – students to run portable met equipment

Science Objectives

Summer is not only poor air quality season – maintaining monitoring networks throughout the year should be a priority

Long-term surface monitoring networks put episodes and field campaigns into climatological context.

ITCT-2K4 objectives were well defined at meeting. Group will work to priortize.

Coordination

- Group will produce master spreadsheet with measurements, locations, PI's, data collection periods, start end dates for campaign, etc. – 1 July

- Web-based layered, mapping system to show all measurement sites that are available (could learn from FSL and EPA experience) – 1 September

- Email traffic among team and conference call if necessary.

Measurement Comparison

Comparison *breakout session*

Purpose: to create a unified observation system by assessing and quantify the uncertainties in all measurements

Results: three scenarios anticipated:

1. The measurements agree within the stated uncertainties
2. Significant differences are observed and reconciled
3. Significant differences are observed but not reconciled

Outcome: Open dissemination of comparison results; ability to use independent measurements as one

Today's goal: Devise a "plan for the planning" needed to execute an optimal matrix of comparisons

Comparison *platforms*

Satellites	Aircraft	Ship	Surface	Sondes
TES (Aura)	NASA DC-8*	Ron Brown*	*Chemistry:*	Trinidad Head
GOME (ERS-2)	NASA P-3		Mt. Washington	Boulder
Moppitt (Terra)	NOAA P-3		Castle Springs	Huntsville
Scia. (Envisat)	NOAA DC-3*		Thompson Farm	Wallops
	DOE G1		Appledore Is.*	
	FAAM Bae 146		Harvard Forest	
	NRL Twin Otter		Whiteface	
	Harvard King Air		Pico (Azores)	
	UMD		Prophet	
	EnvCan Convair 580		Bar Harbor*	
	DLR Falcon			
	CNRS Falcon		*Remote sensing:*	
			Plymouth	
			Pease	
			Concord	
			Sable Is.	

(*) has remote sensing capacity

- which subset of all possible comparisons will be most useful?

Comparison *primary issues*

- Which comparisons of all possible will be most useful?
- Are comparisons of some species more crucial than others?
- How many flight segments should be allocated to comparisons?
- What range of what conditions are desirable for the comparisons?
  (i.e., pollution levels, altitude, time-of-day)
- What level of formality should be used? Data exchanges? Referees? Interactions?
- Should early preliminary comparisons guide later comparisons?
- What organizational structure is needed to do good comparisons?

Comparison *details*

- coordination of platforms for direct comparisons
- maximizing data coverage during comparisons
- reconciling in-situ with remotely-sensed or column data
- aerosol sampling details of RH dependence and size cuts
- comparison of satellite footprints to in-situ data
- Circulation of standards - prior to, during, and/or post-mission

  both gas-phase and aerosol (size, simple composition)

  requires active orchestration

Comparison *break-out goals*

- agree on an organizational structure
- agree on the formality and data handling
- agree on overall comparison strategy
- begin the outline the most valuable comparisons
- begin to outline the desirable conditions for comparisons

Comparison *proposed strategy*

- Organization: a small group, with one person from each major organizational group (NASA, NOAA, etc), to devise a strategy, with input from all, act as referees, and attend to logistical details for comparisons.

- Formality: Semiformal. Data are submitted to referees, then when all data of a chemical for that flight are submitted, are released to all. Referees encourage participants to look for non-recoverable errors.

- Strategy development to create integrated observation system
  - comparison matrix – wingtip-to-wingtip, aircraft to ground or ship, US to European, aircraft/ground to satellite
  - goal: each comparison occurs at least twice
  - goal: comparisons are done over range of important parameters – (i.e., altitude, water vapor, pollutants)

Modeling and Forecasting

SUMMER 2004 FIELD STUDIES

MODELING WG REPORT

1. CATALOG OF FORECAST PRODUCTS
   - Regional Air Quality (RAQ) forecasts: EPA/eta-CMAQ, WRF-Chem, UI/STEM, Canada/AURAM
   - Large-Scale (LS) forecasts: MPI-C, FLEXPART, TOMCAT-based, UMd-GEOS(stretch-grid), MOZART, Langley, FSU/RDF, GEOS-CHEM, H_2O satellite maps (Virginia)

2. MODELING NEEDS
   - Reference standard for anthropogenic emissions
     - U.S.: EPA (Schere) – need detailed speciation
     - Canada: AES (Gong)
   - access to <u>complete</u> 12-km NCEP data with hourly resolution (incl. vertical winds)
   - Near-real-time AIRS data for eastern North America
   - Internet access aboard planes

SUMMER 2004 FIELD STUDIES
MODELING WG REPORT (cont.)

3. EXPECTATIONS FROM THE FORECASTS

- **Different modes of operation for INTEX and ITCT**
  - **ITCT: would a limited set of standard forecast products be useful?**
  - **INTEX: individual groups to examine their forecasts, make recommendations.**

4. FORECAST EVALUATION

- **Formal intercomparison of RAQs – comparison variables to be finalized**
- **Ship, surface data – what about aircraft data? (how fast can it be made accessible?)**
- **Central data archive (NOAA) accessible by Science Team**

SUMMER 2004 FIELD STUDIES
MODELING WG REPORT (cont.)

5. ACCESS TO DATA IN FIELD
- Forecast products posted on web

6. PRE-MISSION PLANNING MEETING
- Hindcast simulations -> identification of ventilation/outflow pathways, coordination between aircraft, fine-tuning of flight scheduling
- To involve modeling groups, mission scientists, interested Science Team members
- January 2004

International Coordination

ITCT-Lagragian-2K4

An IGAC task focused on ITCT
(Intercontinental Transport and Chemical Transformation)

Today Introduce (briefly):

- ITCT-Lagragian-2K4 Concept
- ITCT-Lagragian-2K4 Goals
- Constituent Field Programs
- Research Plan and Timetable
- Task Coordinators and Steering Group

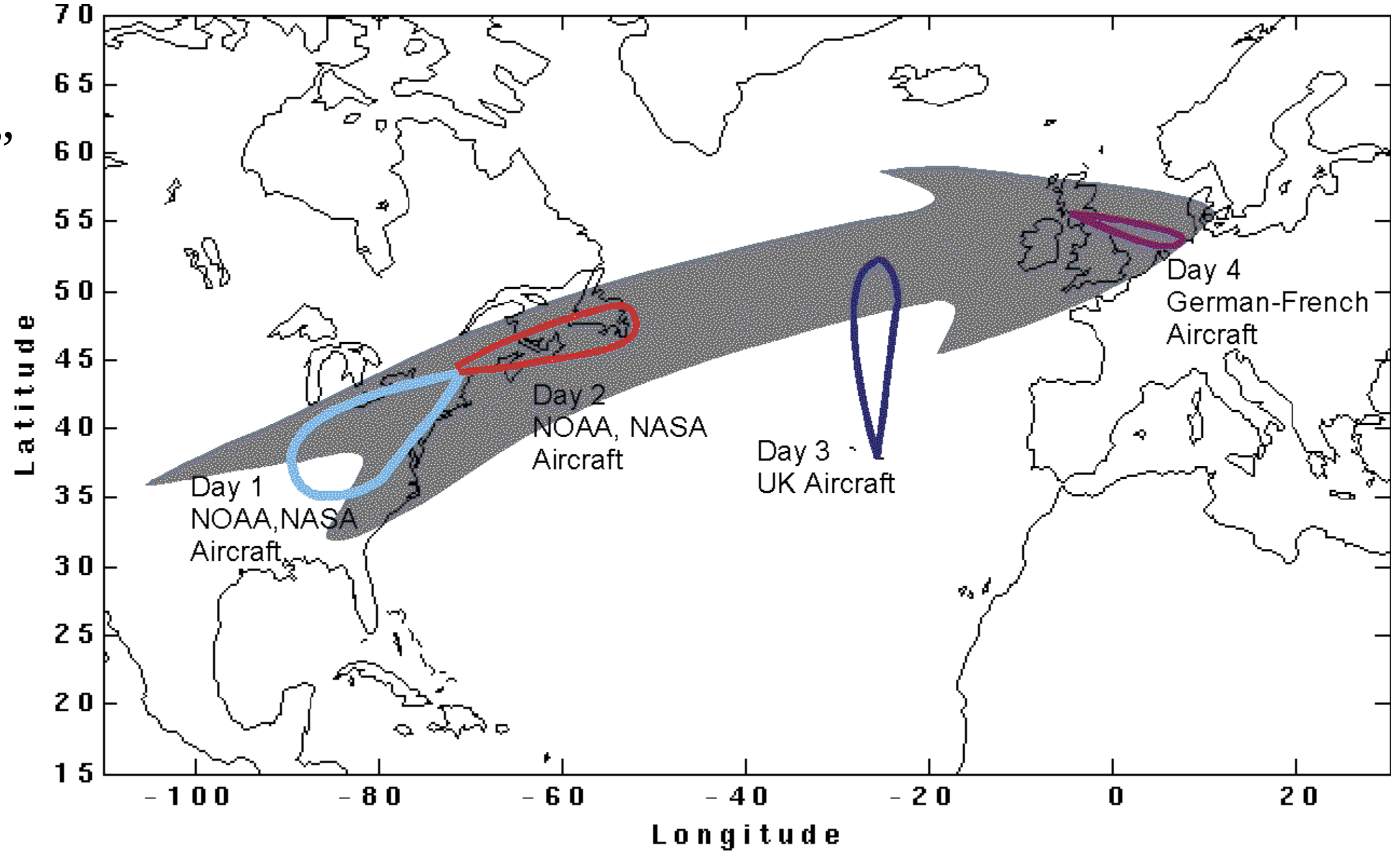
ITCT-Lagragian-2K4 Concept

In summer 2004 several North American and European agencies will conduct research programs on both sides of the Atlantic.

ITCT-Lagrangian goal: Coordinate studies to maximize the insight into ITCT

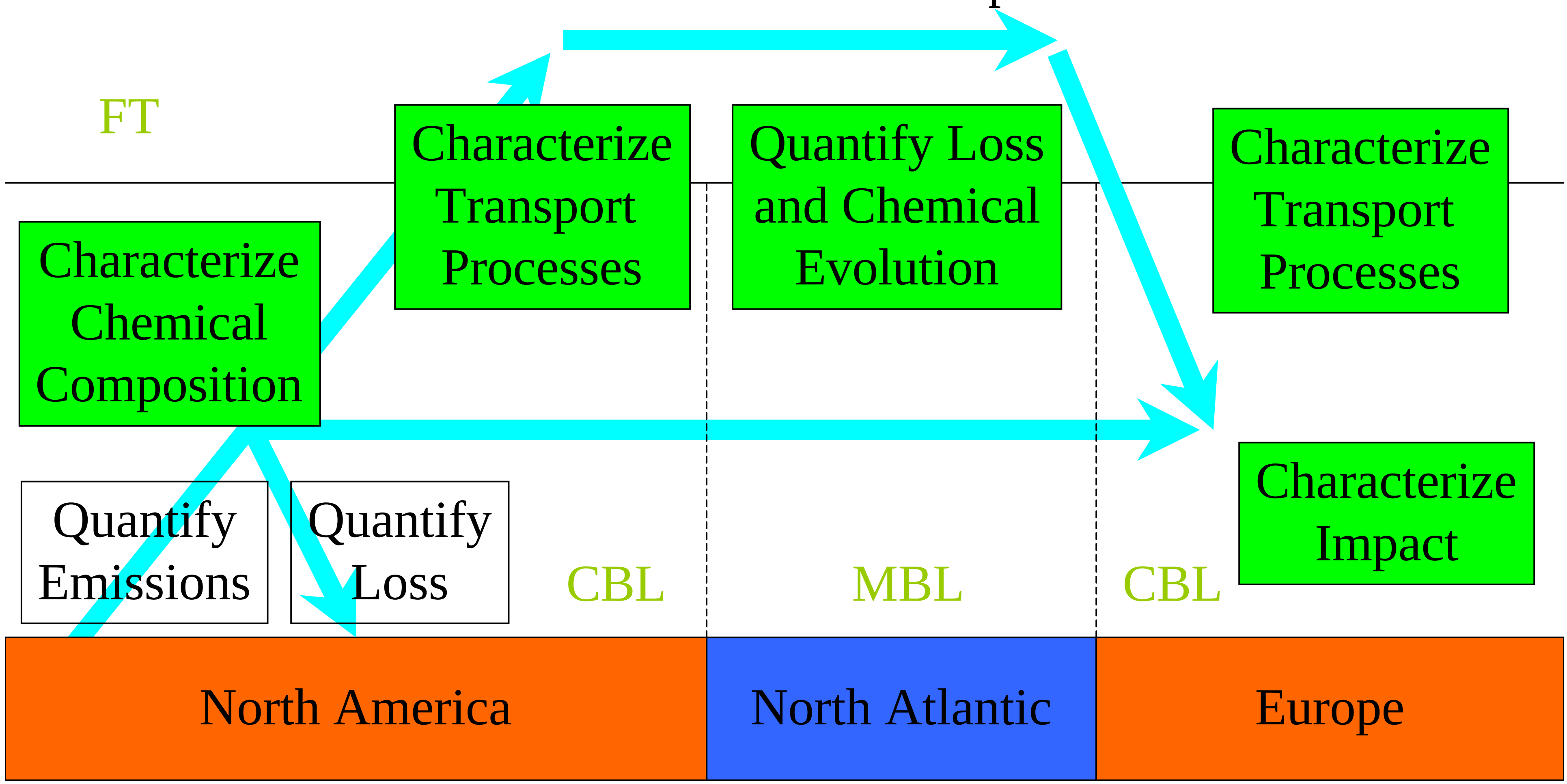
Approach: Create a "pseudo-Lagrangian" framework.

International status of IGAC provides an ideal forum for this coordination.



ITCT-Lagragian-2K4 Goals

Overall: Direct observation of the evolution of the aerosols, oxidants and their precursors from emission over North America, trans-Atlantic transformation and transport, and impact on aerosol and oxidant levels over Europe



Constituent field programs - Summer 2004

On the North American side:

NENA-2004   U.S. NOAA - aircraft, ship, surface

INTEX-NA U.S. NASA - aircraft

Canadian - Cal. Tech indirect aerosol effect study

NSF/Harvard/COBRA - North American Carbon Budget Study

Other ground based and aircraft programs in source region

On the European side:

ITOP NERC- UK; DLR - Germany; CNRS - France

ATMOSFAST - Germany - lidar and surface

On both sides: MOZAIC, CARIBIC, MOPPIT, ENVISAT, AURA(?)

In Central Atlantic: PICO-NARE - Azores

ITCT-Lagragian-2K4 Science Plan

1. **Retrospective Analysis of Previous Pseudo-Lagrangian Results.** During the NARE 1993 and NARE 1997 studies aircraft were operated on both the North American and European sides of the Atlantic. Two possible psuedo-Lagrangian events have been identified. More extensive analysis of these data will be conducted, partially as a guide to the field implementation during 2004.

2. **Instrument Comparison Activities.** For the pseudo-Lagrangian approach to be successful, it is essential that the aircraft involved make measurements that are equivalent within quantified uncertainties. ITCT-Lagragian-2K4 will coordinate comparison activities designed to quantify measurement uncertainty. This will establish an objective, defensible basis upon which the pseudo-Lagrangian analysis can be based. In effect, a unified observation system is created.
   - Evaluation of standards
   - Direct comparison of measurements
   - Indirect comparison of measurements

ITCT-Lagragian-2K4 Science Plan (cont.)

3. Flight Coordination.
   - North American aircraft programs will conduct their independent flight planning.
   - ITCT-Lagrangian-2K4 will closely monitor the flights that are made in the source region, monitor forecast trajectories for these air masses, and alert aircraft in the central and eastern Atlantic of possible interception opportunities.
   - On the European side, efforts will be coordinated under the ITOP umbrella.
   - A coordinated strategy for flight planning will be developed in collaboration with North American participants.

4. Post-Campaign Analysis. ITCT-Lagrangian-2K4 will coordinate a combination of data analysis and modeling to assure that the scientific objectives of ITCT-Lagrangian-2K4 are addressed.

   Specific issues: Data set accessibility to all participants, Workshop organization, Identification and completion of papers.

ITCT-Lagragian-2K4 Timetable

- The planning for the study began in early 2002 and is ongoing.
- Review of previous results will be completed before field deployment.
- Planning for coordinated field activities during coming year (tools, modeling, flight strategy etc.)
- Field deployment will be conducted in July and August, 2004.
- Workshop(s) to discuss results and outline possible manuscripts.
- Manuscripts will be submitted for publication within 18 months after the completion of the field deployment.
- The completion date for the task will be at the publication of the special journal section(s) describing the results of the study.

ITCT-Lagragian-2K4
Task Coordinators and Steering Group

Coordinators:

David Parrish (IGAC, NOAA) - U.S.
Kathy Law (IGAC, CNRS) - France

Steering Group:

Daniel Jacob (NASA) - U.S.
Claire Reeves (ITOP) - UK
Hans Schlager (DLR) - Germany
Andreas Stohl (NOAA NENA - Multinational)
Valerie Thouret (MOZAIC) - France