Weather analysis and forecasting in modern age
An overview

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Weather Risk Ltd.

Numerical weather prediction (NWP)

- Backbone of modern day weather forecasting services
- Highly advanced and sophisticated NWP models
- Great improvements in prediction skill
  - Tremendous enhancement of data base from remote sensing platforms
  - Highly powerful computing systems
  - Advancements in modeling techniques
  - Very high resolution numerical models
  - Global models on mesoscale resolutions
  - Regional models on very fine resolutions

Real Time Data & Products from Global NWP systems

WMO(WWW)/Global Observing System (GOS)

Surface based and space based observing systems – global network

Conventional observations

Surface

Upper air

Non-conventional observations

Remote sensing platforms

Aircraft

Weather Satellites

Polar orbiting & Geostationary

Real Time Data & Products from Global NWP systems

Satellite data
    Radiances
    Cloud motion vectors
    water vapor winds
    Outgoing Longwave Radiation (OLR)
    Precipitation estimates
    Tropical Rainfall Measuring Mission (TRMM)

Doppler Wx Radar
    Reflectivity
    Atmospheric winds
    Precipitation estimates

Data Transport

WMO's Global Telecommunication System (GTS)

Broadband service network

Forecast Products

- Global forecast models
  - NOAA/NCEP Global Forecast System (GFS)
    - Short range forecasts (up to 3 days)
    - Medium range forecasts (4-10 days)
    - Horizontal grid resolution ~ 20-25 km
    - Gridded fields of various atmospheric parameters – initial analysis and forecasts
      - Air temperature, humidity, wind speed/direction, precipitation rate, solar radiation, sunshine duration etc. in real time

Forecast Products

- Global forecast models
  - NOAA/NCEP Climate Forecast System (CFS)
    - Extended range forecasts (beyond 10 days and upto a month)
    - Long range forecasts (monthly & seasonal averages)
    - Horizontal grid resolution ~ 100 km

Forecast Products

- Limited area or regional models
- Weather Research & Forecast models (WRF)
  - Very high resolution (A few kms)
  - Very short range & short range forecasts
  - Area specific

A few demo products processed at WRL

J&K Floods Sep-2014 TRMM estimates (2-5 Sep)

trmm (mm) 02Sep2014 24h cum
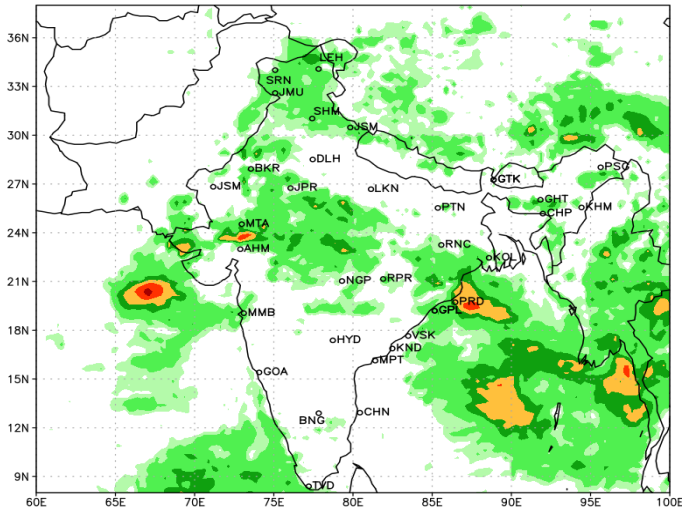
trmm (mm) 03Sep2014 24h cum
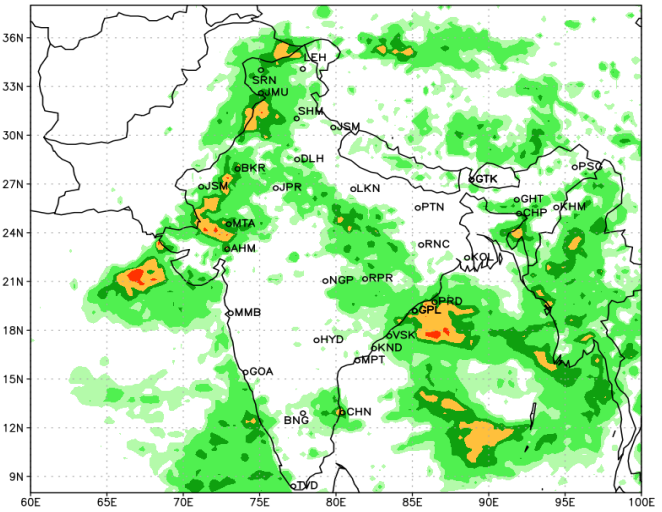
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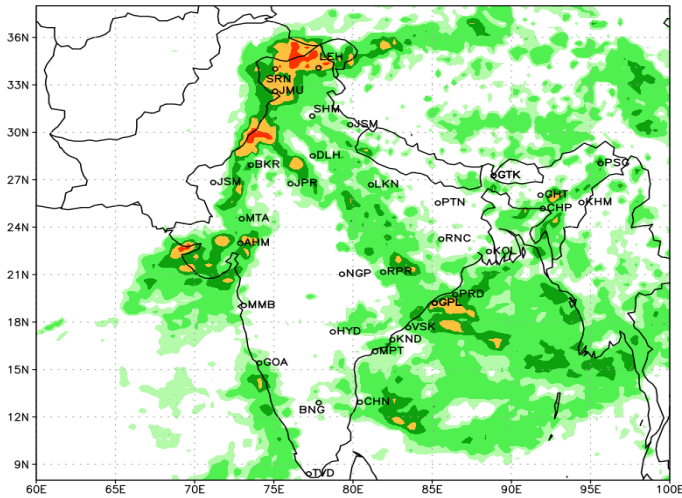
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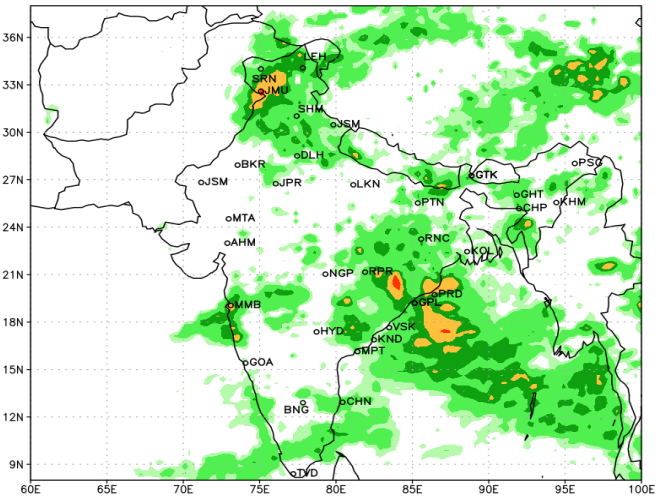
U'Khand Floods Jun-2013 TRMM estimates (15-18 Jun)
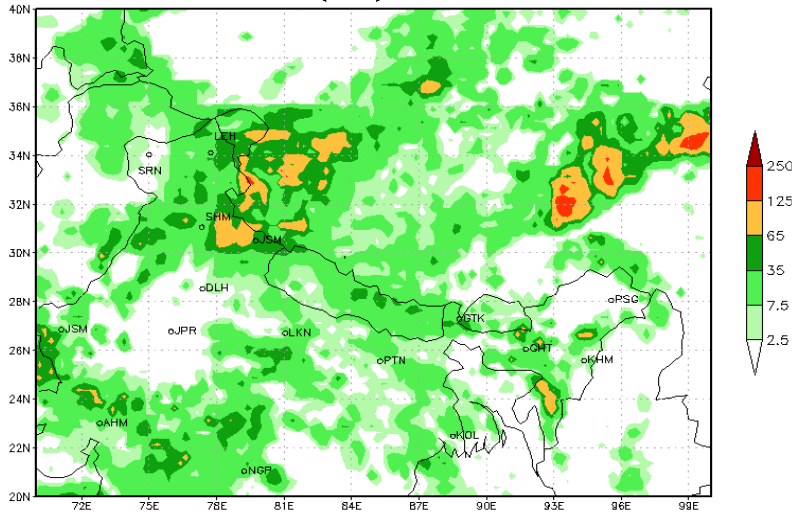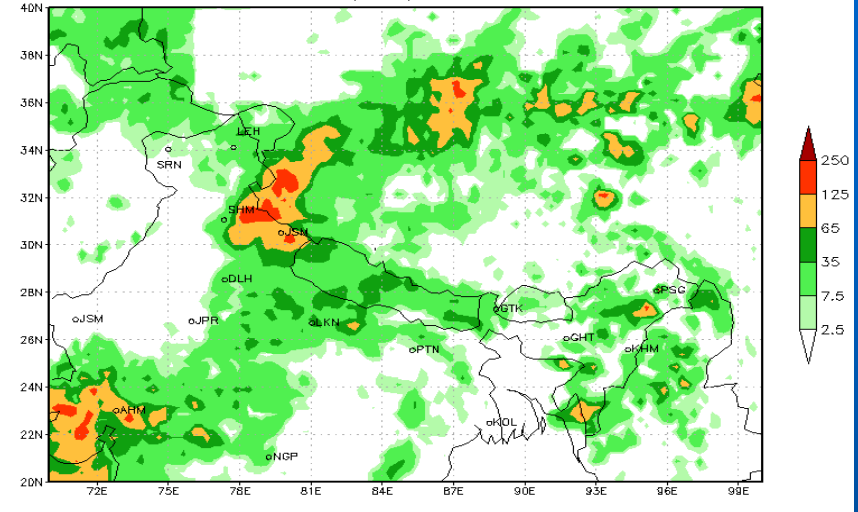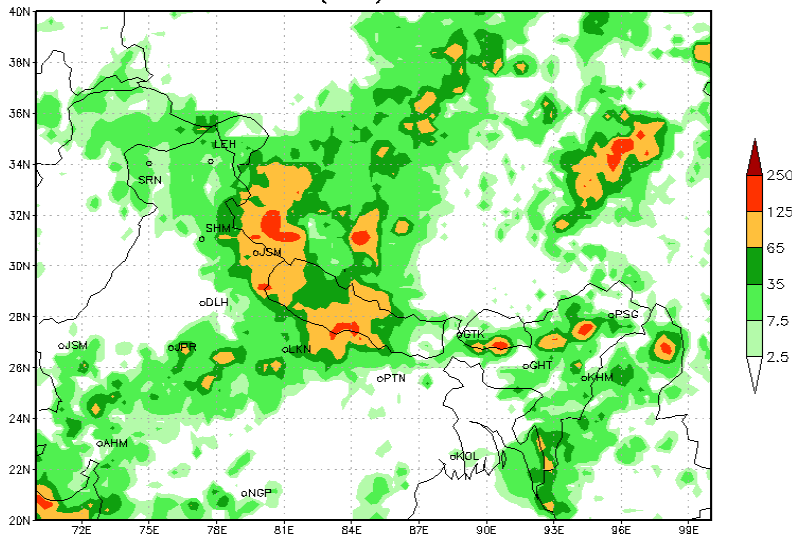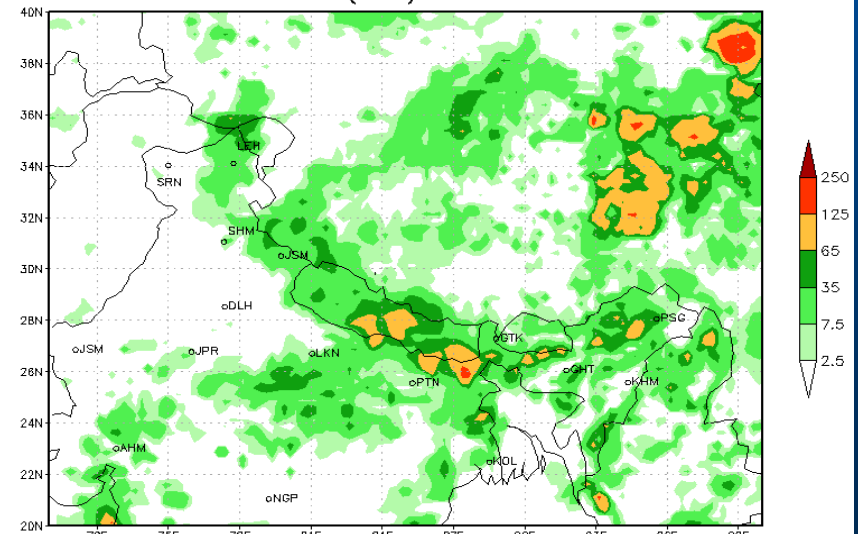
Tropical cyclone Phailin Oct 2013
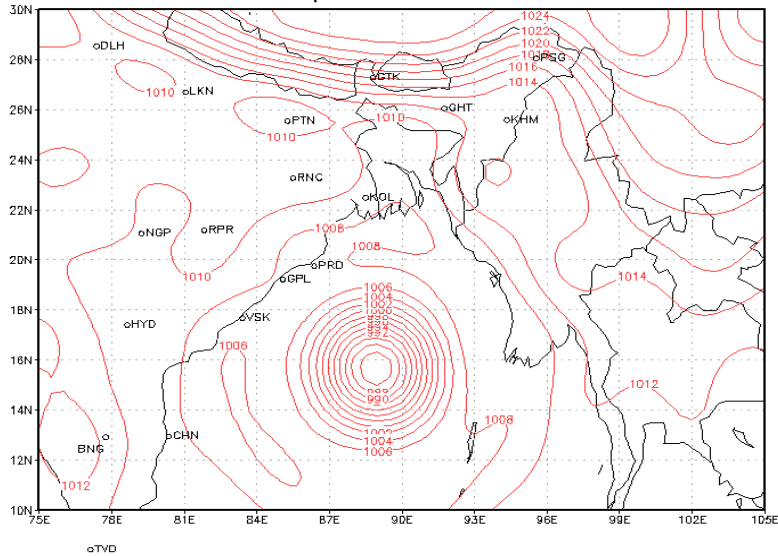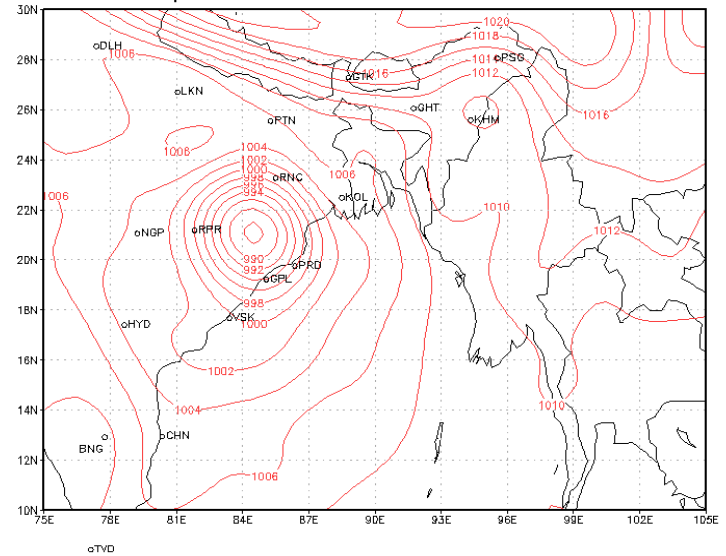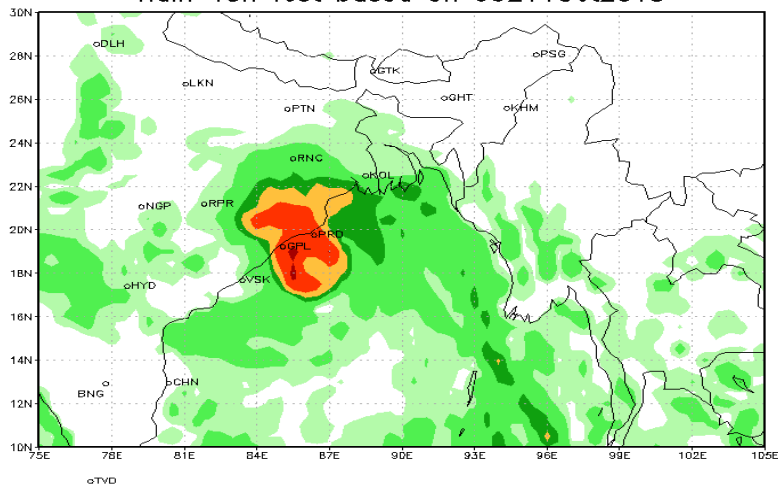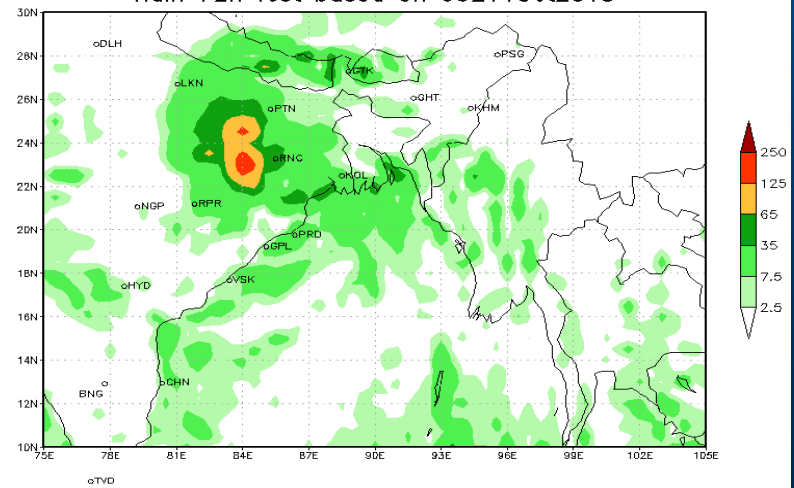
Climate Forecast System (CFS) products
Monthly precipitation fcst anomaly; prepared 3 June 2014
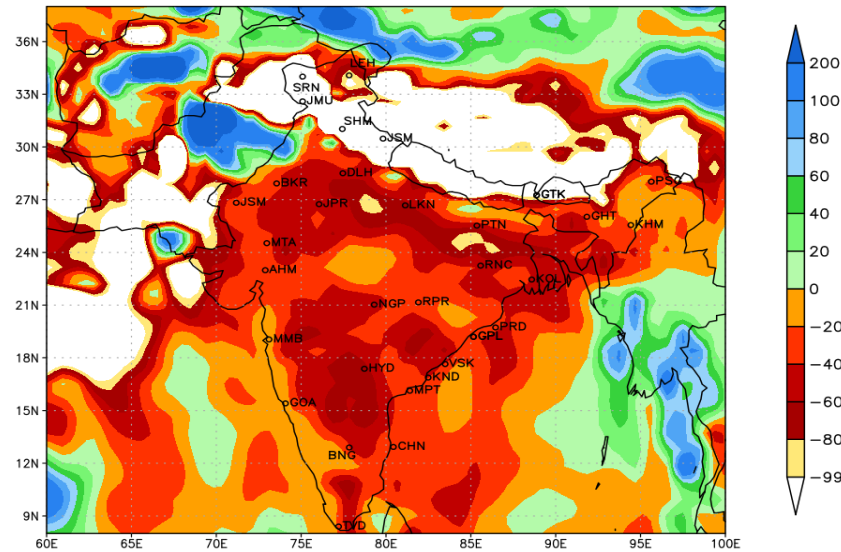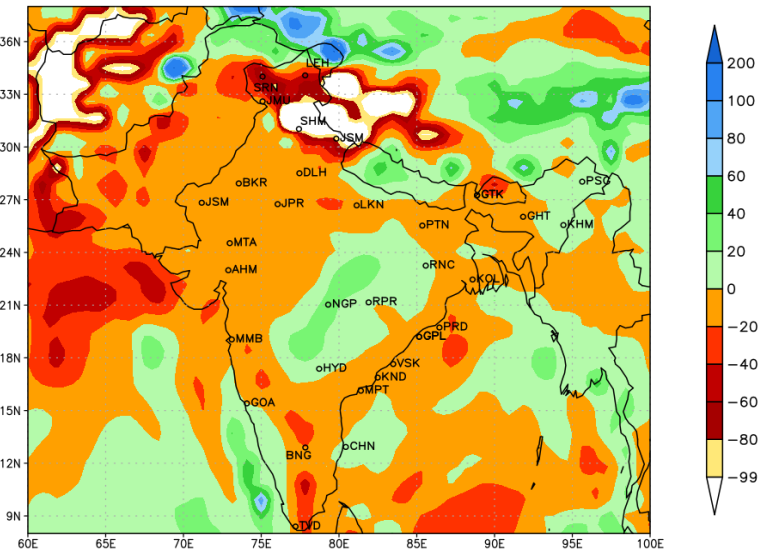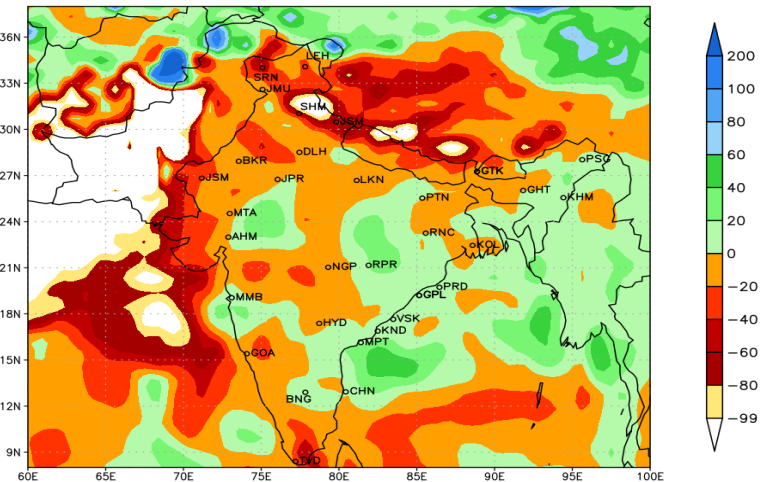
Historical data sets

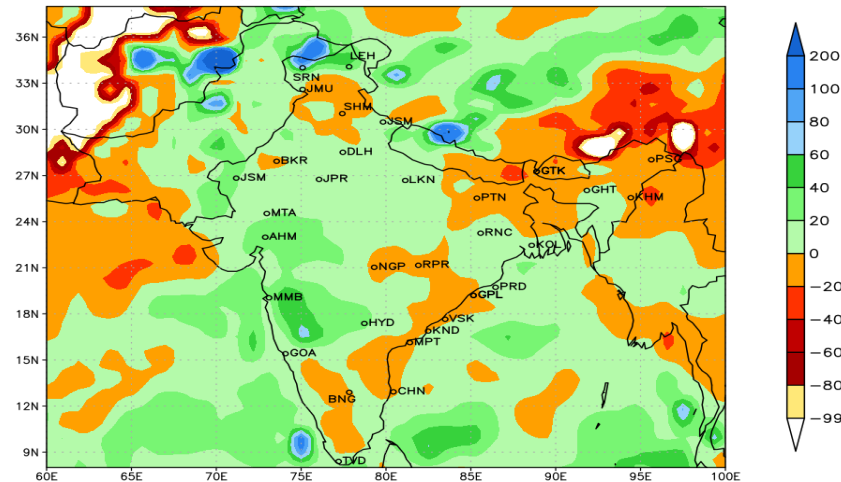- Global gridded data sets from NWP data assimilation systems
- Reanalysis of past observational data
- Include satellite data (1979 onwards)
- Several atmospheric and oceanic parameters
- Analysis of past weather events
- Weather indices; Trend analysis, validation of observational data
- Weather and climate risk management

Thank You