Observation of NCEP/NCAR Reanalysis Satellite data over India

R. Ratan Kumar Pasalapudi

Assistant Professor of Physics,

Tara Government Degree College, Sangareddy

Abstract:

Presently, remote sensing of boundary layer meteorology is playing a vital role for weather forecasting. The NCEP/NCAR 40-year reanalysis uses a frozen state-of-the-art global data assimilation system, and a data base as complete as possible. The system has been designed with advanced quality control and monitoring components, and can produce one month of reanalysis per day on a Cray YMP/8 supercomputer. In this paper we discussed NCEP/NCAR reanalysis data for all seasons, for assessing possible transport of winds from different regions to Andhra Pradesh.

Keywords: Remote sensing, NCEP/NCAR, Boundary layer meteorology

Introduction:

Meteorology is a branch of the atmospheric sciences which includes atmospheric physics and chemistry, with mainly explains weather forecasting. Meteorology word came from Greek meaning “the study of things high in the air”. Blaise Pascal discovered that atmospheric pressure decreases with the height in 1648 [1]. The kinetic theory of gases and their basic laws in the atmosphere are published as Hydrodynamics by Daniel Bernouli [2]. Edmund Halley studied the motion of winds and monsoons and reported atmospheric motions are effectively changes with the solar heating [3]. Vilhelm Bjerknes revealed weather forecasting might be possible to predict using natural laws of atmosphere [4]. Boundary layer meteorology is the study of atmospheric meteorology above the earth surface such as wind speed, wind direction, temperature, pressure, humidity, and rain fall. The effects of the surface heating, cooling, and friction causes turbulent mixing within the boundary layer [5]. Recently, remote sensing is being used for boundary layer meteorology such as Lidar, Radar, and satellites, is the concept of collecting data from remote weather events and subsequently producing weather information. Generally, satellites collect meteorology data about the atmosphere from a remote location, and store the data where the instrument is located [6]. This data could be used to produce maps of the state of the atmosphere for a region near the Earth's surface and to study how these states evolved through time.

Result and Discussion:

NCEP and NCAR are cooperating in a project to produce a 40-year record of global analyses of atmospheric fields in support of the needs of the research and climate monitoring communities. This effort involves the recovery of land surface, ship, rawinsonde, pibal, aircraft, satellite and other data, quality

controlling and assimilating these data with a data assimilation system which is kept unchanged over the reanalysis period 1957 through 1996. This eliminates perceived climate jumps associated with changes in the data assimilation system. The NCEP/NCAR 40-year reanalysis uses a frozen state-of-the-art global data assimilation system, and a data base as complete as possible. The data assimilation and the model used are identical to the global system implemented operationally at NCEP on 11 January 1995, except that the horizontal resolution is T62 (about 210 km). The data base has been enhanced with many sources of observations not available in real time for operations, provided by different countries and organizations. The system has been designed with advanced quality control and monitoring components, and can produce one month of reanalysis per day on a Cray YMP/8 supercomputer. Different types of output archives are being created to satisfy different user needs, including one CD-ROM per year containing selected subsets of NCEP/NCAR Reanalysis products for each year that has been processed. A special CD-ROM, containing selected observed, daily, monthly, and climatological data from the NCEP/NCAR Reanalysis, is included in this issue. Reanalysis information and selected output is also available online by internet (http://www.ncep.noaa.gov) [7]. Output variables are classified into four classes, depending on the degree to which they are influenced by the observations and/or the model. For example "C" variables (such as precipitation and surface fluxes) are completely determined by the model during the data assimilation, and should be used with caution. Nevertheless, a comparison of these variables with observations and with several climatologies shows that they generally contain considerable useful information. Eight day forecasts, produced every five days, should be useful for predictability studies and for monitoring the quality of the observing systems.

Studies on wind speed and wind direction are carried out by using the NOAA Earth system Research Laboratory NCEP/NCAR reanalysis data for all seasons, for assessing possible transport of winds from different regions to Andhra Pradesh. The colour contour indicates the wind speed (m/s) and arrows indicate the wind direction. During the monsoon period westerly winds with greater speed were found to be dominant that were coming from the marine region i.e. from the Arabian Sea. During the post monsoon, winds were predominantly from the easterly or north easterly and central Indian regions. In winter, most of the winds were originated from central India, while in summer the winds were predominantly from central India and marine regions with high speed.

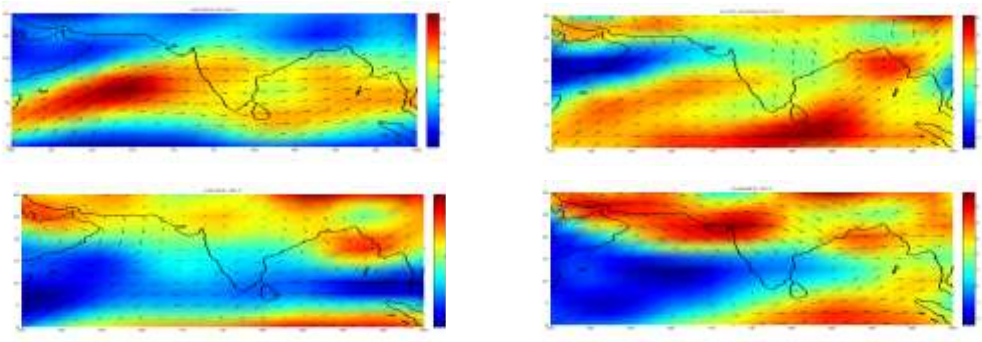

Fig. 1. Mean prevailing winds at 850 hpa over Indian region during monsoon, post monsoon, winter and summer (from NCEP/NCAR reanalysis data).

Conclusions:

Meteorology is a branch of the atmospheric sciences which includes atmospheric physics and chemistry, with mainly explains weather forecasting. Presently, remote sensing of boundary layer meteorology is playing a vital role for weather forecasting. Satellites collect meteorology data about the atmosphere from a remote location, and store the data where the instrument is located. During the monsoon period westerly winds with greater speed were found to be dominant that were coming from the marine region i.e. from the Arabian Sea. The winds were predominantly from the easterly or north easterly and central Indian regions during post monsoon and winter, while in summer the winds were predominantly from central India and marine regions with high speed.

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