

Trajectory Analysis of Pakistan for the Year 2007

By

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3rd Malé Declaration emissions inventory
workshop (28th Jan – 01st Feb 2008), AIT Bangkok.

Introduction

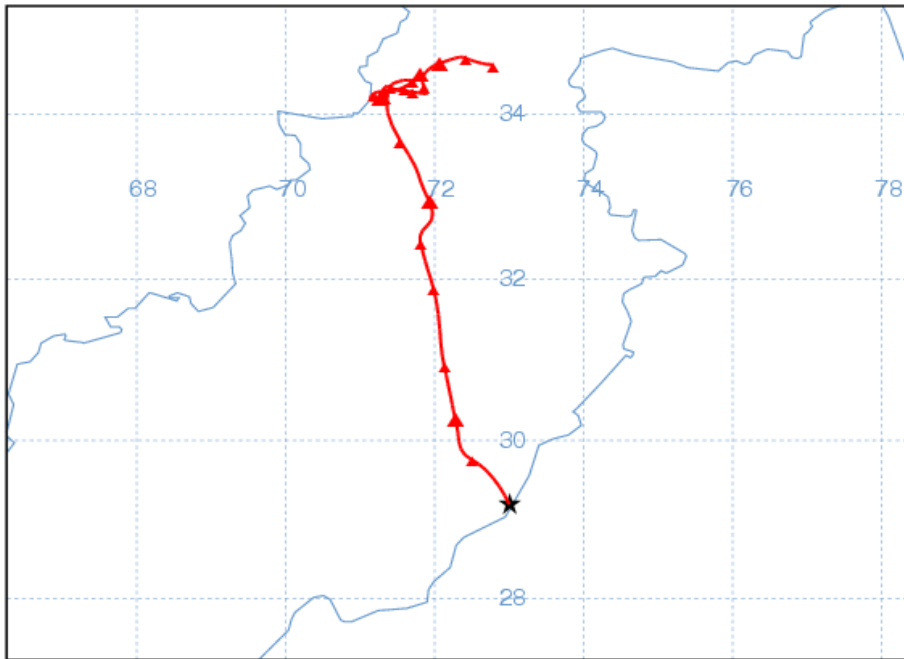
- Bahawal Nagar situated at 29.20°N and 73.51°E
- The station elevation is 161.05 m from sea level.
- Backward trajectories are drawn on the above station.
- Data of 1200 UTC is used in this trajectory.
- Mercator Map projection is used in this case.
- Total runtime (in hours) is 120.
- Start height is 500 m

Physiographic Map of Pakistan



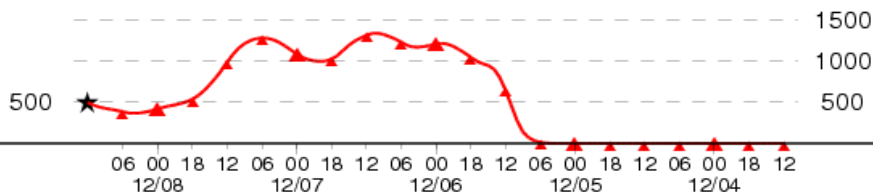
December- January, 2007

NOAA HYSPLIT MODEL
Backward trajectory ending at 12 UTC 08 Dec 06
GDAS Meteorological Data



Source ★ at 29.20 N 73.00 E

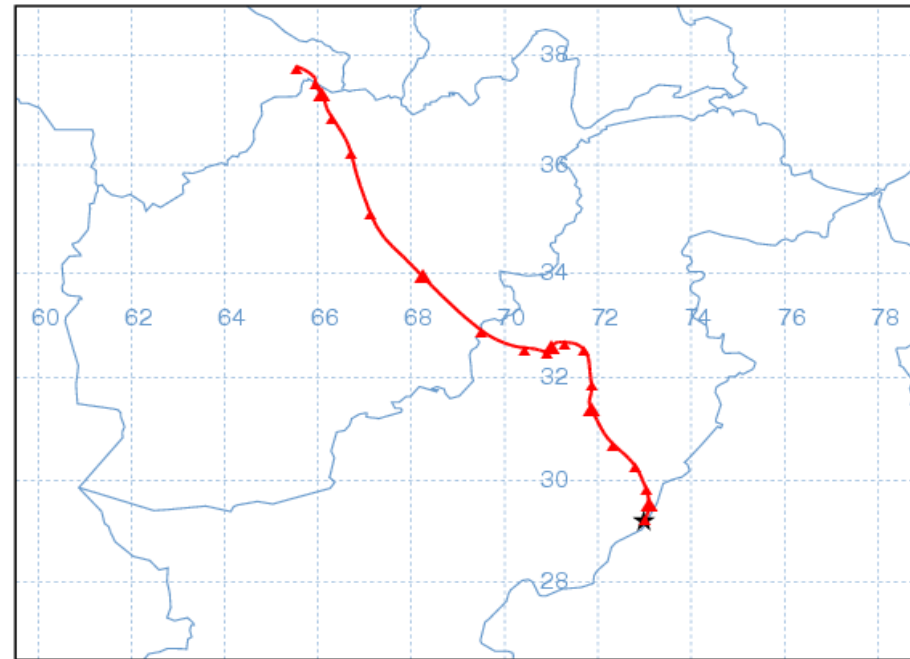
Meters AGL



Job ID: 35315 Job Start: Fri Feb 1 02:57:20 GMT 2008
Source 1 lat.: 29.20 lon.: 73.00 height: 500 m AGL

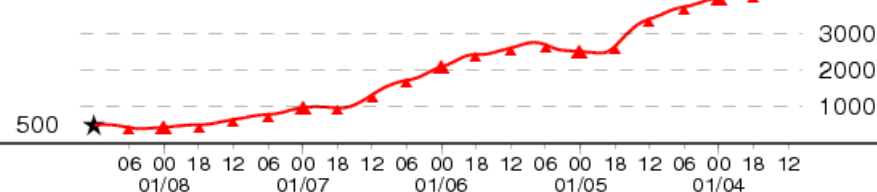
Trajectory Direction: Backward Duration: 120 hrs Meteo Data: GDAS1
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (<http://www.arl.noaa.gov/ready/>)

NOAA HYSPLIT MODEL
Backward trajectory ending at 12 UTC 08 Jan 07
GDAS Meteorological Data



Source ★ at 29.20 N 73.00 E

Meters AGL

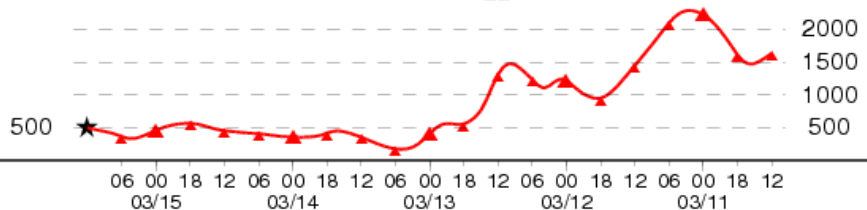
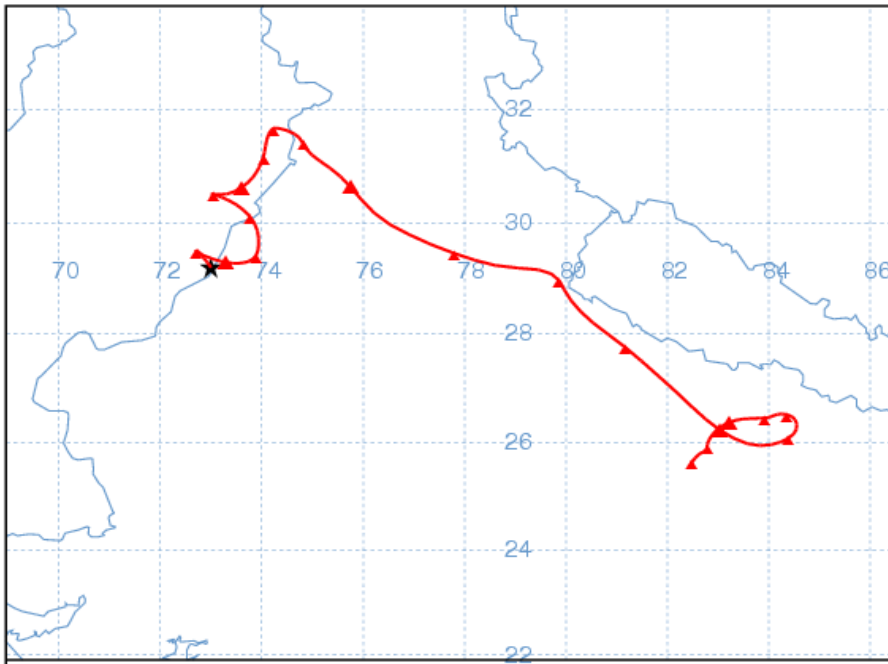


Job ID: 35678 Job Start: Fri Feb 1 03:47:36 GMT 2008
Source 1 lat.: 29.20 lon.: 73.00 height: 500 m AGL

Trajectory Direction: Backward Duration: 120 hrs Meteo Data: GDAS1
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (<http://www.arl.noaa.gov/ready/>)

March- April, 2007

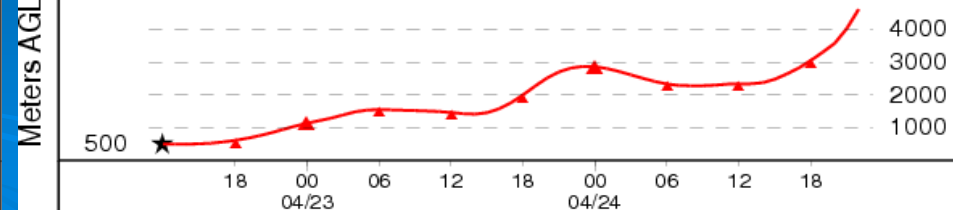
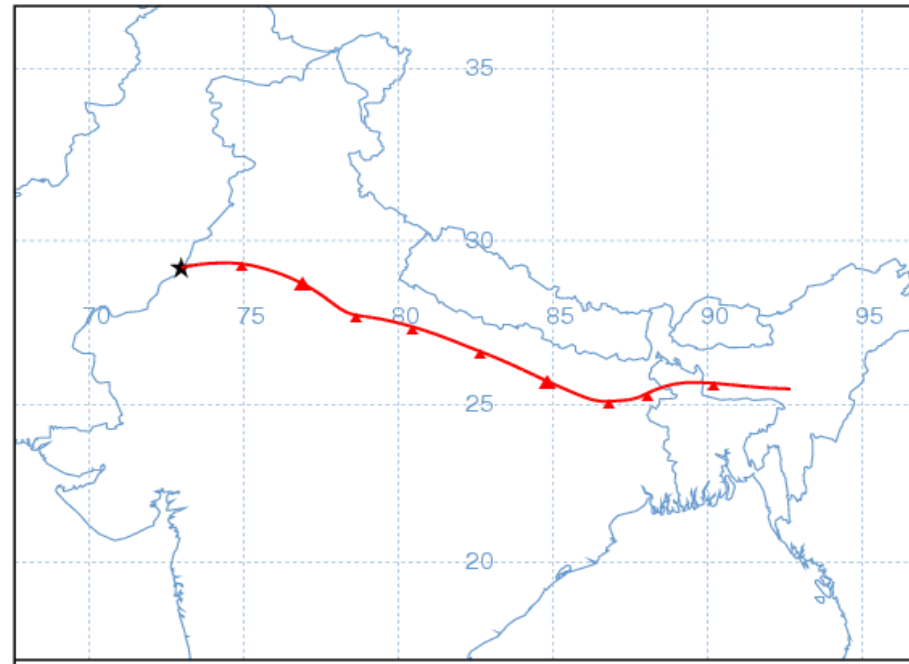
NOAA HYSPLIT MODEL
Backward trajectory ending at 12 UTC 15 Mar 07
GDAS Meteorological Data



Job ID: 35320 Job Start: Fri Feb 1 02:59:48 GMT 2008
Source 1 lat.: 29.20 lon.: 73.00 height: 500 m AGL

Trajectory Direction: Backward Duration: 120 hrs Meteo Data: GDAS1
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (<http://www.arl.noaa.gov/ready/>)

NOAA HYSPLIT MODEL
Forward trajectory starting at 12 UTC 22 Apr 07
GDAS Meteorological Data

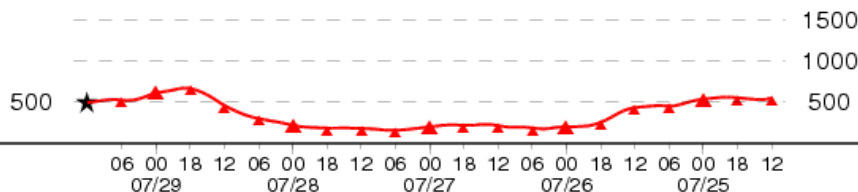
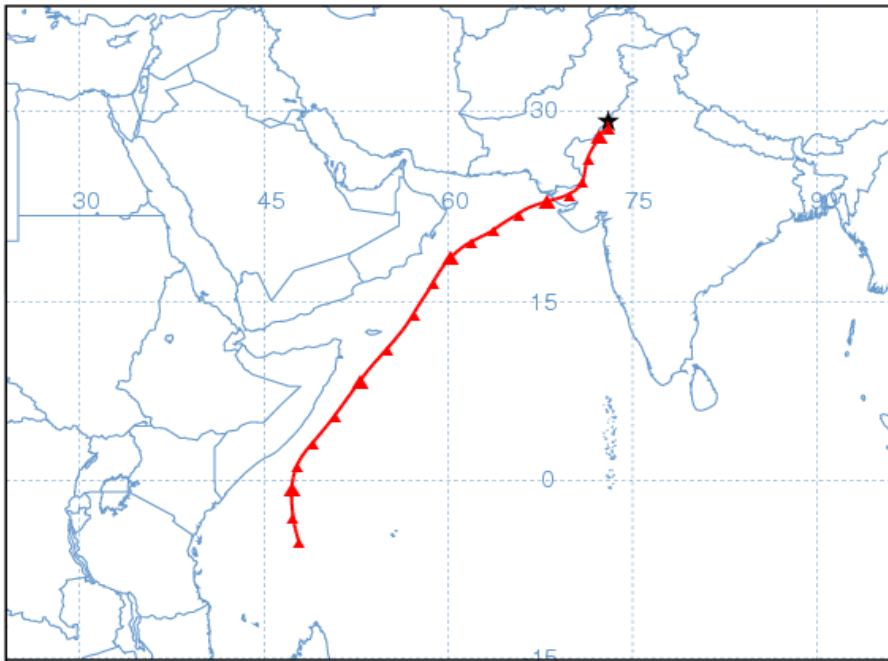


Job ID: 34985 Job Start: Fri Feb 1 02:38:49 GMT 2008
Source 1 lat.: 29.20 lon.: 73.00 height: 500 m AGL

Trajectory Direction: Forward Duration: 120 hrs Meteo Data: GDAS1
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (<http://www.arl.noaa.gov/ready/>)

July-August, 2007

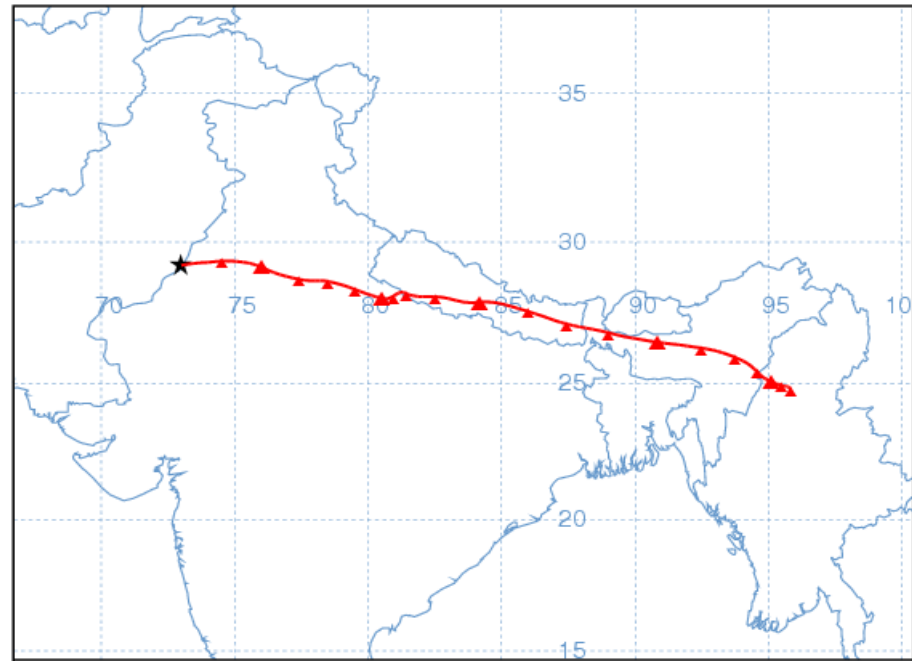
NOAA HYSPLIT MODEL
Backward trajectory ending at 12 UTC 29 Jul 07
GDAS Meteorological Data



Job ID: 35023 Job Start: Fri Feb 1 02:41:25 GMT 2008
Source 1 lat.: 29.20 lon.: 73.00 height: 500 m AGL

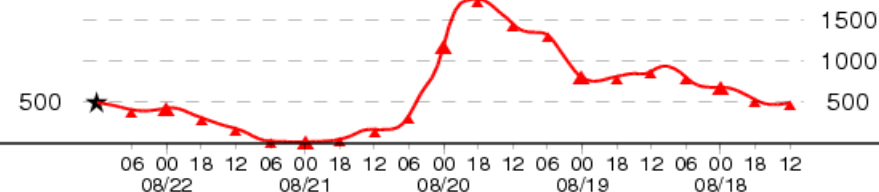
Trajectory Direction: Backward Duration: 120 hrs Meteo Data: GDAS1
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (<http://www.arl.noaa.gov/ready/>)

NOAA HYSPLIT MODEL
Backward trajectory ending at 12 UTC 22 Aug 07
GDAS Meteorological Data



Source ★ at 29.20 N 73.00 E

Meters AGL



Job ID: 35138 Job Start: Fri Feb 1 02:46:28 GMT 2008
Source 1 lat.: 29.20 lon.: 73.00 height: 500 m AGL

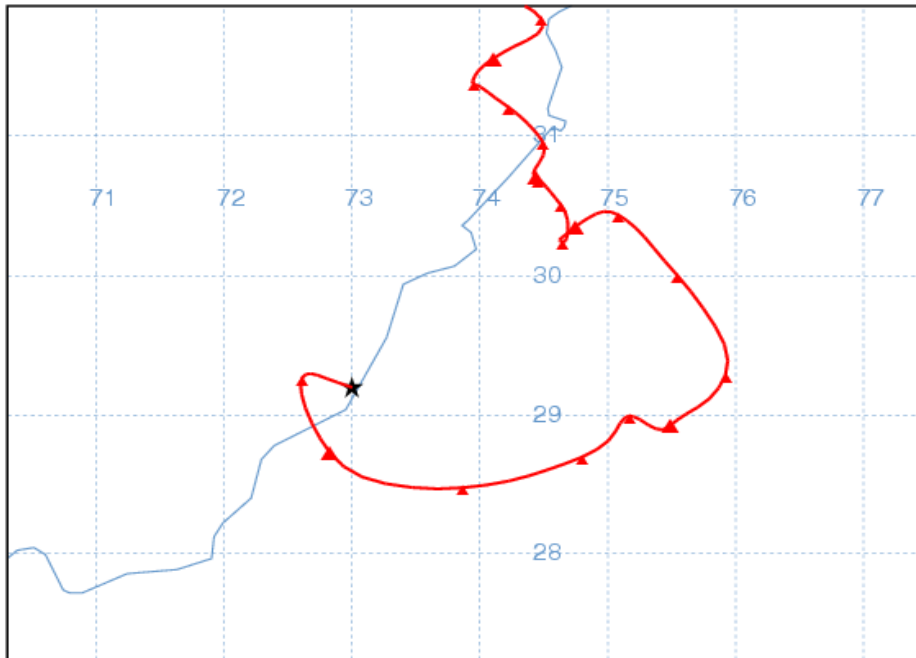
Trajectory Direction: Backward Duration: 120 hrs Meteo Data: GDAS1
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (<http://www.arl.noaa.gov/ready/>)

Source ★ at 29.20 N 73.00 E

Meters AGL

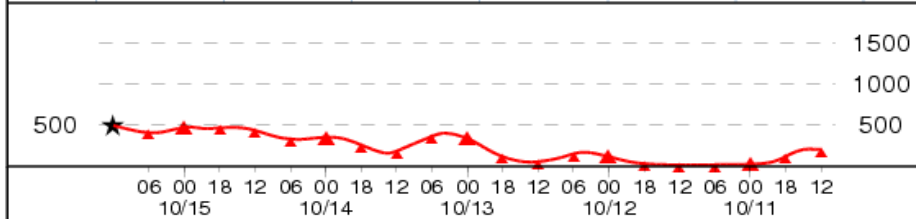
October- November, 2007

NOAA HYSPLIT MODEL
Backward trajectory ending at 12 UTC 15 Oct 07
GDAS Meteorological Data



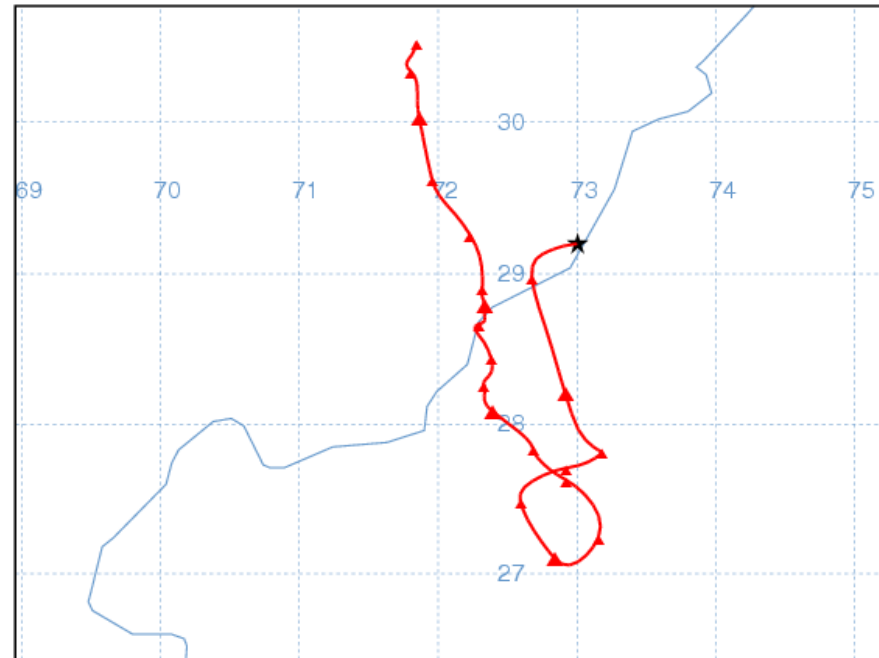
Source ★ at 29.20 N 73.00 E

Meters AGL



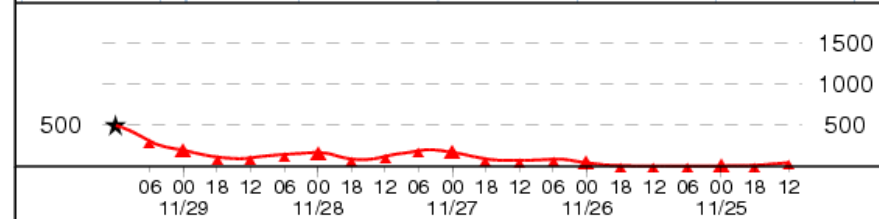
Job ID: 35246 Job Start: Fri Feb 1 02:52:22 GMT 2008
Source 1 lat.: 29.20 lon.: 73.00 height: 500 m AGL
Trajectory Direction: Backward Duration: 120 hrs Meteo Data: GDAS1
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (<http://www.arl.noaa.gov/ready/>)

NOAA HYSPLIT MODEL
Backward trajectory ending at 12 UTC 29 Nov 07
GDAS Meteorological Data



Source ★ at 29.20 N 73.00 E

Meters AGL



Job ID: 35287 Job Start: Fri Feb 1 02:55:07 GMT 2008
Source 1 lat.: 29.20 lon.: 73 height: 500 m AGL
Trajectory Direction: Backward Duration: 120 hrs Meteo Data: GDAS1
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (<http://www.arl.noaa.gov/ready/>)

Conclusions

- **December- January:**
The horizontal wind approaching the station is mainly from western side.
- **March- April:**
This is generally a transition period between Winter and Summer Monsoon Season. The analysis showed that the wind approaching is from eastern side, which may bring huge pollutants with it.
- **July- August:**
Summer monsoon season in which wind normally approach either from South or South eastern direction (Indian Side). This also causes huge transportation of pollutants from Indian region to Pakistan.
- **October- November:**
Same as the winter season pattern.

Thank you

