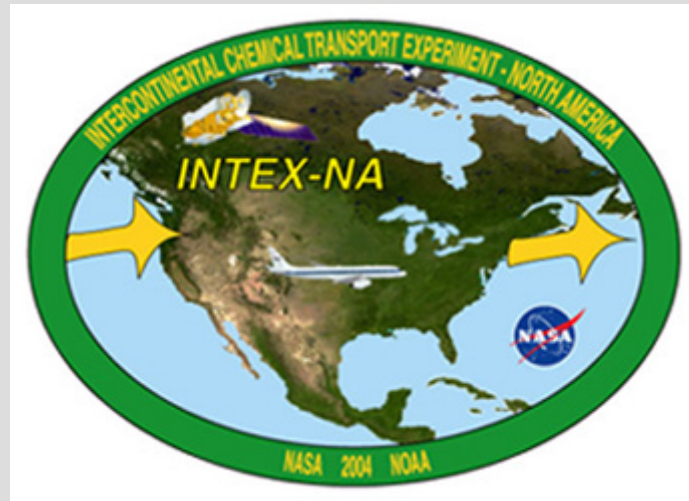


# INTEX - NA

## Meteorological Overview



Henry Fuelberg

Chris Kiley

Danielle Morse

Michael Porter



# Outline

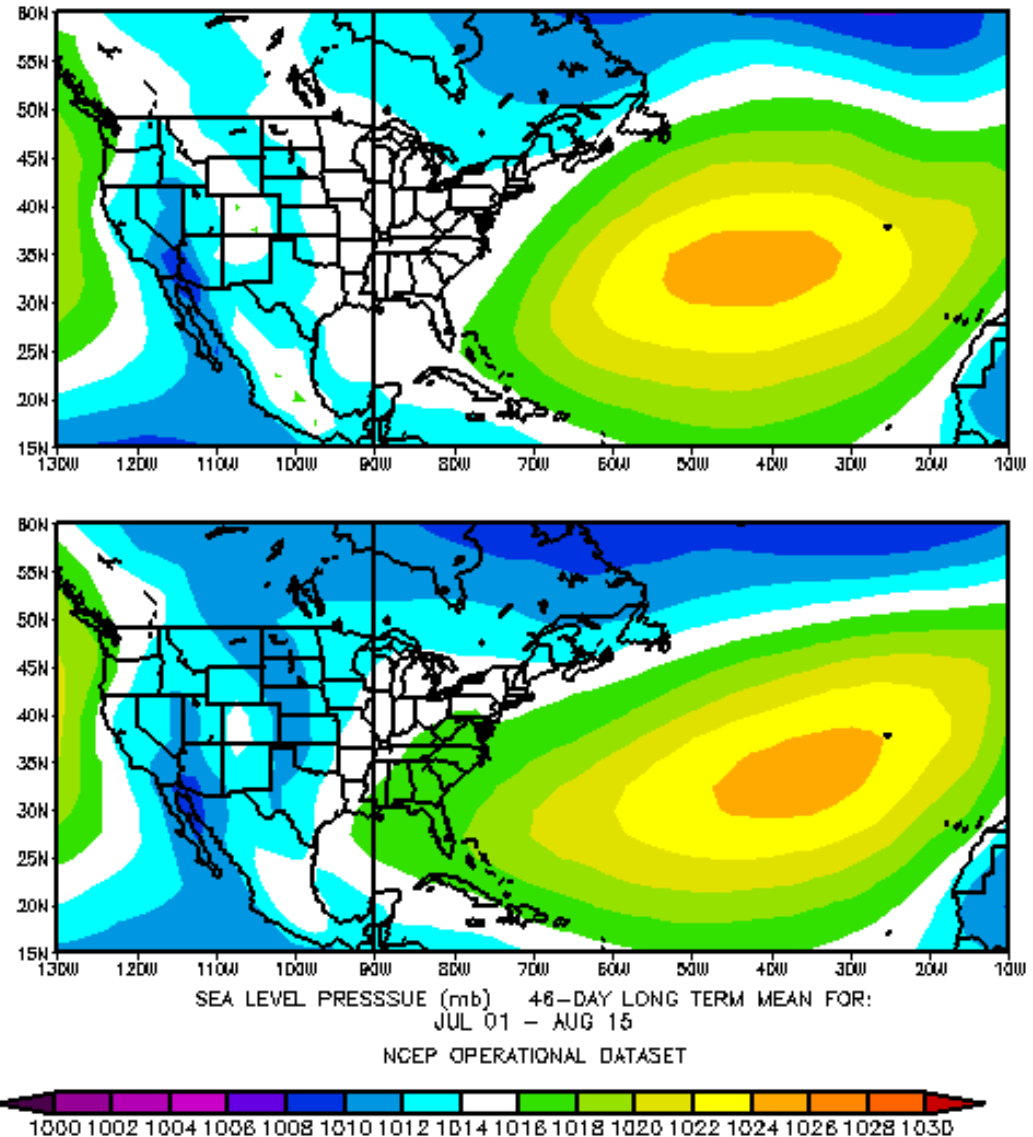
- Describe meteorological conditions during INTEX
- Assess representativeness of INTEX period
- Examine interesting scenarios
  - Extensive lightning
  - Asian pollution
  - Alaskan fires
  - Transport to Europe (Lagrangian experiment)



# Surface Pressure

**2004  
46-day Mean**

**Climatology**



# Animation of Sea Level Pressure

July 1-6 – California flights

July 7-15 – Mid America I flights

July 16-Aug 11 – Pease flights

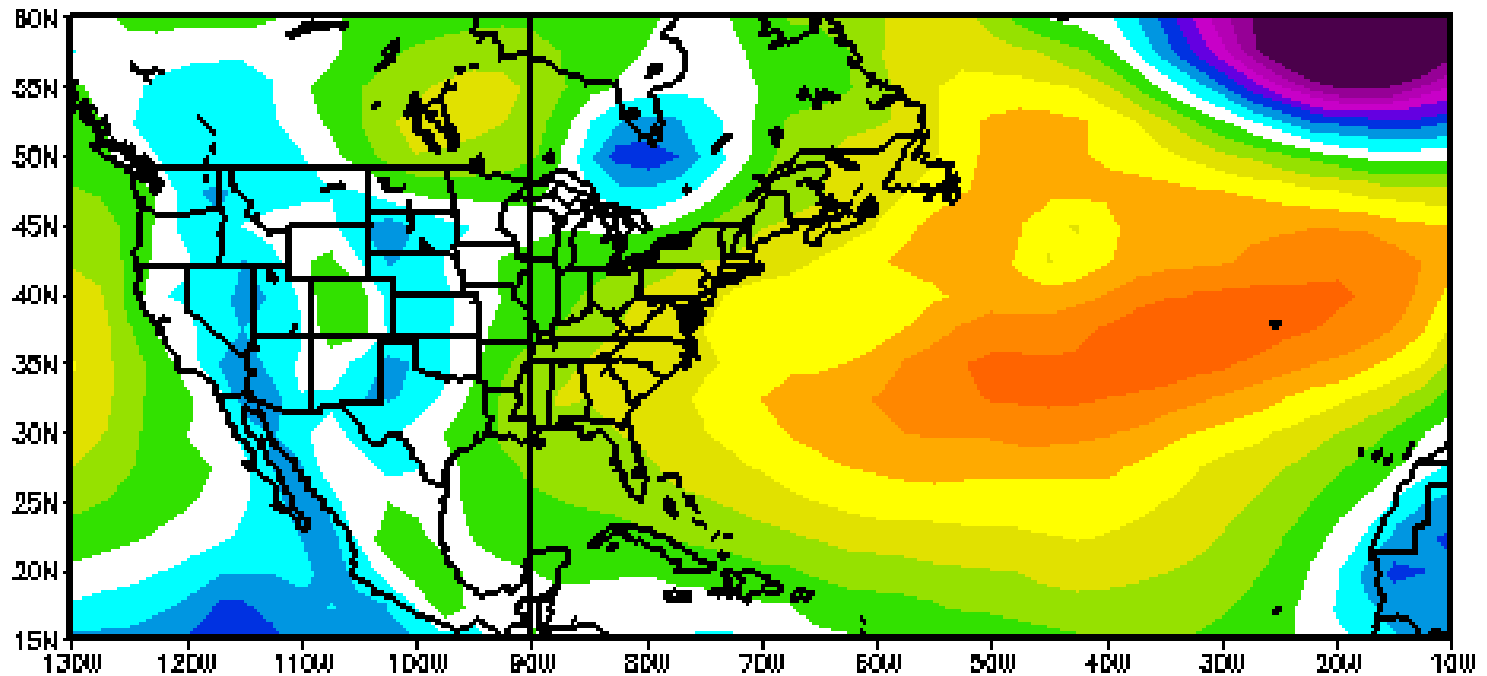
Pause July 28 – North Atlantic flight

Pause July 31 – Bermuda high flight

August 12-15 – Mid America II flights  
and return to Dryden



# Surface Pressure - CA

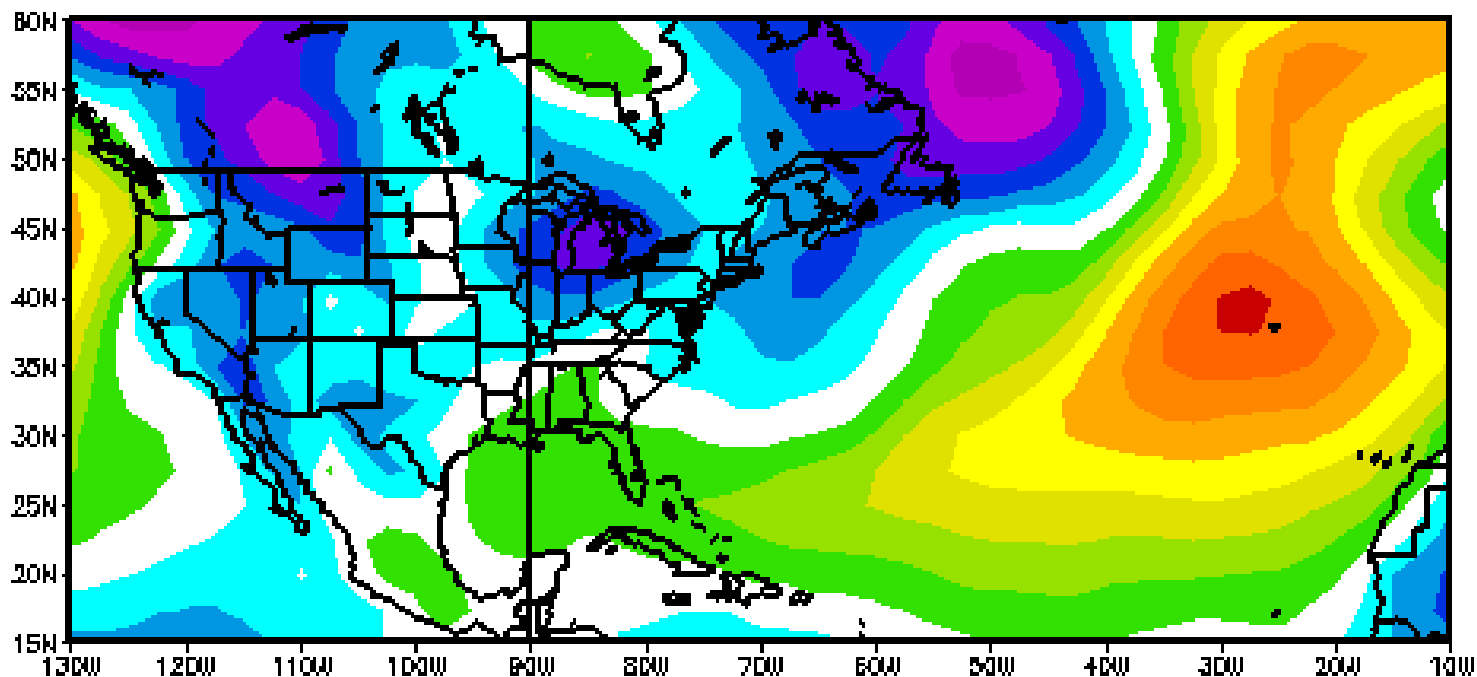


SEA LEVEL PRESSURE (mb) 01-DAY MEAN FOR:  
Thu JUL 01 2004  
NCEP OPERATIONAL DATASET



# Surface Pressure - STL

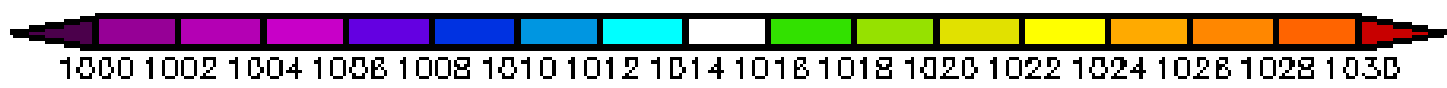
St Louis



SEA LEVEL PRESSURE (mb) 01-DAY MEAN FOR:

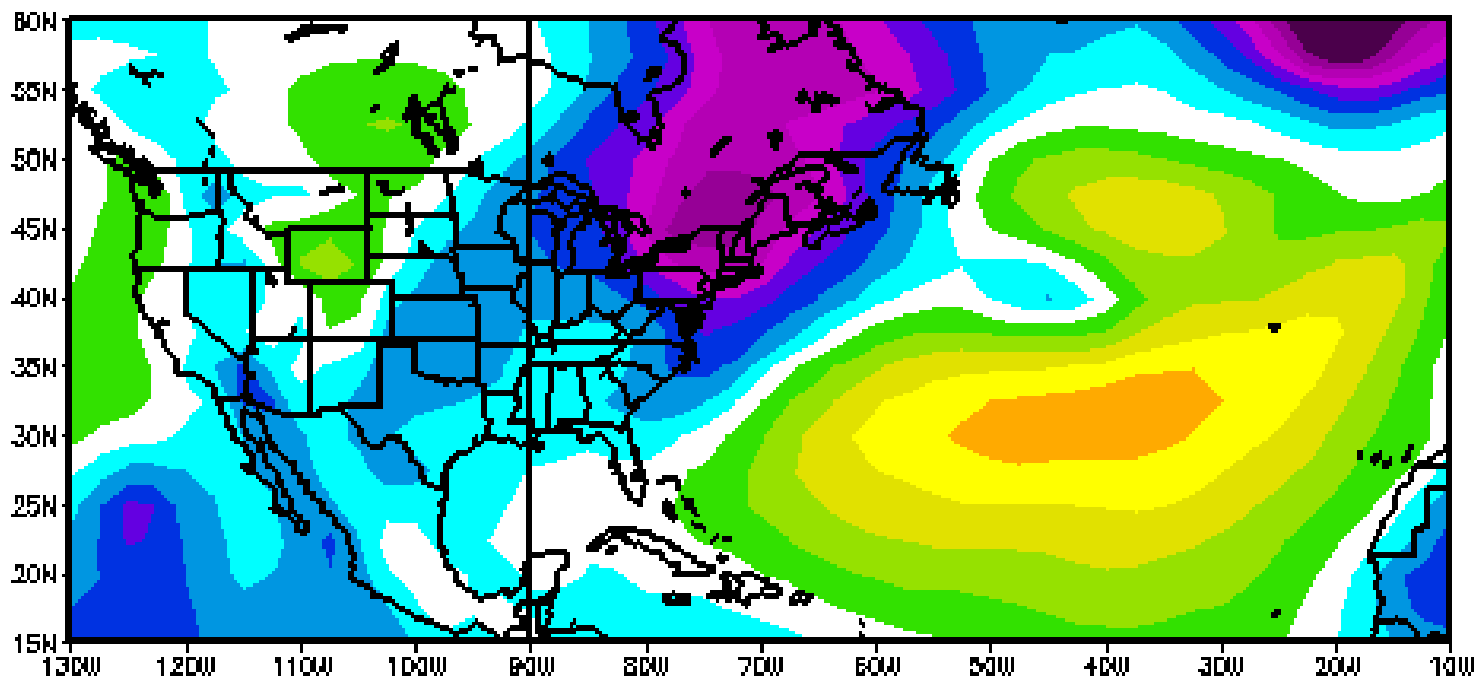
Wed JUL 07 2004

NCEP OPERATIONAL DATASET



# Surface Pressure - NH

Pease



SEA LEVEL PRESSURE (mb) 01-DAY MEAN FOR:

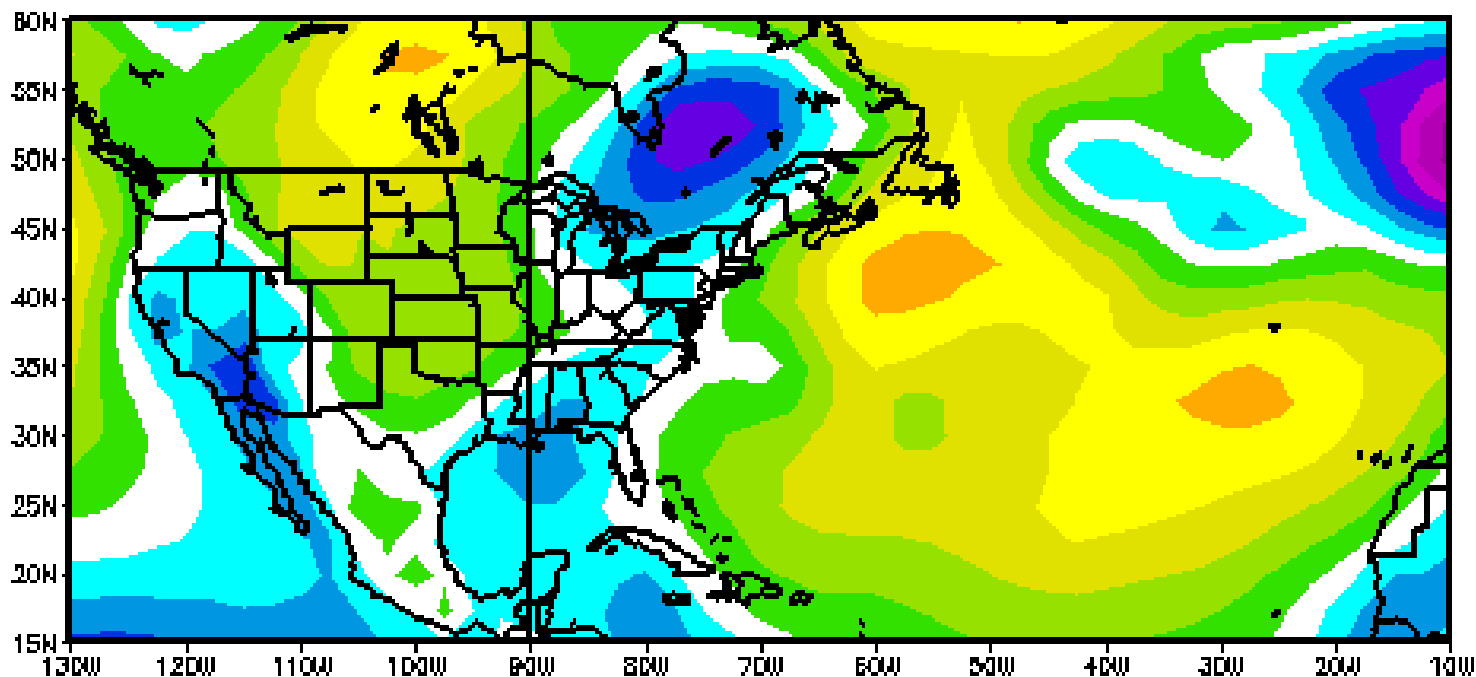
Fri JUL 16 2004

NCEP OPERATIONAL DATASET



# Surface Pressure - STL

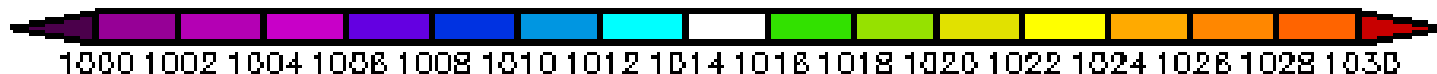
St Louis



SEA LEVEL PRESSURE (mb) 01-DAY MEAN FOR:

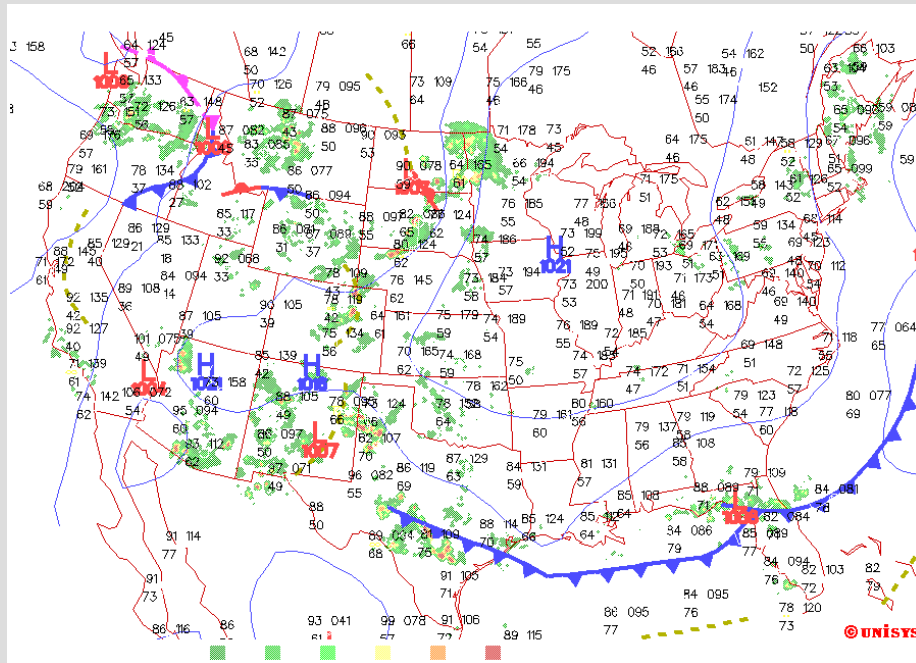
Thu AUG 12 2004

NCEP OPERATIONAL DATASET

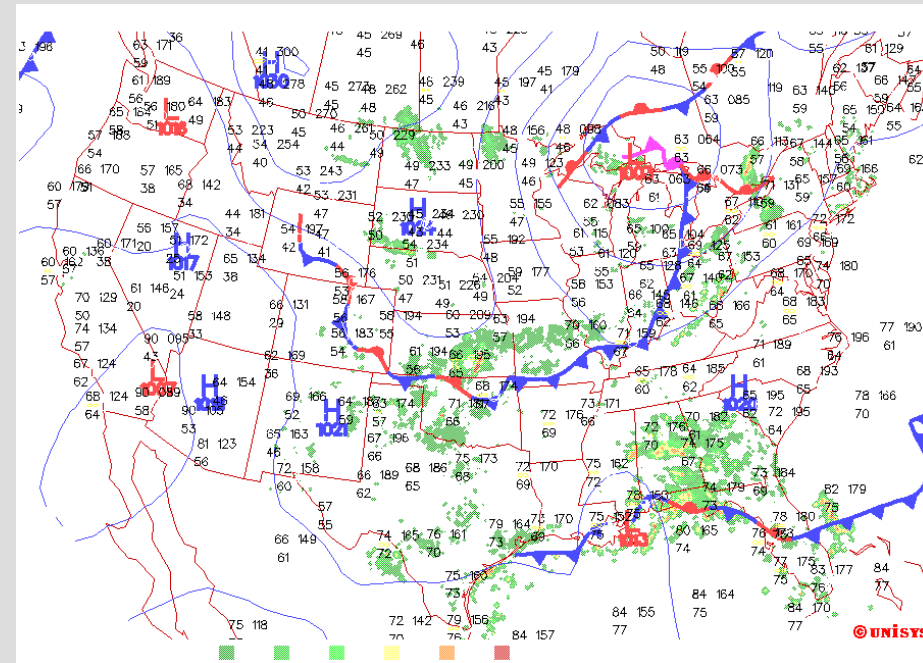




# Contrasting Weather Patterns



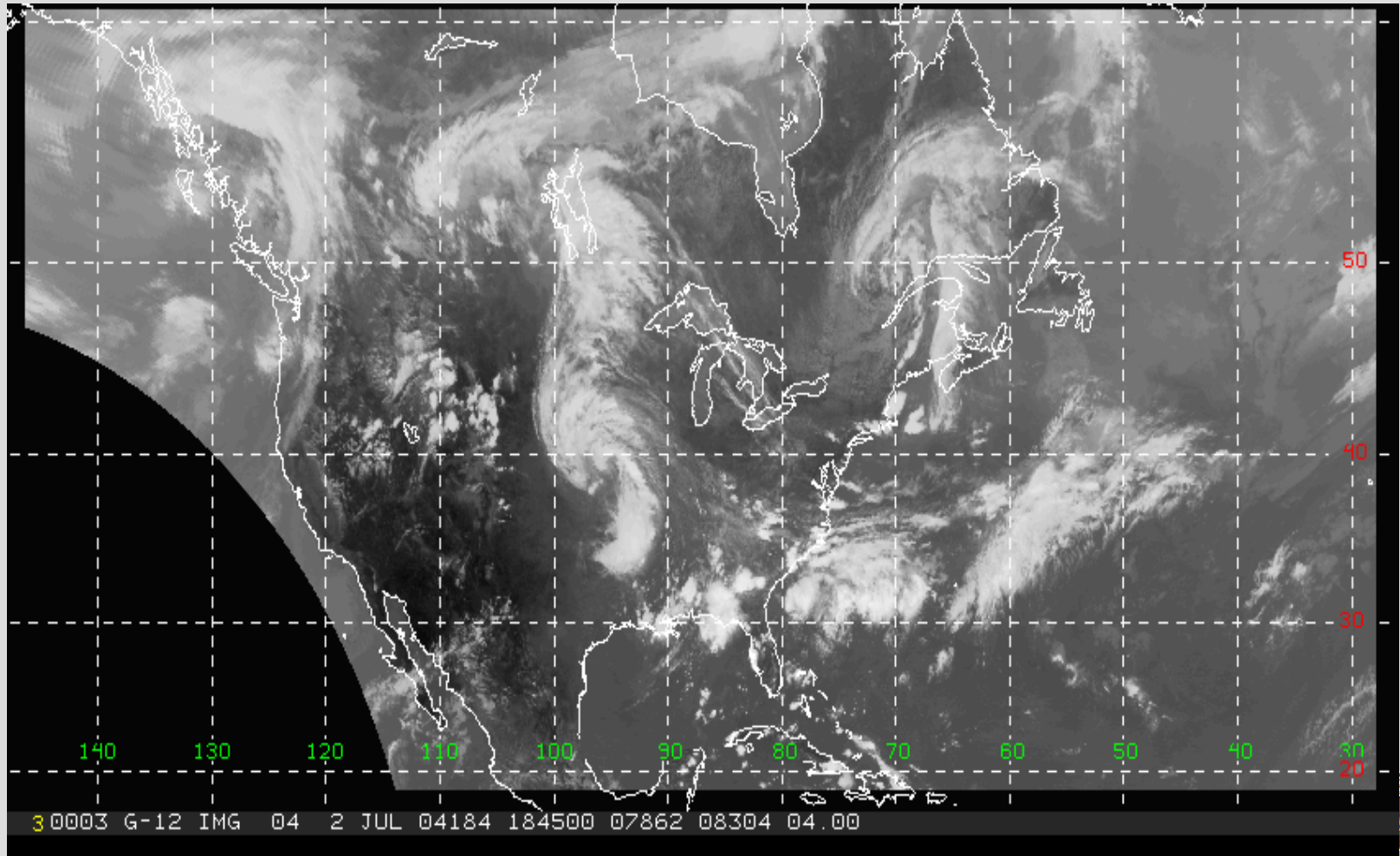
**Strongest High – Aug 7 00Z**



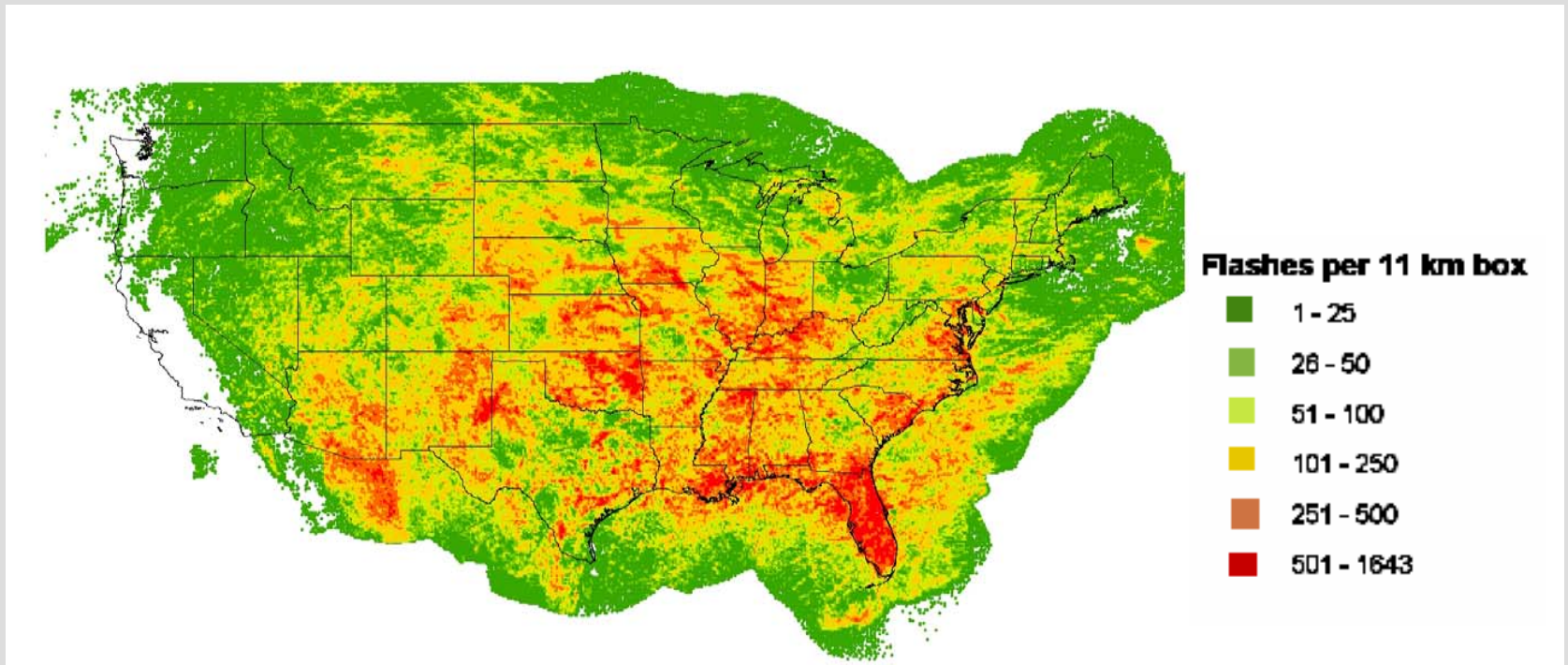
**Deepest Low – Aug 10 12Z**



# GOES-8 IR Imagery



# Lightning Composite Entire INTEX Period



# Frontal Statistics

A frontal passage can produce much convection, whereas a high pressure area can suppress convection.

July	Number of Fronts Passing NE US	Average Time Between Fronts
2000	3	7 days
2001	4	8 days
2002	6	5.2 days
2003	6	3.8 days
2004	5	5.3 days



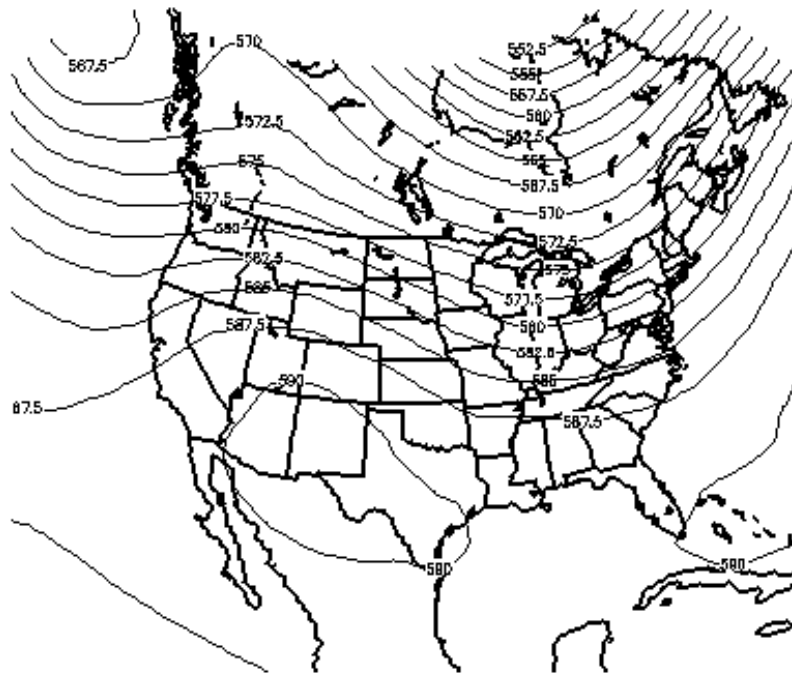
# Days With Closed High Affecting Northeast During INTEX Period

- 2000      13 days
- 2001      14 days
- 2002      14 days
- 2003      8 days
- 2004      10 days

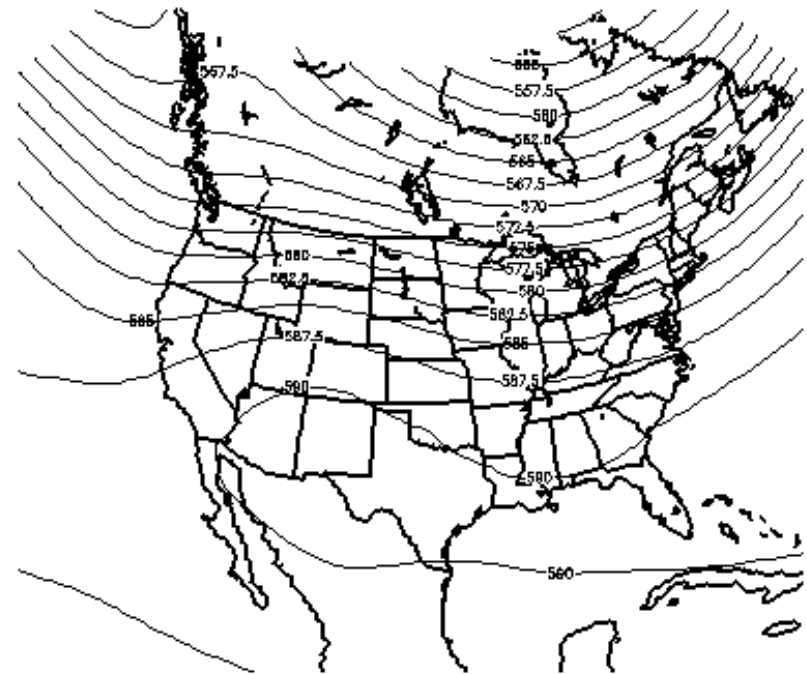
**No stagnant highs over northeast !**



# 500 mb Heights



500mb GEOPOTENTIAL HEIGHTS (dam) 46-DAY MEAN FOR:  
Thu JUL 01 2004 - Sun AUG 15 2004  
NCEP OPERATIONAL DATASET



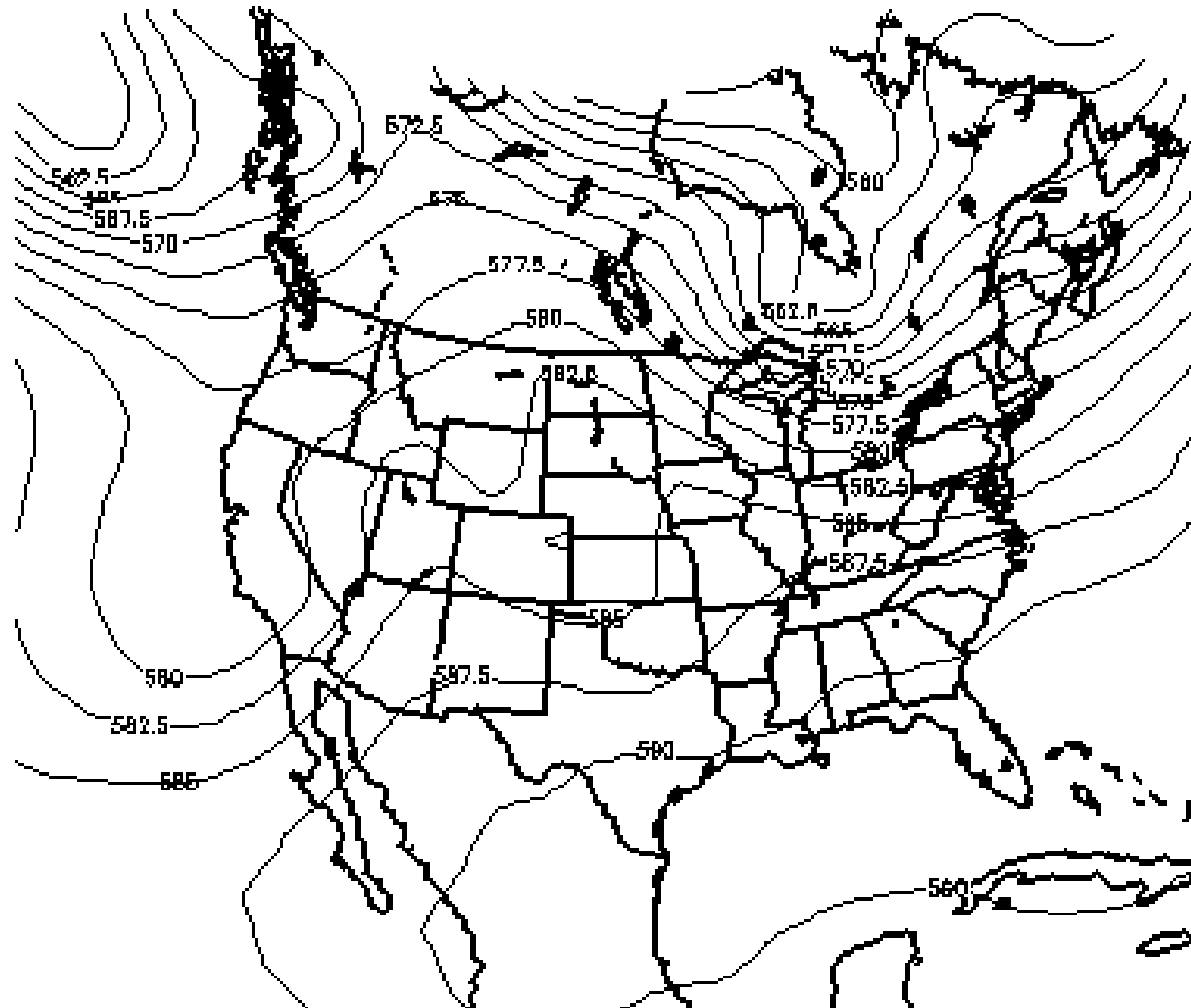
500mb GEOPOTENTIAL HEIGHTS (dam) 46-DAY LONG TERM MEAN FOR:  
JUL 01 - AUG 15  
NCEP OPERATIONAL DATASET

**2004**  
**46-day Mean**

**Climatology**



# 500 mb Heights - CA

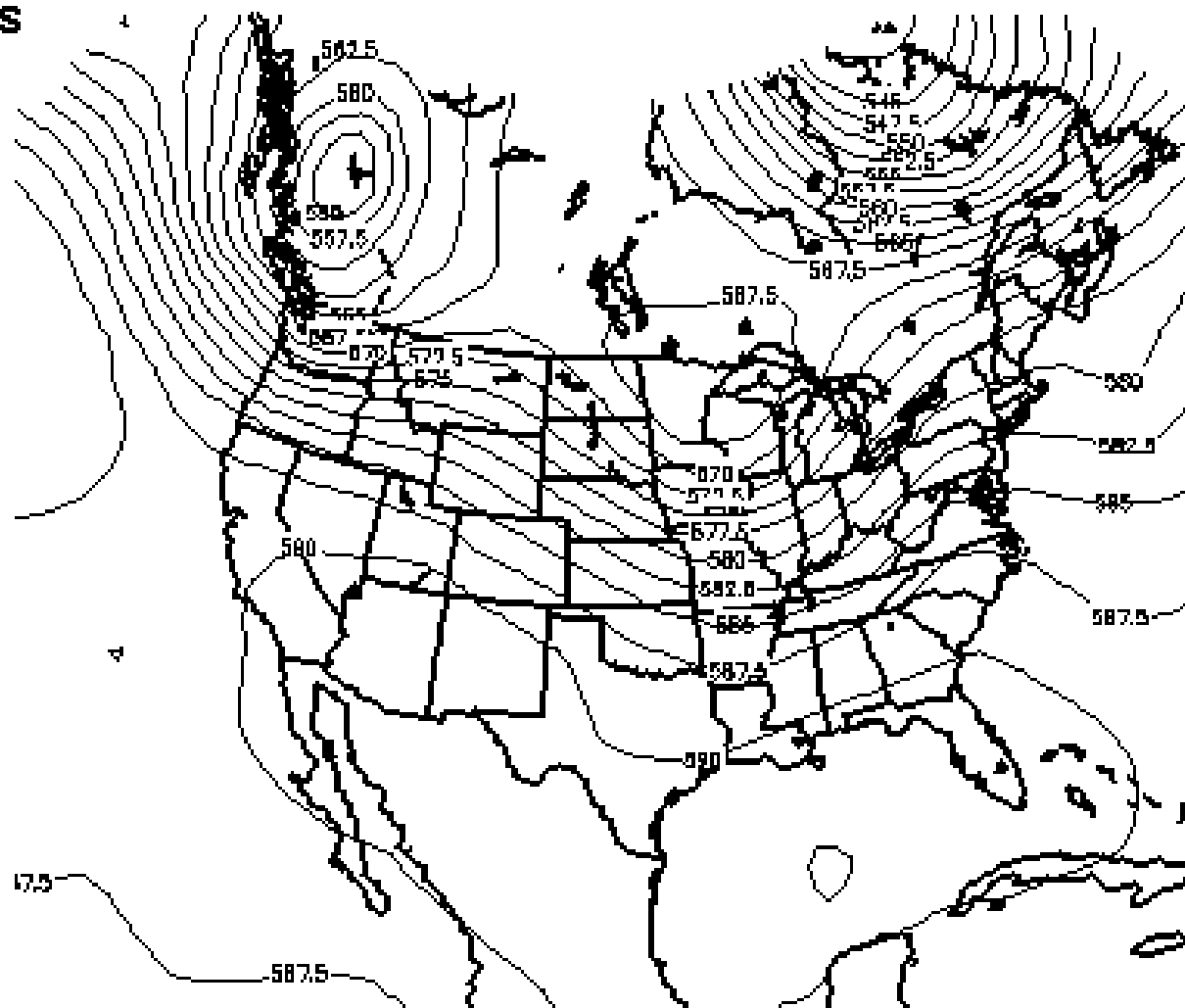


500mb GEOPOTENTIAL HEIGHTS (dam) 01-DAY MEAN FOR:  
Thu JUL 01 2004

NCEP OPERATIONAL DATASET

# 500 mb Heights - STL

St Louis



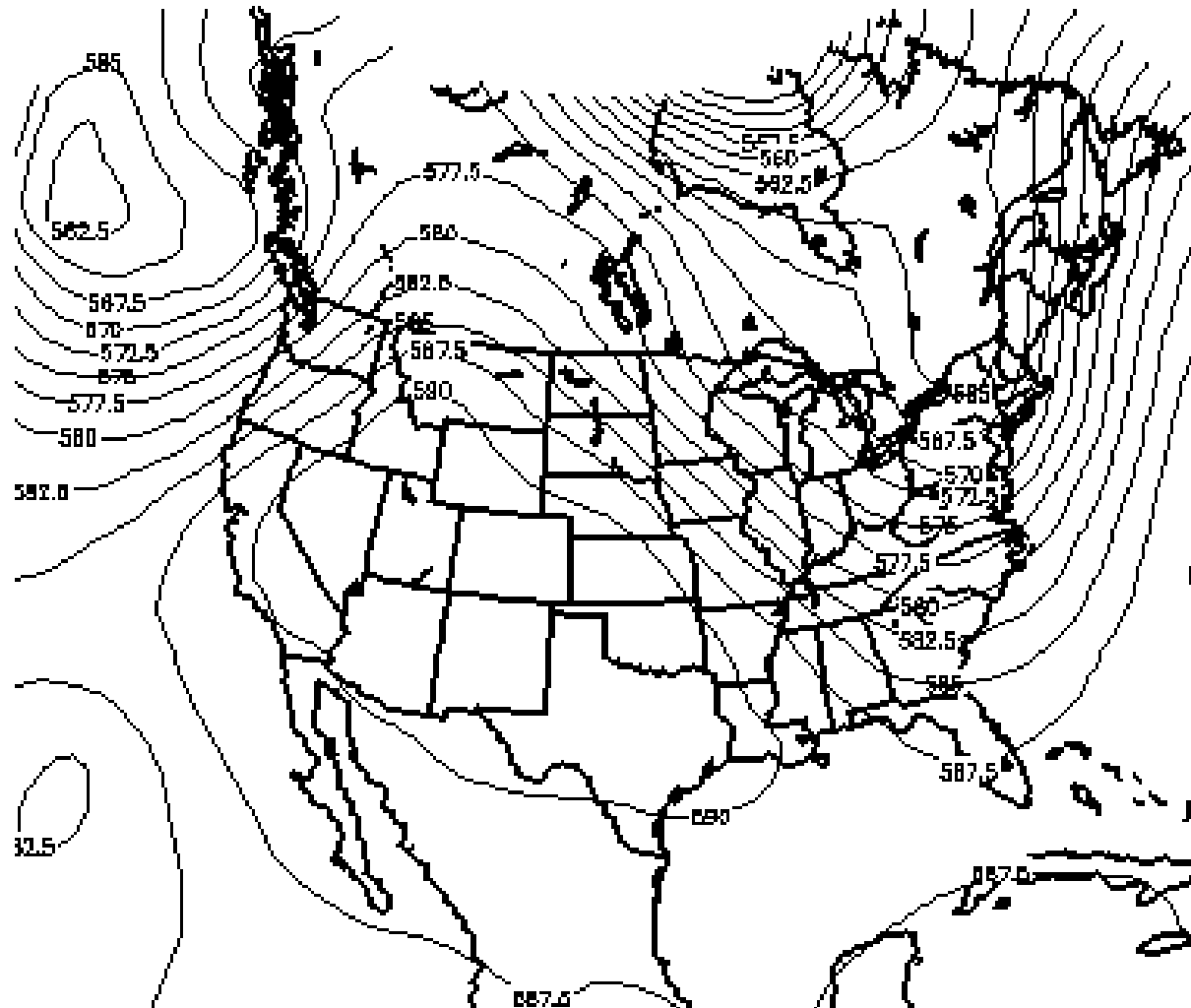
500mb GEOPOTENTIAL HEIGHTS (dam) D1-DAY MEAN FOR:  
Wed JUL 07 2004

NCEP OPERATIONAL DATASET



# 500 mb Heights - NH

Pease

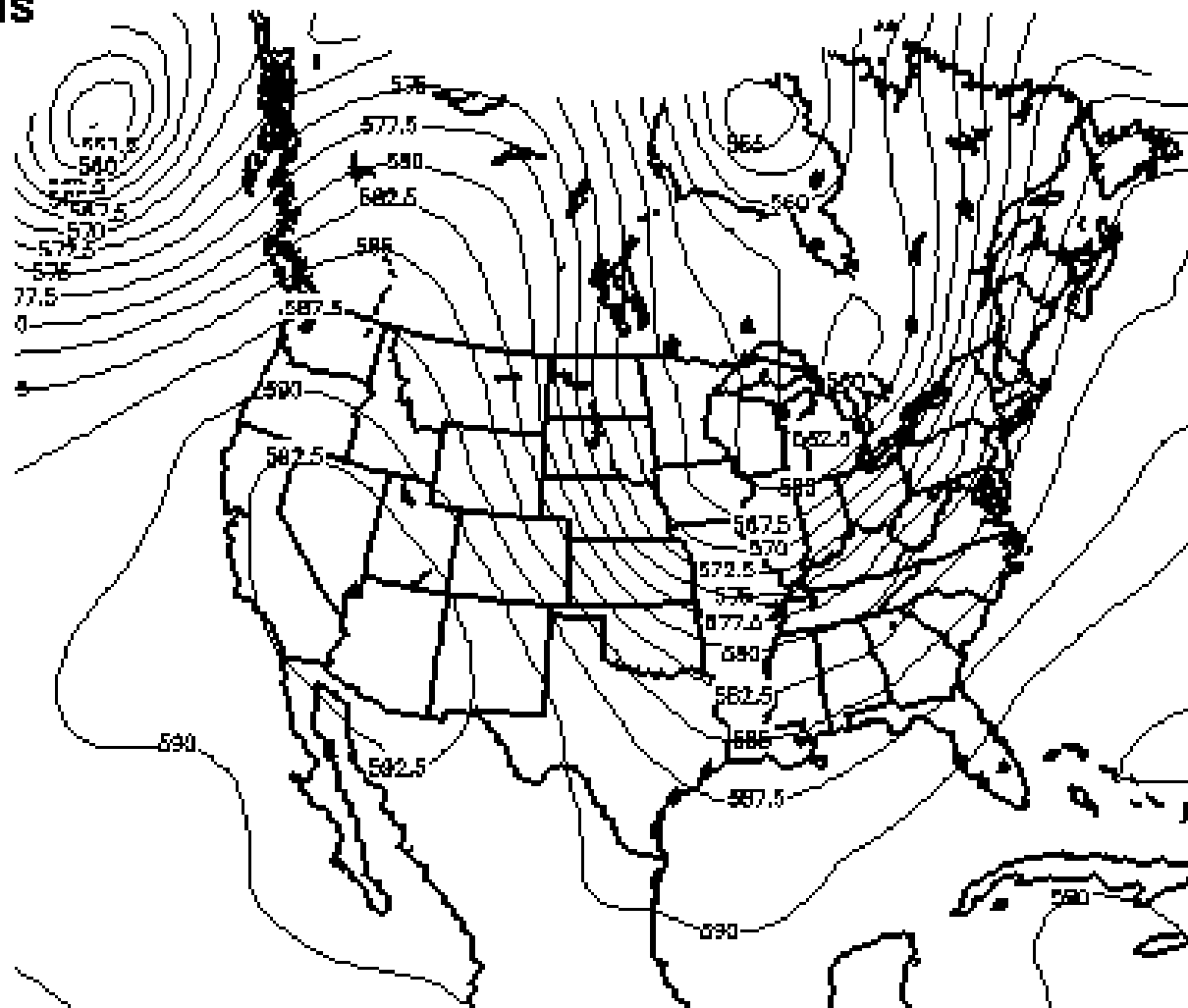


500mb GEOPOTENTIAL HEIGHTS (dam) D1-DAY MEAN FOR:  
Fri JUL 16 2004

NCEP OPERATIONAL DATASET

# 500 mb Heights - STL

St Louis



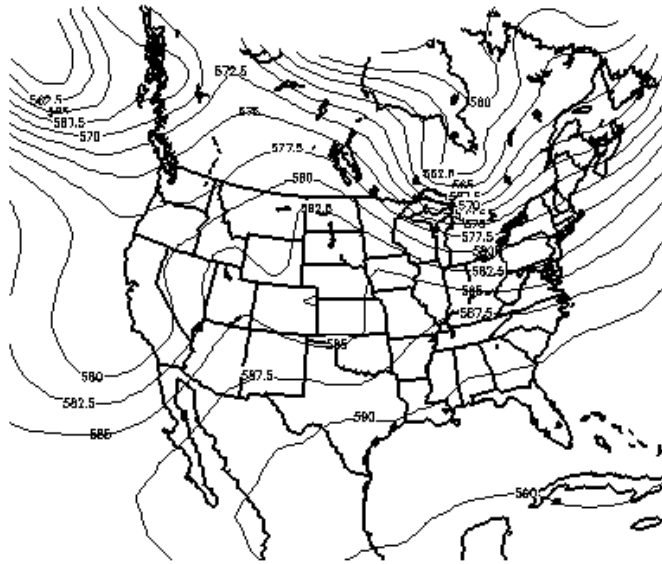
500mb GEOPOTENTIAL HEIGHTS (dam) 01-DAY MEAN FOR:  
Thu AUG 12 2004

NCEP OPERATIONAL DATASET

# 2004 vs 2003 & 2002

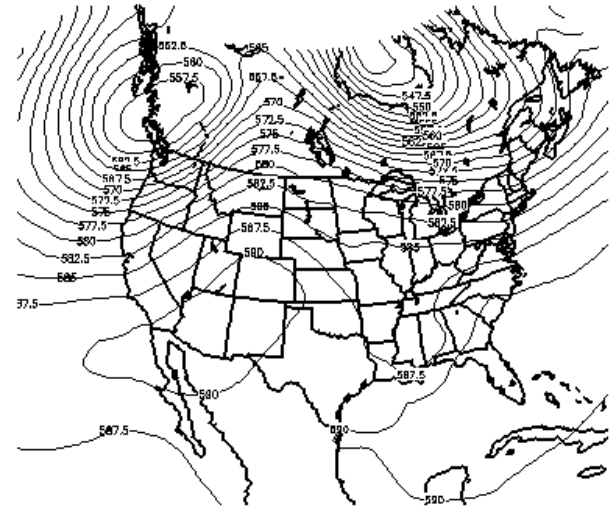
## 500 mb

2003

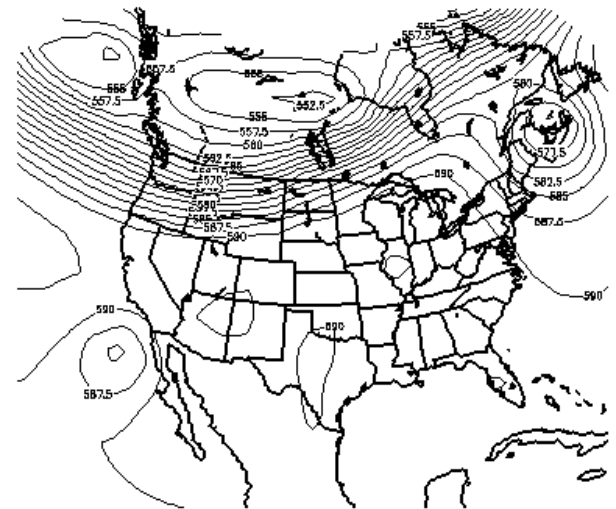


500mb GEOPOTENTIAL HEIGHTS (dam) 01-DAY MEAN FOR:  
Thu JUL 01 2004  
NCEP OPERATIONAL DATASET

2004



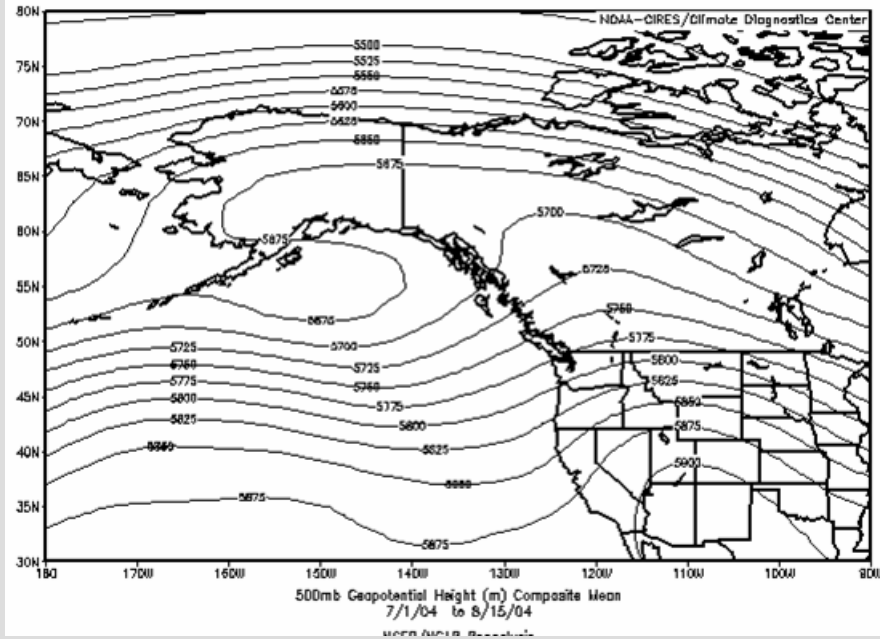
500mb GEOPOTENTIAL HEIGHTS (dam) 01-DAY MEAN FOR:  
Tue JUL 01 2003  
NCEP OPERATIONAL DATASET



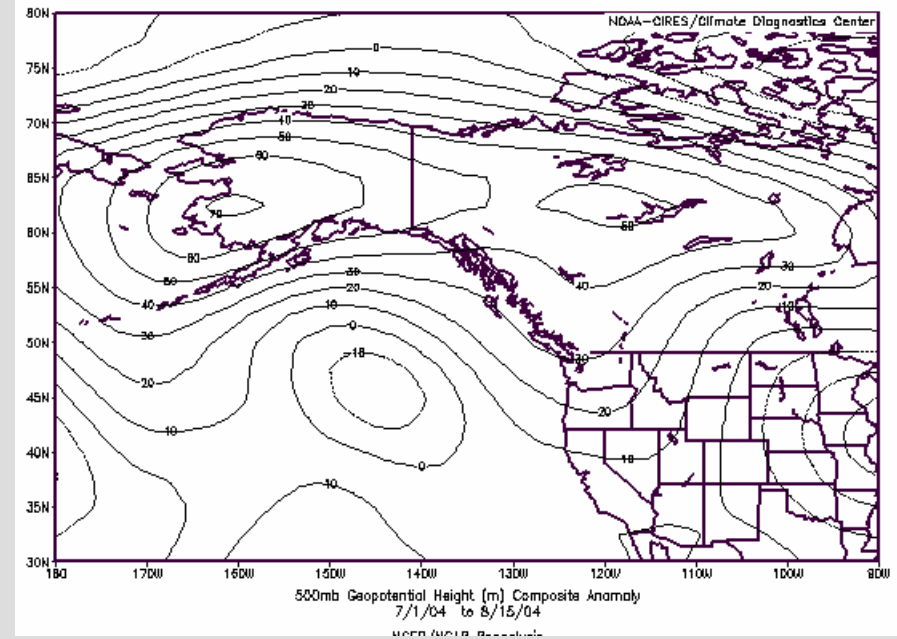
500mb GEOPOTENTIAL HEIGHTS (dam) 01-DAY MEAN FOR:  
Mon JUL 01 2002  
NCEP OPERATIONAL DATASET

2002

# Strong Alaskan Ridge



**Jul 1 – Aug 15 2004**

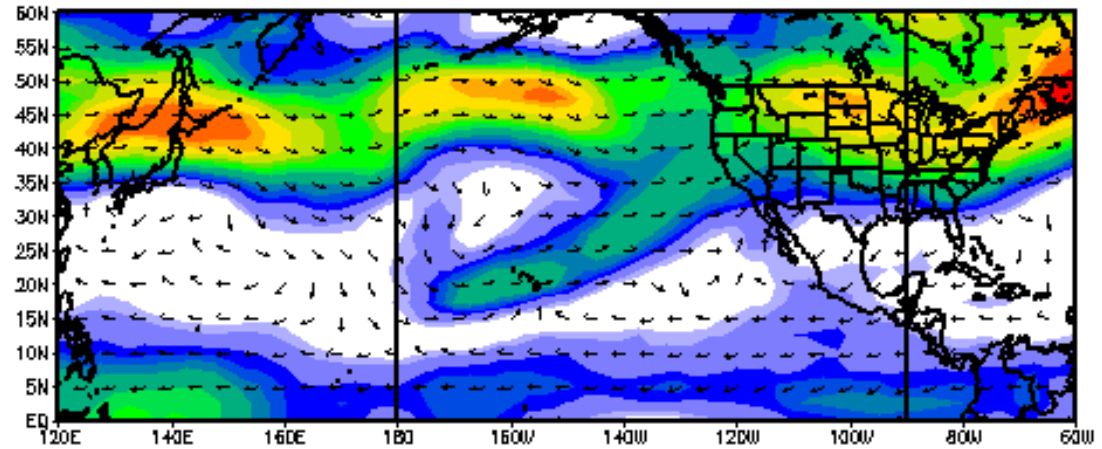


**Anomaly**

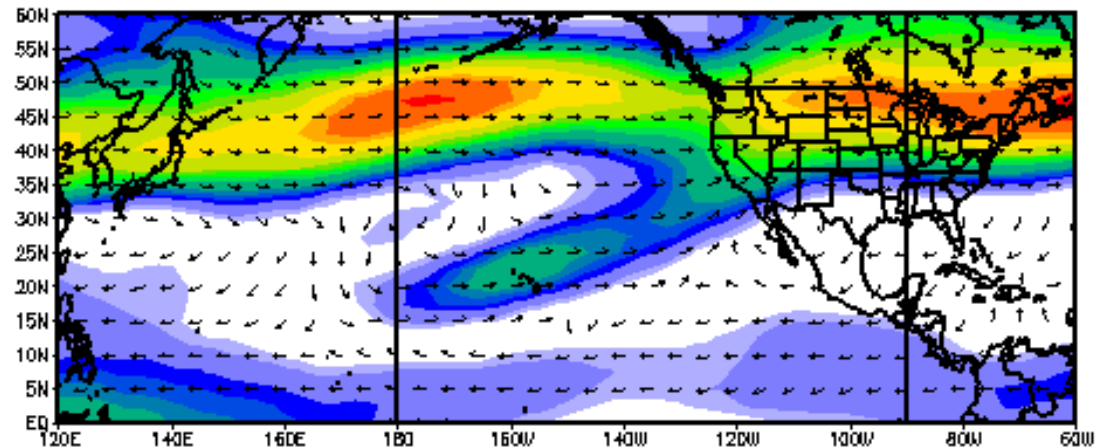


# 300 mb Winds

2004  
46-day Mean

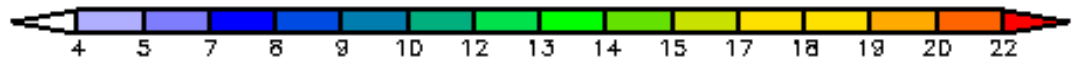


Climatology

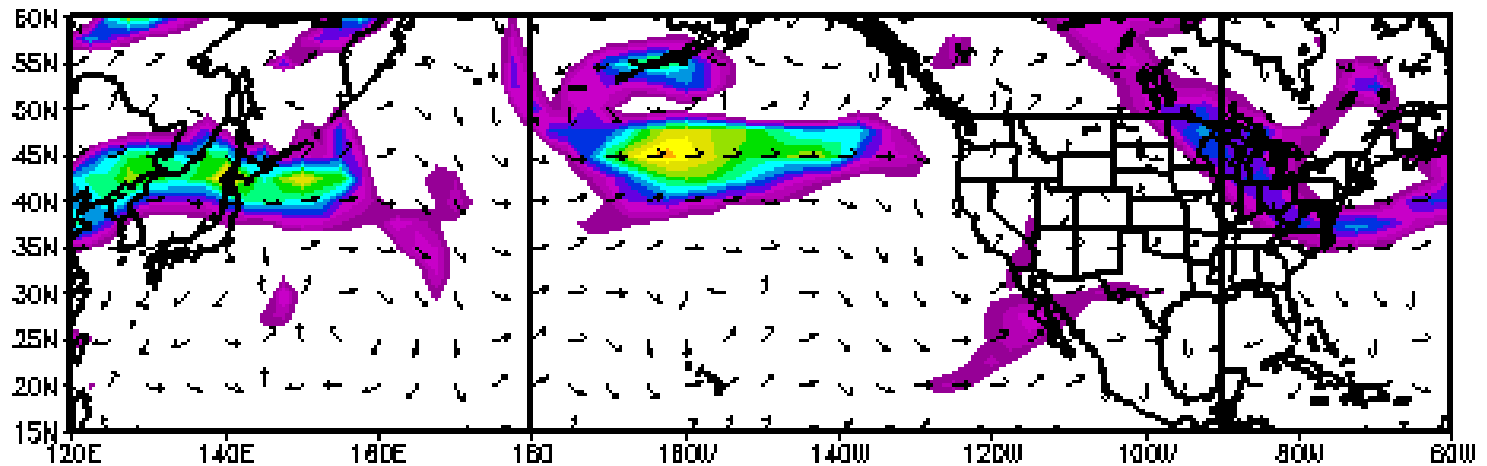


300mb WINDS (m/s) 46-DAY LONG TERM MEAN FOR:  
JUL 01 - AUG 15

NCEP OPERATIONAL DATASET

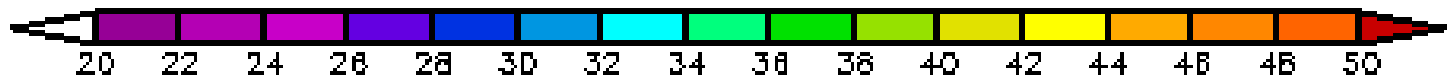


# 300 mb Winds - CA



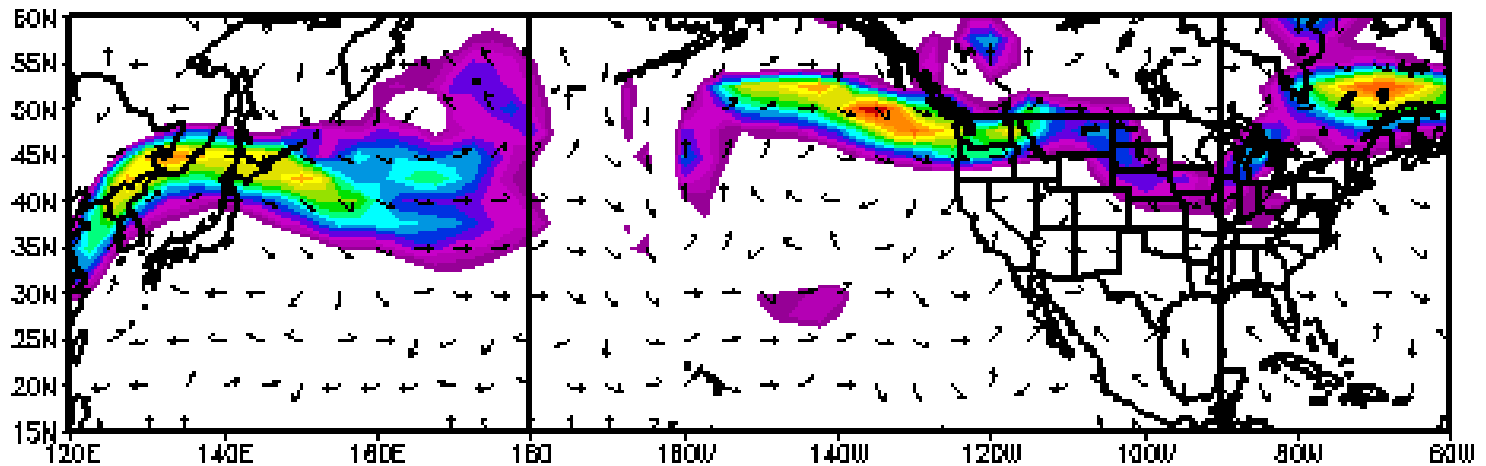
300mb WINDS (m/s) 01-DAY MEAN FOR:  
Thu JUL 01 2004

NCEP OPERATIONAL DATASET



# 300 mb Winds - STL

St Louis



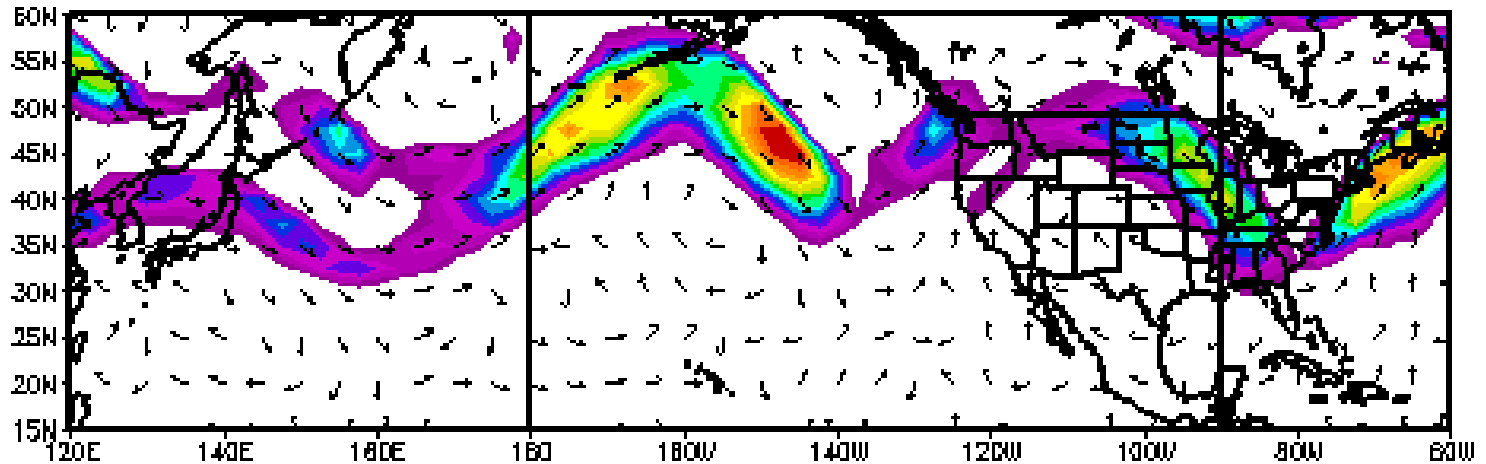
300mb WINDS (m/s) 01-DAY MEAN FOR:  
Wed JUL 07 2004

NCEP OPERATIONAL DATASET



# 300 mb Winds - NH

Pease



300mb WINDS (m/s) 01-DAY MEAN FOR:  
Fr JUL 16 2004

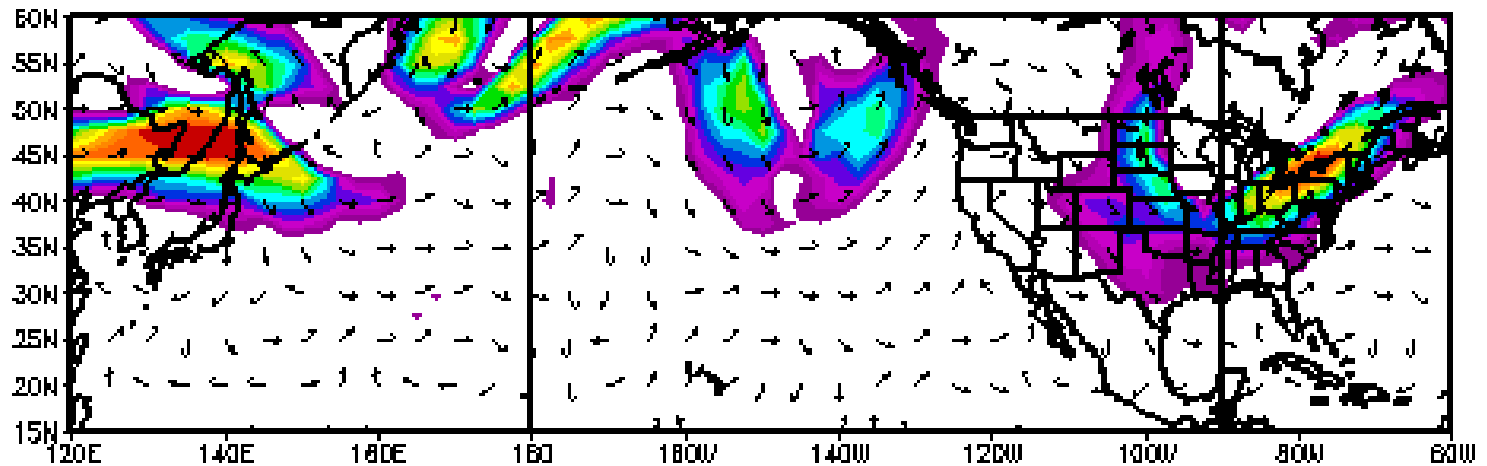
NCEP OPERATIONAL DATASET





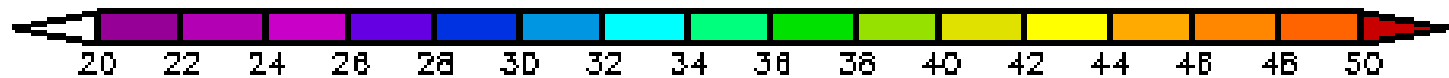
# 300 mb Winds - STL

St Louis



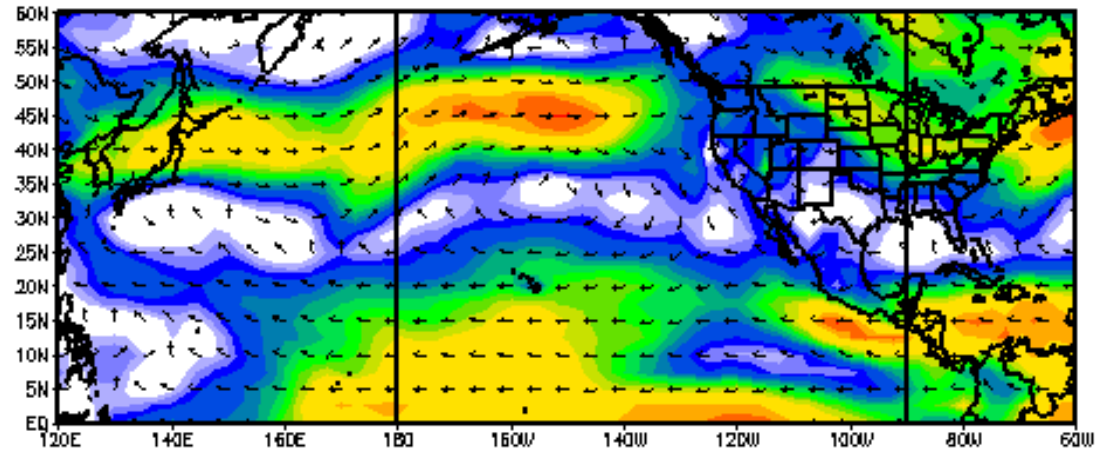
300mb WINDS (m/s) 01-DAY MEAN FOR:  
Thu AUG 12 2004

NCEP OPERATIONAL DATASET

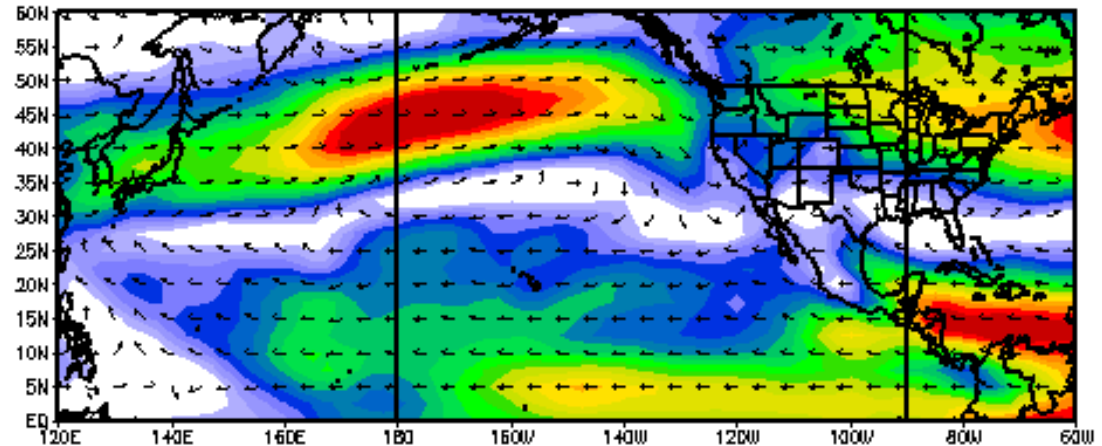


# 700 mb Winds

**2004  
46-day Mean**



**Climatology**



700mb WINDS (m/a) 46-DAY LONG TERM MEAN FOR:  
JUL 01 - AUG 15

NCEP OPERATIONAL DATASET

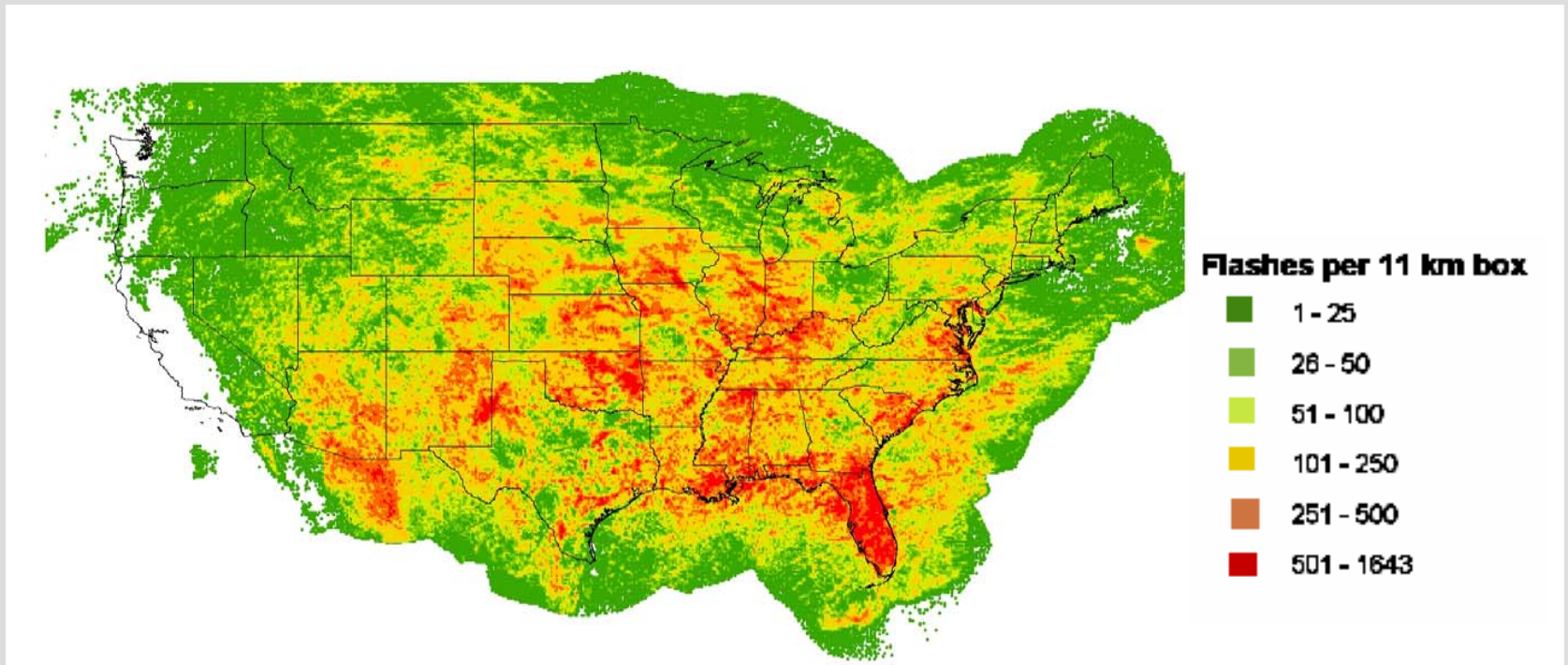


# Case Studies

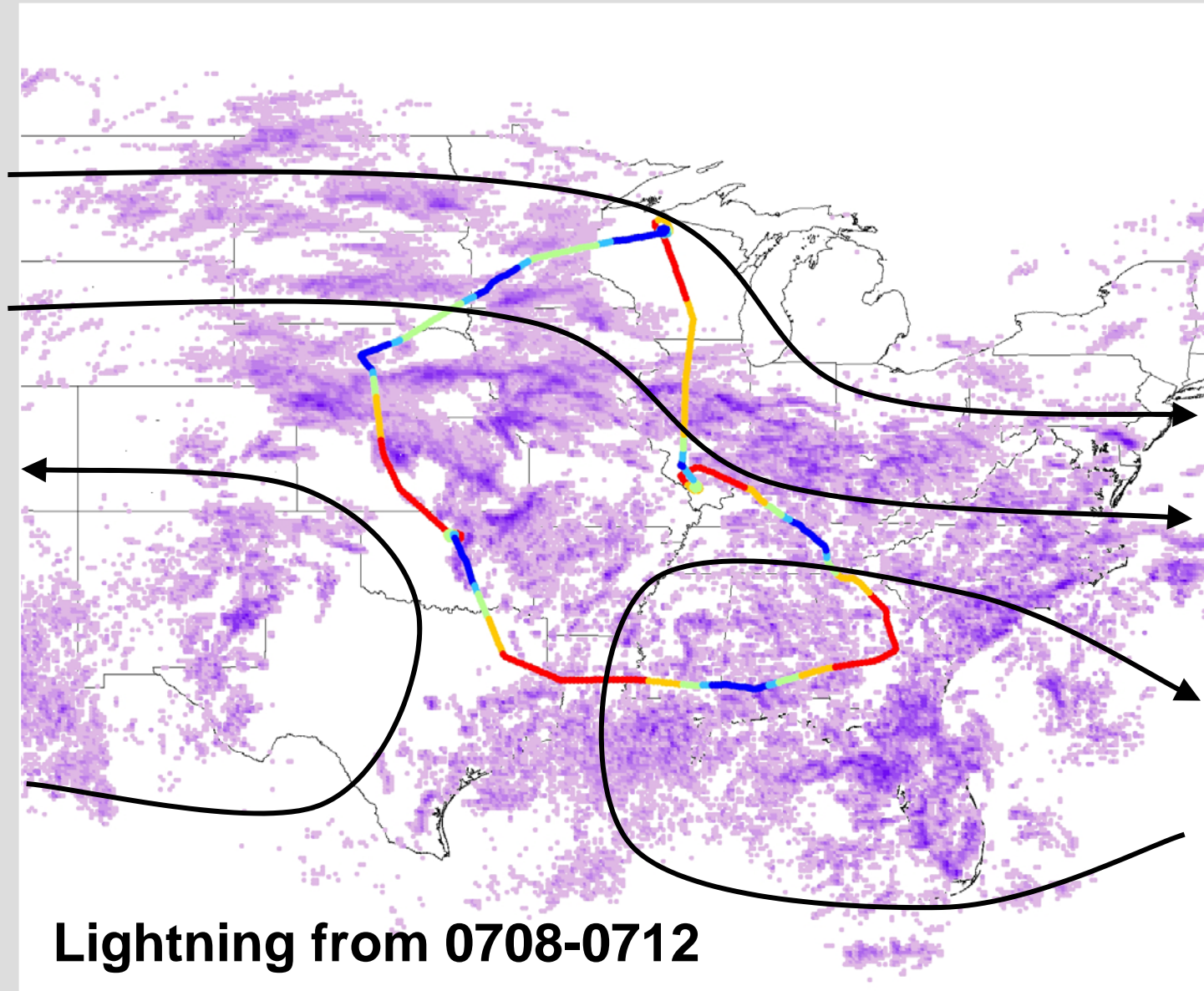
- Lightning
- Asian Pollution
- Alaskan Fires
- Flow to Europe (Lagrangian Experiments)



# Lightning Composite Entire INTEX Period

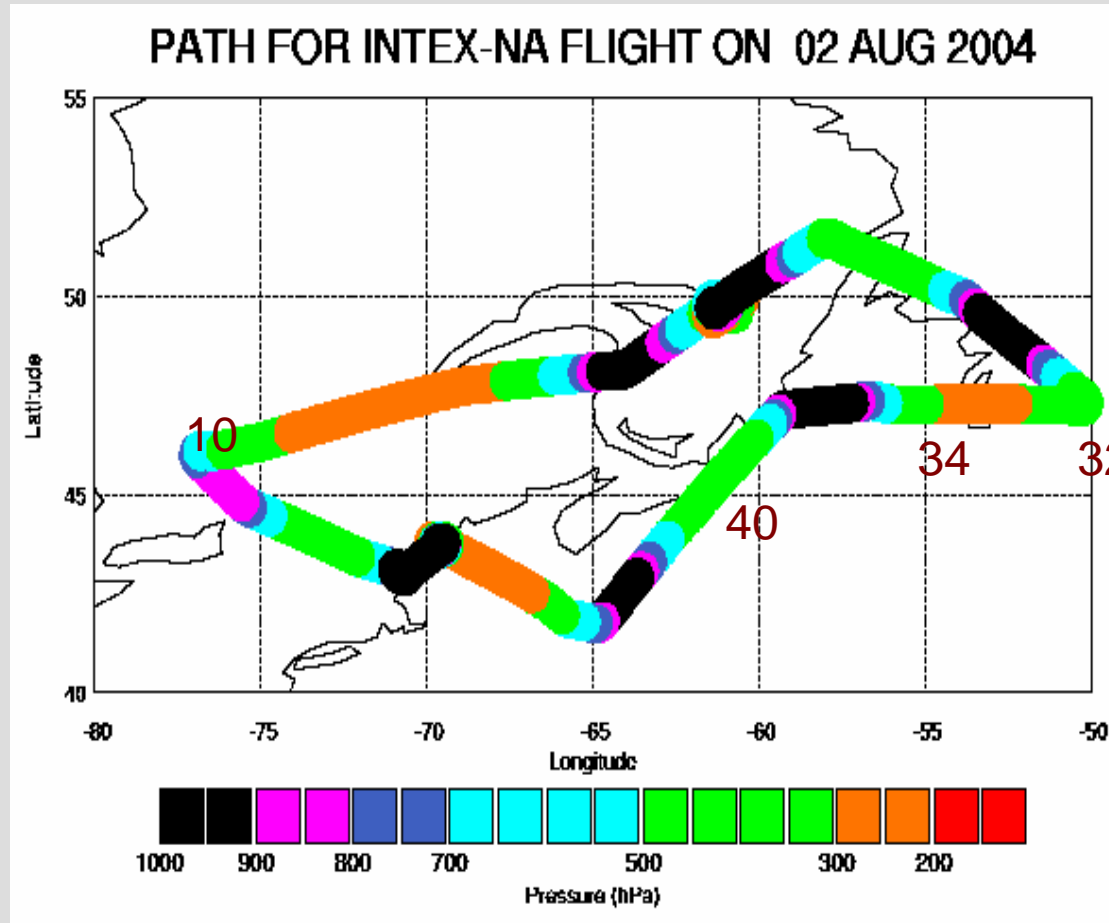


# July 12 Flight



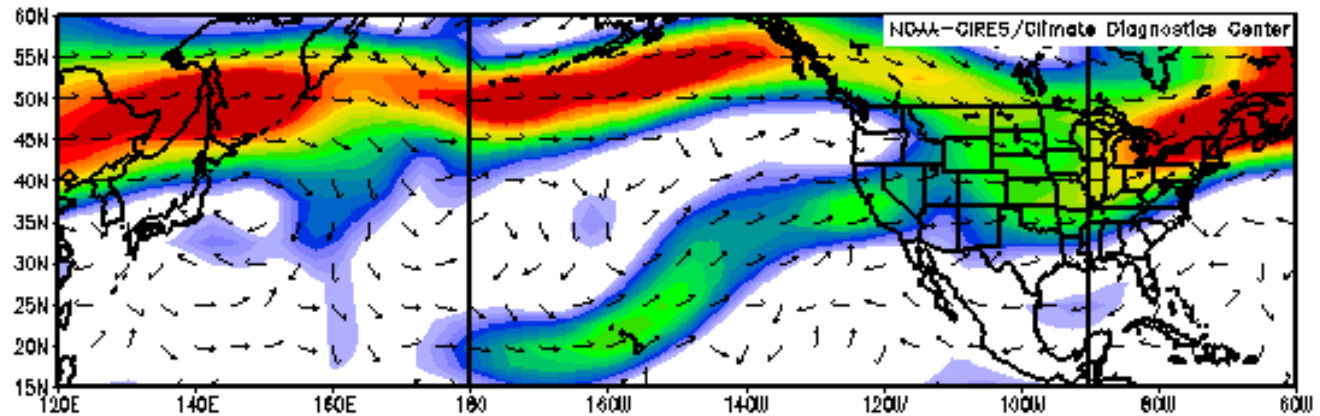
# Asian Pollution – August 2

## Note flight legs

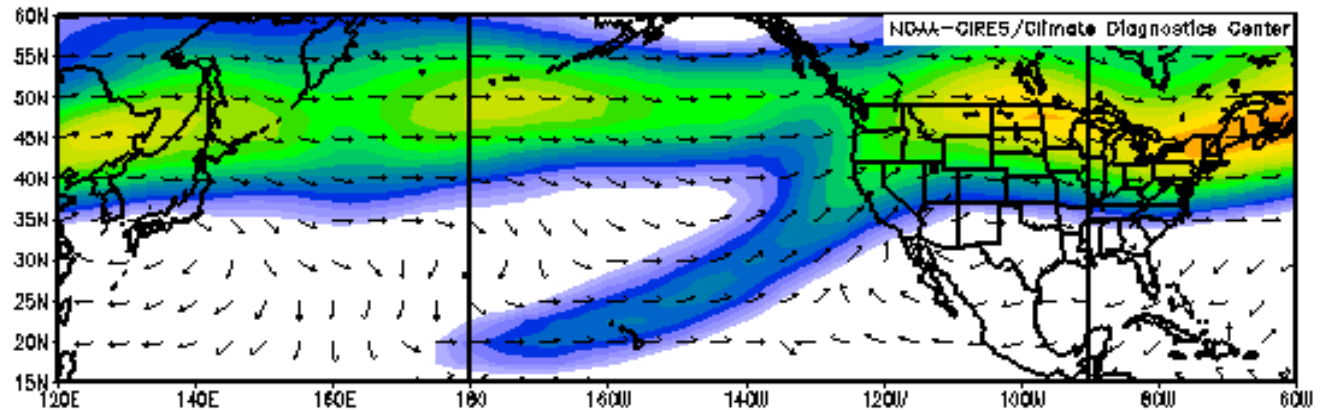


# 300 mb Winds July 24 – Aug. 2

2004



Climatology



300mb Vector Wind (m/s) Climatology 1968-1996 NCEP/NCAR Reanalysis  
7/24 to 8/2

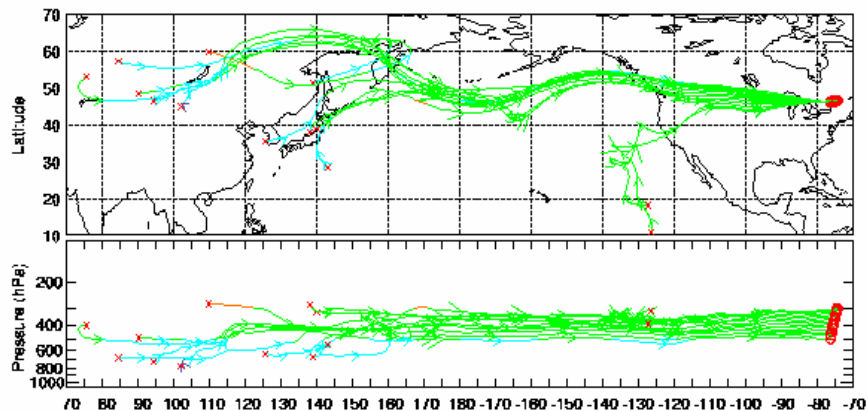
NCEP/NCAR Reanalysis



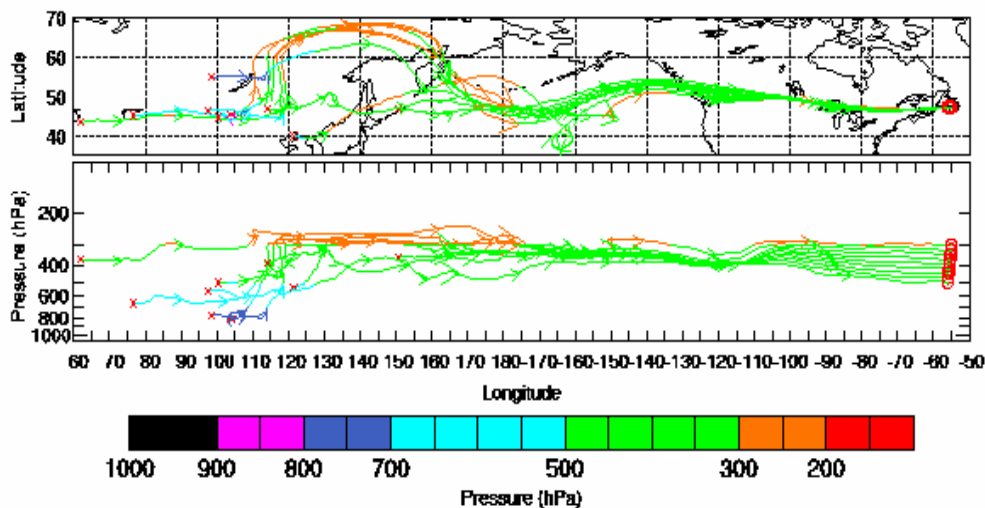
# Back Trajectories from Aug. 2

## INTEX-NA 1-MINUTE TRAJECTORIES - FSU METEOROLOGY

10 DAYS BACK FROM FLIGHT ON 02 AUG 2004  
INITIATED AT FLIGHT LEVEL FOR FLIGHT LEG 10

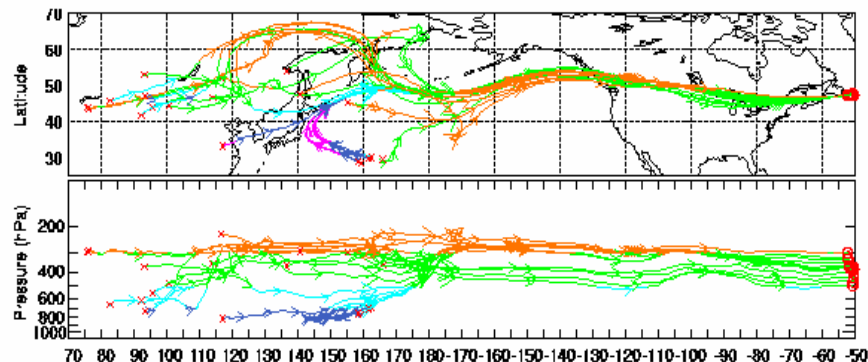


10 DAYS BACK FROM FLIGHT ON 02 AUG 2004  
INITIATED AT FLIGHT LEVEL FOR FLIGHT LEG 34

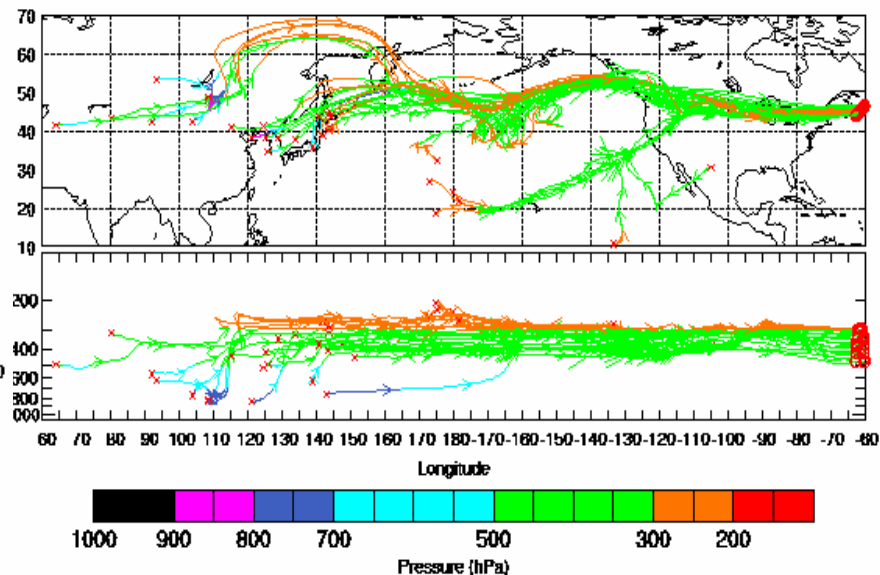


## INTEX-NA 1-MINUTE TRAJECTORIES - FSU METEOROLOGY

10 DAYS BACK FROM FLIGHT ON 02 AUG 2004  
INITIATED AT FLIGHT LEVEL FOR FLIGHT LEG 32



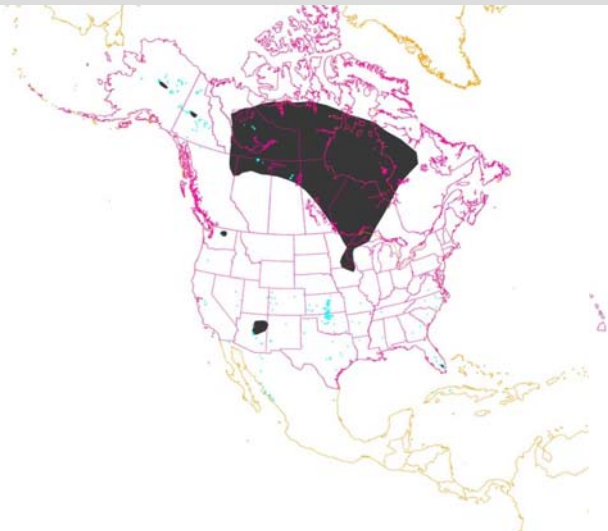
10 DAYS BACK FROM FLIGHT ON 02 AUG 2004  
INITIATED AT FLIGHT LEVEL FOR FLIGHT LEG 40



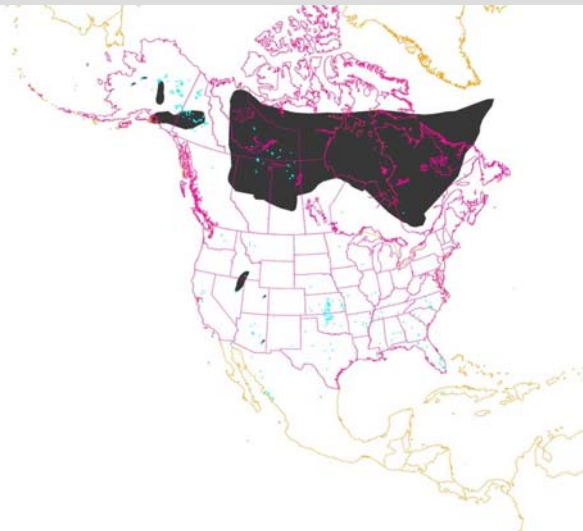


# Alaskan Fires

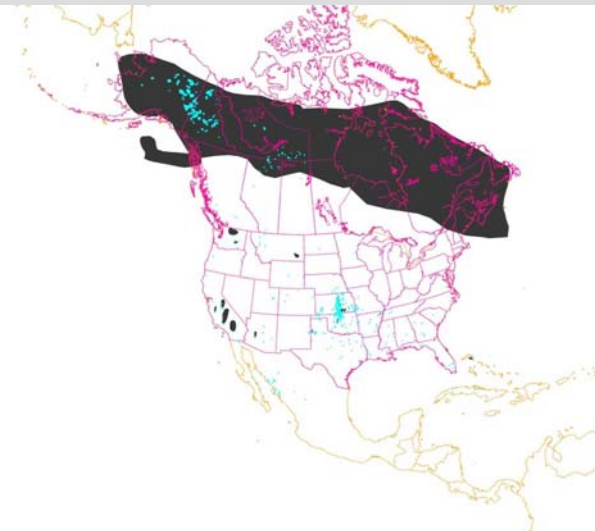
**Jul 8**



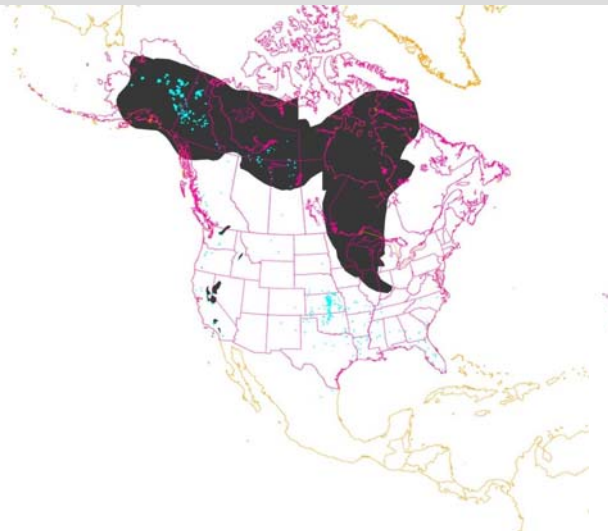
**Jul 10**



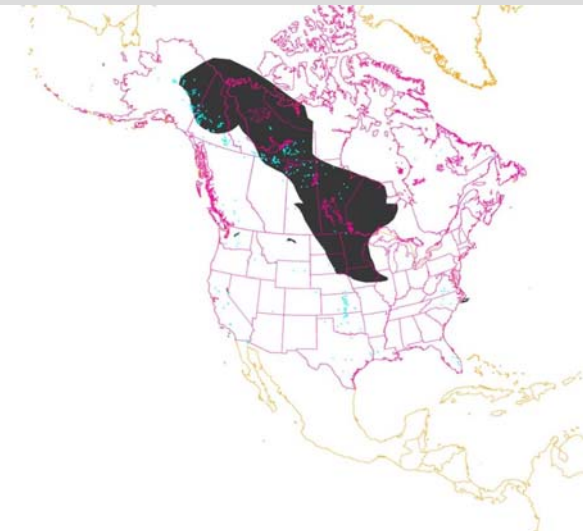
**Jul 12**



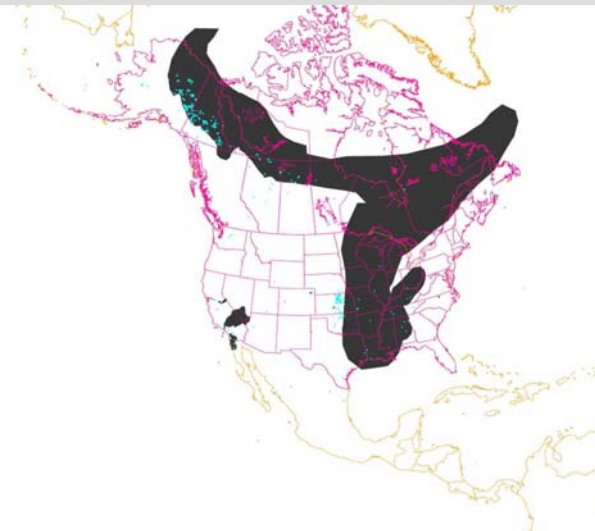
**Jul 14**



**Jul 16**

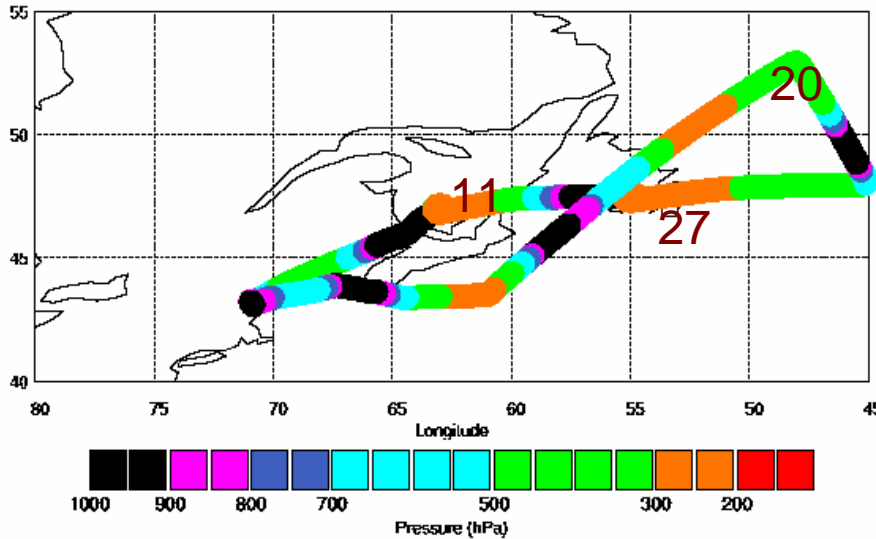


**Jul 18—See next**



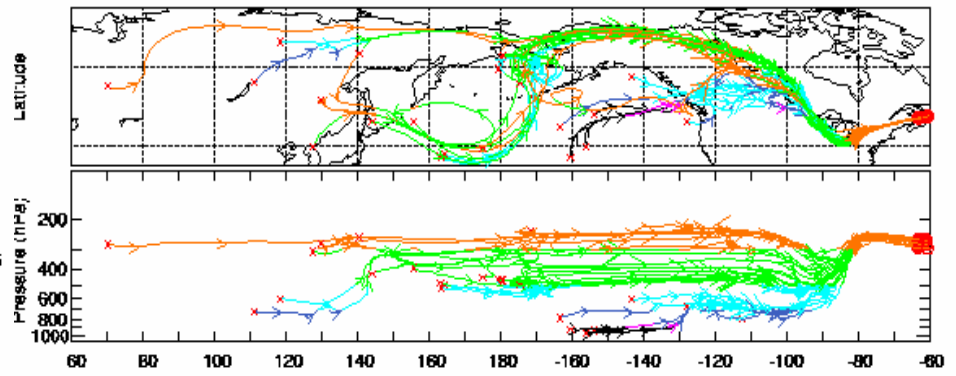
# Alaskan Fires

PATH FOR INTEX-NA FLIGHT ON 18 JUL 2004

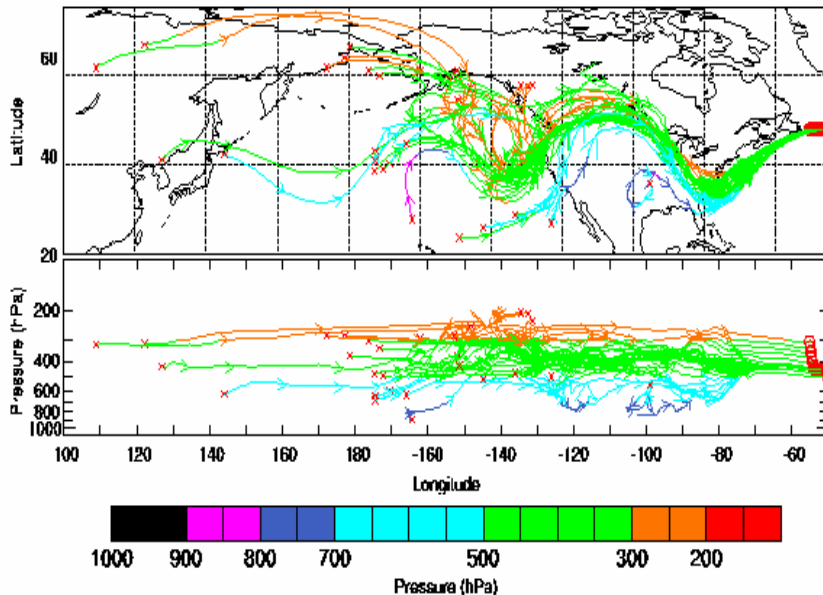


INTEX-NA 1-MINUTE TRAJECTORIES - FSU METEOROLOGY

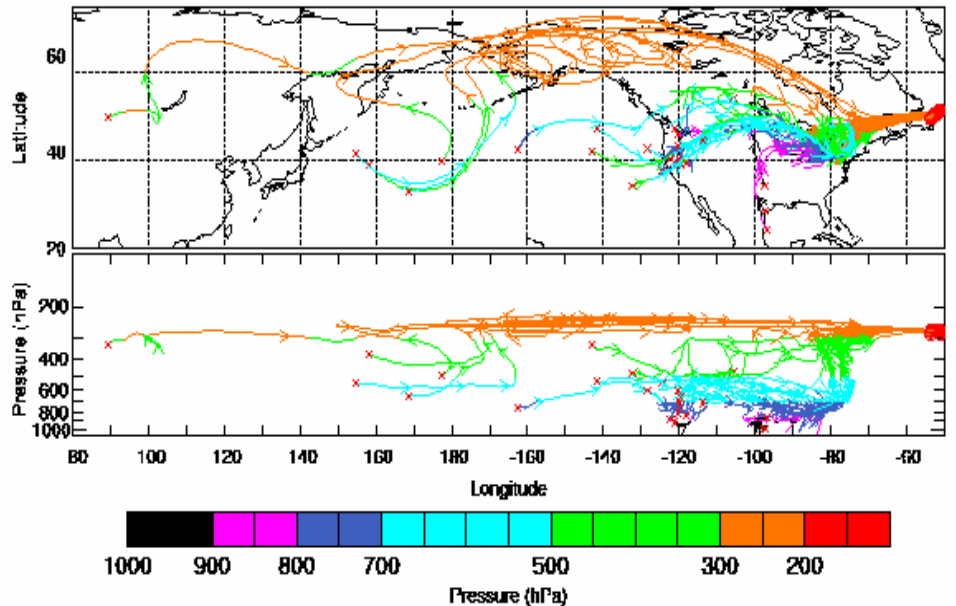
10 DAYS BACK FROM FLIGHT ON 18 JUL 2004  
INITIATED AT FLIGHT LEVEL FOR FLIGHT LEG 11



10 DAYS BACK FROM FLIGHT ON 18 JUL 2004  
INITIATED AT FLIGHT LEVEL FOR FLIGHT LEG 20

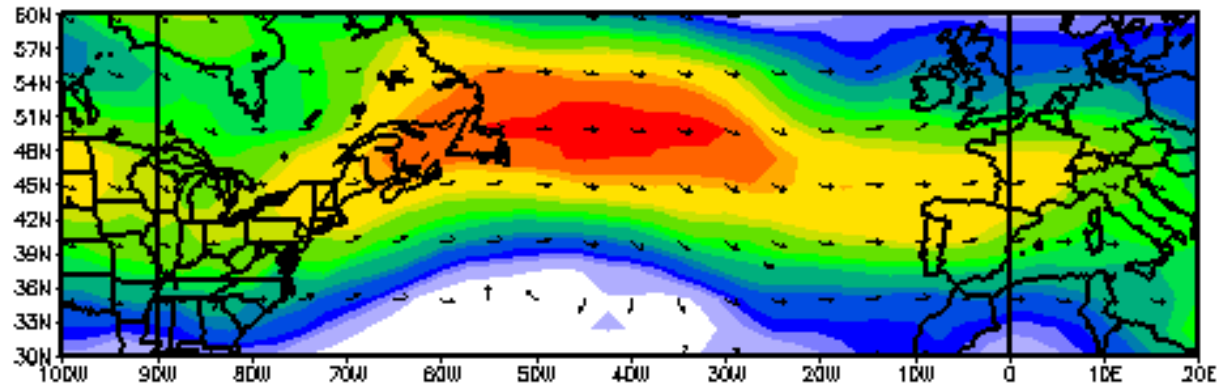


10 DAYS BACK FROM FLIGHT ON 18 JUL 2004  
INITIATED AT FLIGHT LEVEL FOR FLIGHT LEG 27

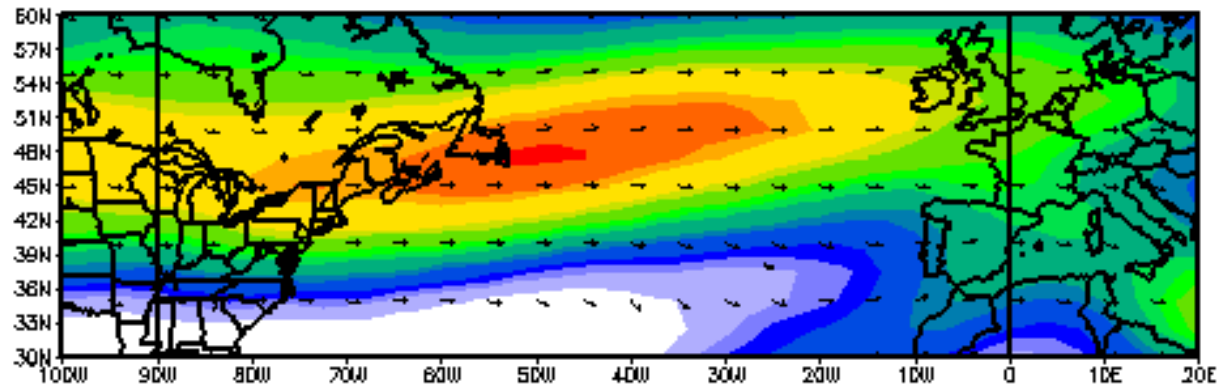


# Lagrangian to Europe--300 mb Winds

**2004  
46-day Mean**



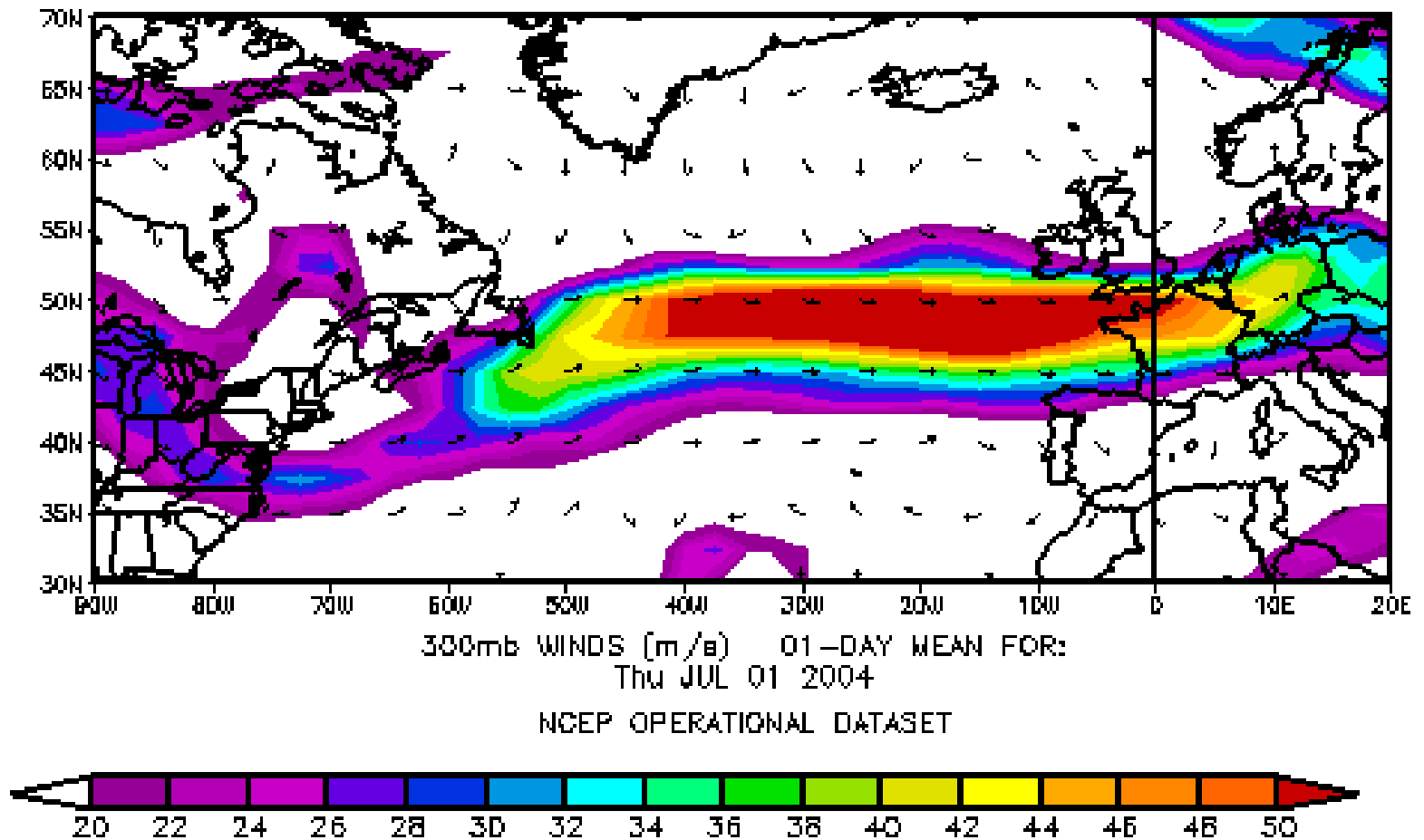
**Climatology**



300mb WINDS (m/s) 46-DAY LONG TERM MEAN FOR:  
JUL 01 - AUG 15  
NCEP OPERATIONAL DATASET



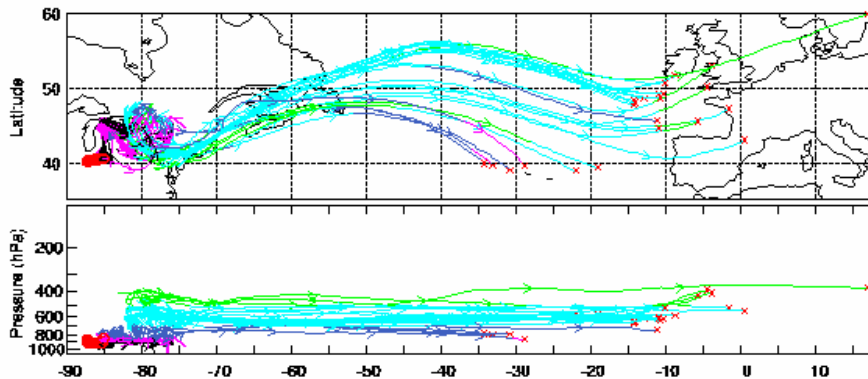
# Lagrangian to Europe 300 mb Winds



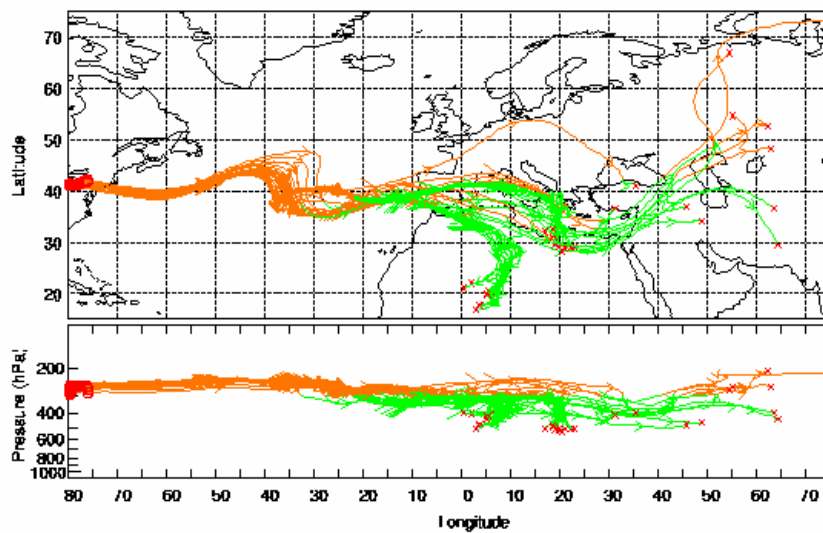
# Lagrangian Case Forward Trajectories

## INTEX-NA 1-MINUTE TRAJECTORIES - FSU METEOROLOGY

10 DAYS FORWARD FROM FLIGHT ON 10 JUL 2004  
INITIATED AT FLIGHT LEVEL FOR FLIGHT LEG 5

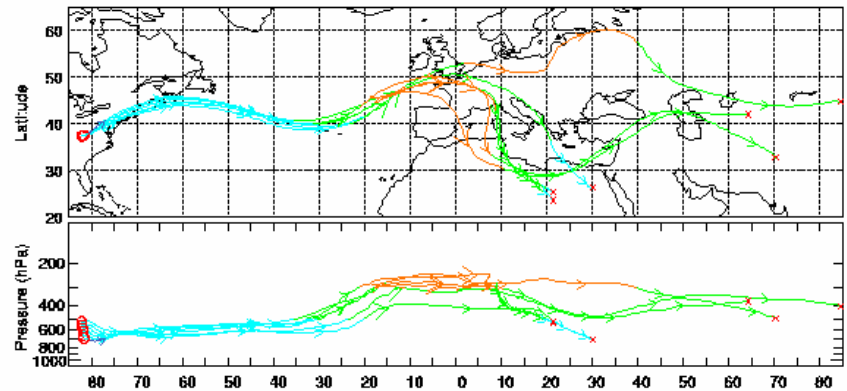


10 DAYS FORWARD FROM FLIGHT ON 10 JUL 2004  
INITIATED AT FLIGHT LEVEL FOR FLIGHT LEG 13

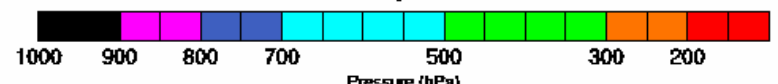
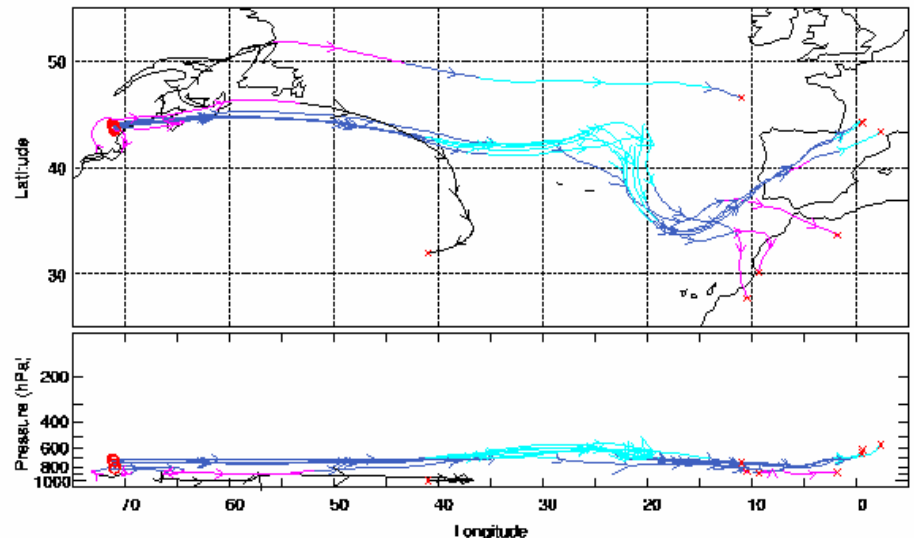


## INTEX-NA 1-MINUTE TRAJECTORIES - FSU METEOROLOGY

10 DAYS FORWARD FROM FLIGHT ON 25 JUL 2004  
INITIATED AT FLIGHT LEVEL FOR FLIGHT LEG 37

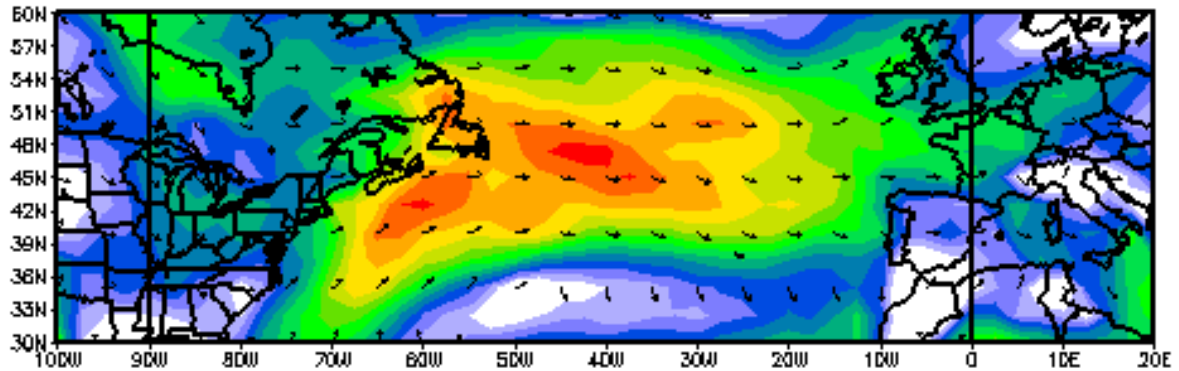


10 DAYS FORWARD FROM FLIGHT ON 25 JUL 2004  
INITIATED AT FLIGHT LEVEL FOR FLIGHT LEG 50

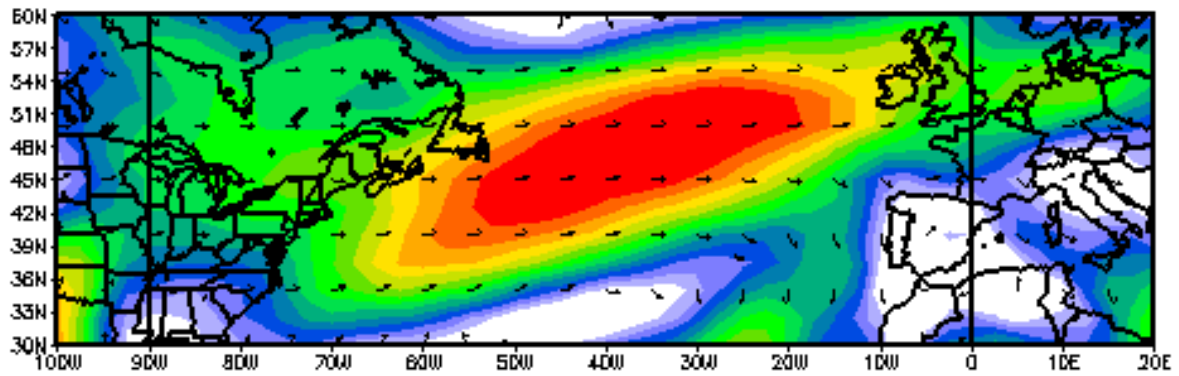


# 850 mb Winds

**2004  
46-day Mean**



**Climatology**



850mb WINDS (m/s) 46-DAY LONG TERM MEAN FOR:  
JUL 01 - AUG 15

NCEP OPERATIONAL DATASET



# Conclusions

- INTEX-A mostly representative of climatology
- But, a persistent trof along the East Coast
- Frontal passages on the “high” end of normal
- No stagnant high pressure centers over NE
- Hot and dry over Alaska → record fires
- TransPacific flow sometimes conducive to long range transport to central/eastern U.S.
- TransAtlantic sometimes conducive to European transport, but farther south than usual



# Our Goal is to Assist You

Our web site contains met. data about each flight, e.g., trajectories, flow patterns, etc.

We are happy to help you apply meteorology to your own research

If we do not have the product you need, we will make it for you

Just let us know !!

