

**Curriculum Vitae  
(Dr K J Ramesh)**

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1. Name : Dr. K. J. Ramesh
2. Date of Birth: 26<sup>th</sup> July, 1959
3. Designation: DIRECTOR GENERAL  
INDIA METEOROLOGICAL  
DEPARTMENT
4. Education Qualifications (from Degree Level):

Name of the Degree/ Diploma	Name of the Institution	Year of Passing	Subjects taken	Division/ Percentage of Marks
B. Sc.	Govt. Degree College Hanamkonda Warangal District Andhra Pradesh <b>[Under Kakatiya University]</b>	1979	Mathematics Physics Chemistry	First Division
M. Sc.	University College of Science & Technology <b>Andhra University</b> Visakhapatnam Andhra Pradesh	1982	Meteorology	First Division
Ph. D.	Indian Institute of Technology, Delhi <b>[IIT Delhi]</b> Hauz Khas, New Delhi	1990	Monsoon Dynamics*	NA

\*Title of the Thesis: A STUDY ON CERTAIN ASPECTS OF THE DYNAMICS AND ENERGETICS OF THE ASIAN SUMMER MONSOON

- This research was conducted at the Centre for Atmospheric Sciences of the IIT Delhi in India under the a Research Fellowship from IIT Delhi and R&D grants from the Dept. of Science & Technology, Govt. of India
- Daily Global Level IIIB Analyses of First GARP Global Experiment(FGGE) produced at the ECMWF, U.K. for the summer monsoon of 1979 and the Daily Operational uninitialised Analyses of the ECMWF, U.K. for the summer monsoon of 1983 are utilised for the research.

- The meteorological and physical aspects of the Asian summer monsoon for the poor monsoon year of 1979, as well as for the good monsoon year of 1983, are described and thoroughly analysed based on daily analyses of wind components and geopotential height fields. The methodology used is to first describe for the summer of 1979 the mean circulation characteristics, and then to present and discuss extensive diagnosis of the various terms in the kinetic energy budget, vorticity budget, and angular momentum budget. The results for the poor monsoon summer of 1979 are next compared with those for the good monsoon summer of 1983.

The study basically covers the computation of a great variety of statistics that are central to the monsoon problem from the global analysed fields of 1979 and 1983 monsoon seasons.

5. Additional Qualifications/Training in India and /or Abroad [List all Part-Time or Short-Term Training not included in Educational Career]

<b>Name of the Training Programme</b>	<b>Organising/Sponsoring Agency</b>	<b>Duration</b>
Training Workshop on <b>Monsoon Rainfall Prediction</b> held at Dhaka, Bangladesh	International Centre for Theoretical Physics[ICTP], Trieste, Italy & Bangladesh Space Research and Remote Sensing Organisation <b>[Sponsored by International Atomic Energy Agency and UNESCO]</b>	20-23 June, 1983
Autumn Workshop on <b>Cloud Physics and Climate</b> held at ICTP, Trieste, Italy	ICTP, Italy <b>[Sponsored by International Atomic Energy Agency and UNESCO]</b>	25 <sup>th</sup> November – 20 <sup>th</sup> December, 1985
Manpower Training on <b>Deterministic Medium Range Weather Forecasting</b> held at Indian Institute of Technology, Delhi	Sponsored by the Department of Science & Technology	4 weeks March-April, 1987
Advance Training Attachment on <b>Monsoon Dynamics</b> with the Department of Meteorology, University of Reading, Reading, United Kingdom	<b>Sponsored by the Indo-UK Technical Cooperaion &amp; Training Programme (Colombo Plan) of the British Council</b>	July, 1988 – August, 1999
Workshop on <b>Atmospheric Limited Area Modelling</b> held at the ICTP, Italy	ICTP, Italy <b>[Sponsored by International Atomic Energy Agency and UNESCO]</b>	15 <sup>th</sup> October – 2 <sup>nd</sup> November, 1990

6. i) Employment / Experience Record

<b>Name of the Division</b>	<b>Designation</b>	<b>From</b>	<b>To</b>	<b>Details of R &amp; D Activities</b>
<b>Centre for Atmospheric Sciences(CAS), IIT Delhi</b>	Senior Research Assistant (Rs. 5500-175-9000)	28 <sup>th</sup> August, 1984	15 <sup>th</sup> August 1989	Research on a) Monsoon Dynamics; b)Limited Area Modelling
<b>Centre for Atmospheric Sciences(CAS), IIT Delhi</b>	Senior Scientific Officer-Gr I (Rs. 10000-325-15200)	7 <sup>th</sup> July, 1991	21 <sup>st</sup> August, 1994	Research on a) Limited Area Modelling; b)Monsoon Dynamics etc.
<b>Dept. of Science &amp; Technology (National Centre for Medium Range Weather Forecasting)</b>  Lead the Group on Model Diagnostics	Principal Scientific Officer / Scientist-'D' (Rs. 12000-375-16500)	22 <sup>nd</sup> August 1994	30 <sup>th</sup> June 1999	Research on a)Monsoon Forecasting; b)Impact studies on the incorporation of the new data sets in the analysis-forecast system; c)Diagnostics of global model forecasts etc. including cyclonic circulations and Monsoon Depressions
<b>Disaster Management Unit, Planning Department, Government of Andhra Pradesh, Secretariat, Hyderabad</b> [On Deputation from the Department of Science & Technology, New Delhi]	Chief Technical Officer & Scientist – 'F'	3 <sup>rd</sup> July, 2001	16 <sup>th</sup> March, 2005	<ul style="list-style-type: none"> <li>Coordinated efforts towards development and implementation of Real-Time Hazard Mitigation Modelling Systems in respect of Floods and Cyclones affecting Andhra Pradesh</li> <li>Establishment of the fail-proof satellite telemetry based observational network in support of real-time operations of the hazard mitigation modeling systems</li> <li>Establishment of High-end Computing and Networking Infrastructure in support of real-time operations of the hazard mitigation modeling systems and for dissemination of customized</li> </ul>

<p><b>Andhra Pradesh State Remote Sensing Applications Centre, Hyderabad</b> [On Deputation from the Department of Science &amp; Technology, New Delhi]</p>	<p>Director on Full Additional Charge</p>	<p>18<sup>th</sup> June, 2004</p>	<p>28<sup>th</sup> Oct., 2004</p>	<p>warnings, hazard maps etc. to district administration using the Andhra Pradesh State Wide-Area Fibre Channel based Network</p> <ul style="list-style-type: none"> <li>• Coordinated efforts towards Development of Long-Term Hazard Reduction and Vulnerability Assessment Plans in respect of Cyclones, Drought and Earthquakes for Andhra Pradesh</li> <li>• Coordinated efforts towards expansion of satellite based network of Digital Cyclone Warning Dissemination Systems in the highly vulnerable areas of the coastal Andhra Pradesh [From pre-existing 82 sites to 182 sites]</li> <li>• Establishment of real-time data exchange procedures with the India Meteorological Department, Central Water Commission and the state departments of Irrigation, Agriculture etc. in support of real –time operations of the hazard mitigation modeling systems</li> <li>• Coordinated efforts towards development of customized application modules and maps for various state government departments/agencies involving high-end remote sensing and GIS techniques</li> </ul>
<p><b>Dept. of Science &amp; Technology</b> (National Centre for Medium Range Weather Forecasting)</p>	<p>Scientist –F'</p>	<p>23<sup>st</sup> March, 2005</p>	<p>11<sup>th</sup> June, 2006</p>	<ul style="list-style-type: none"> <li>• Application oriented Research work in the field of Model Diagnostics</li> <li>• Coordinated R &amp; D efforts with other groups towards reducing the systematic forecast errors of the Real-Time Global Data Assimilation and Forecast System(GDAFS) of India focusing</li> </ul>

				<p>on the high impact weather systems – Cyclones; Heavy rainfall events; Disaster Mitigation Modelling</p> <ul style="list-style-type: none"> <li>• Real-Time Implementation of the fully tested R &amp; D modules from time to time</li> </ul>
<p><b>Dept. of Science &amp; Technology</b> <b>(Disaster Management Cell)</b></p>	<p>Scientist-'F' till 4<sup>th</sup> Oct., 2006</p> <p>Scientist-'G' from 5<sup>th</sup> Oct., 2006</p>	<p>12<sup>th</sup> June 2006</p>	<p>11<sup>th</sup> July 2007</p>	<ul style="list-style-type: none"> <li>• To assist NDMA in building S &amp; T Capacities for Disaster Management</li> <li>• Development of background strategy documents to NDMA for integrating activities of S &amp; T institutions in the country for Disaster Management</li> <li>• Develop proof of the concept projects for adaptation involving State of the art S &amp; T tools for Disaster Management</li> </ul>
<p><b>Ministry of Earth Sciences</b> <b>(Disaster Support and Climate Change)</b></p> <p><b>Head of the Programme Office</b></p>	<p>Adviser and Scientist 'G'</p>	<p>12<sup>th</sup> July 2007</p>	<p>31<sup>ST</sup> July 2016</p>	<ul style="list-style-type: none"> <li>• Building and implementation of activities under the Global and Regional Climate Change (GRCC) Programme launched during the current five year plan</li> <li>• Building and implementation of activities planned under the National Action Plan on Climate Change (NAPCC) Formulate and coordinate the implementation of various Programme activities related to the Multi-Hazard Early Warning Systems outreach capabilities on continuous basis</li> <li>• Plan and Establish Networking Partnerships through evolving joint programmes with institutions both with in MoES and other institutions in the country dealing with the hazard warning and dissemination for executing coherent and consistent activities</li> <li>• Liaison with various developers/users of hazard related data ( spatial and non-spatial) for using such data sets for Multi Hazard Early Warning</li> <li>• Evolve suitable close working</li> </ul>

				links with other public service agencies at the national and state levels to provide appropriate technical information, professional training and support for multi-hazard early warning, dissemination and preparedness capacities
<b>India Meteorological Department</b>	Director General	1 <sup>st</sup> August 2016	Till date	<ul style="list-style-type: none"> <li>Responsible for operational weather and climate services &amp; monitoring, detection and warning of hydrometeorological hazards (cyclones; thunderstorms; other severe weather phenomena)</li> </ul>

## 7. Areas of specialization:

a) Discipline:

- i) MEDIUM RANGE WEATHER FORECASTING
- ii) HAZARD AND CLIMATE RISK ASSESSMENT AND EARLY WARNING SYSTEMS

b) Nature of specialization:

- i) Model Diagnostics
- ii) Monsoon Dynamics
- iii) Disaster Mitigation Modelling
- iv) Vulnerability Assessment

### Scientific Contributions/Achievements in the Specialised fields

- i) Keeping in view of the requirements of the NCMRWF in providing location specific agro-advisory services to the farming community of India, certain **objective methodologies have been evolved and implemented for the real-time assessment of the various facets of the summer monsoon** viz. onset and advancement of the summer monsoon; Northern limit of the monsoon; Stagnation of the monsoon; Retreat of the monsoon etc. It is to mention that these **objective methodologies are developed for the first time in India** and are being used for the real-time assessment of the summer monsoon onset, advancement and retreat over the Indian sub-continent at the NCMRWF from Monsoon-1996 onwards. Prior to their real-time implementation, these objective methodologies were subjected to performance evaluation for the monsoon seasons of 1994-96 thoroughly and the **results of performance evaluation have been published in reviewed scientific journals** viz. METEOROLOGY AND ATMOSPHERIC PHYSICS; ADVANCES IN ATMOSPHERIC SCIENCES. The paper published in Vol. 61, PP 137-151 of the international journal of METEOROLOGY AND ATMOSPHERIC PHYSICS (as a lead author) is adjudged as a **Best**

**Paper Published by the Indian scientists and conferred by Dr B N Desai Award by the Indian Meteorological Society** in 1999.

In an effort to improve the above developed objective methodologies further with enhanced physical and dynamical basis, detailed evaluation of the budgets of Kinetic Energy, Vorticity, Angular Momentum, Heat and Moisture is carried out using the analyses/forecasts of NCMRWF for the periods of 1994-97 and the long-term re-analyses fields National Center for Environmental Prediction(NCEP), USA through a collaborative effort with Prof. U. C. Mohanty's group of IIT Delhi.

The studies carried out in association with IIT Delhi's group **have fetched two Ph. D. Degrees and one of the studies is pursued under joint supervision.** These studies demonstrated that net tropospheric adiabatic production of Kinetic Energy from the available potential energy(APE) source display a dramatic increase in its magnitude over the Arabian Sea about 2-3 days prior to the sharp rise in 850hPa Kinetic Energy that is associated with the summer monsoon onset over the Kerala coast. Thus, these studies provided an **additional lead time in the prognosis of the monsoon onset** over India than that has been achieved through the development of objective methodologies at NCMRWF. Further, the increase in the magnitudes of net tropospheric heat and moisture influx and diabatic heating over the Arabian Sea in association with the sharp rise of 850hPa Kinetic Energy confirms the advancement of the monsoon circulation over the south peninsular India.

- ii) In an effort to enhance the technical capacity of the Government of Andhra Pradesh in effectively dealing with the Cyclones and Floods, Disaster Management Unit is created to carryout the following tasks:
  - a) Monitoring and Prediction of Disasters associated with Cyclones and Floods through development of computer models; Preparation of maps for various spatial and non-spatial themes; Installation of meteorological equipment (meteorological, tide/surge gauging measurements, river and rain gauges, high wind speed recorders, digital cyclone warning dissemination systems etc.; computer network and satellite based communication facilities; establish mandal level computer network for operating hazard management information system(HMIS) etc. required for real-time operations
  - b) Community mobilization for mitigation activities through raising awareness of vulnerable communities towards disasters, associated warning and their response; facilitating community works for hazard management etc.
  - c) Preparation of comprehensive disaster management plans for mapping, planning, hazard management and vulnerability reduction of major disasters(Cyclones, Floods, Droughts and Earthquakes); Integrated coastal zone management plan; Delta Water Management Plan; Watershed Management Plan etc.

As a Chief Technical Officer/ Project Manager(Technical) & Scientist – 'F', I was to work towards accomplishing the above tasks successfully so as to facilitate for the real-time implementation of the hazard mitigation modelling systems for damage minimization from the impending disasters related with floods and cyclones. **Much of the activities completed thus far constitute a technologically advanced disaster mitigation system that does not exist in other states at the moment.**

- **Development of real-time Cyclone Hazard Mitigation Modelling Systems including the Integrated Coastal Zone Management(ICZM) Plan and GIS based Decision Support Systems(DSS):**

### **Components of the Cyclone Hazard Mitigation Modelling System:**

Cyclone Track:	To Prepare the best track prediction which Provides input for other modules [Portable Unified Model( <b>PUM</b> ) of the UK Meteorological Office is adopted for the purpose]
Wind structure Generation:	To generate wind and pressure profiles around the cyclone using PUM output and surface wind data from conventional and non-conventional sources
Wind Hazard Prediction:	To compute likely damage quantitatively due to cyclonic Winds to houses; crops; power transmission network towers; roads etc.
Rainfall Model:	To predict intensities of rainfall and its dispersion using PUM output and rainfall collected from conventional and non-conventional sources
Storm Surge model:	To calculate the storm surge heights and to map the extent of inland surge inundation
Decision Support System:	To make the warning, damage quantification and dissemination process duly customised through the analysis of the model output blended with the various themes and attributes of spatial and non-spatial data sets.
Real Time System:	To automate the operation of all modules of the cyclone hazard mitigation modelling system round the clock
ICZM & EDSS Vulnerability:	To help coastal zone regulatory agencies to optimise utilisation of coastal resources, reducing impact of natural hazards and improve in the quality of life of people in coastal areas

All components of the above mentioned **cyclone hazard mitigation modelling system are fully developed** and are subjected to thorough performance evaluation for the selected past cases of cyclones formed over the Bay of Bengal. Some amount of work is still outstanding as



far as the PUM and ICZM components are concerned. Only after the successful completion of the outstanding work, the whole system can be considered for real-time operations.

- **Development of real-time Flood Hazard Mitigation Modelling Systems including the Delta Water Management Plan and GIS based Decision Support Systems(DSS):**

### **Components of the Flood Hazard Mitigation Modelling System:**

It is planned to set up flood hazard mitigation modelling system for 24 rivers of Andhra Pradesh that have the past history of flooding. For some of the rivers, sub-basin areas extend well in to neighbouring states.

Upscale Physical(UP) Model:

Hydrological Model for carryout sub-basin wise rainfall to runoff estimations in terms of an hydrograph, thus estimating the quantum of inflow in to the river sub-system. Wherever gauged flows are available, these estimated hydrographs are validated using the observational data of the Central Water Commission. Rainfall forecasts(up to 48hrs) of the PUM are considered for estimating run-off in to the river sub-systems.

MIKE 11 Model:

1-Dimensional Hydrodynamic model exclusively set up for each of the 24 rivers accounting for the actual bank top overflows leading to the inundation of neighbouring flood plains. Lead time of the Mike11 flood forecasts would be largely determined by the lead time of the rainfall forecasts and to certain extent by the natural time of down stream flow characteristics.

MIKE 11 GIS:

A fully integrated GIS based flood management module, centred around Arcview GIS, using pre-defined flood plain schematisation for generating detailed inundation maps with extent and depth of inundation

Flood Watch and Offline DSS:

A fully developed data management and warning/flood hazard map generation system for generating tailor made outputs of flood hazard mitigation modelling system blended with the various themes and attributes of spatial and non-spatial data sets for facilitating the damage quantification over the affected areas

Delta Water Management Plan:

An efficient water management system is developed for the three delta's viz. Godavari, Krishna and Pennar, of Andhra Pradesh based on the water available in the beginning of the crop cycle both for Kharif and Rabi.

All components of the above mentioned **flood hazard mitigation modelling system are fully developed** and are subjected to thorough performance evaluation for the selected past cases of floods. Numerical experimentation with models shall be carried out by prescribing different intensities of flooding having different return period frequencies, to evolve appropriate flood control strategies for each of the 24 river systems.

- **Commissioning of Hazard Monitoring Observational Network for Andhra Pradesh:**

In an attempt to provide near real-time data inputs to hazard mitigation models that are under final stage of development for effective utilisation, a satellite telemetry based hazard monitoring observational network is established covering all the major catchments of 24 rivers considered for flood modelling and meteorological observations at five coastal districts for cyclone modelling.

The ground reception station, that operates on one of the data relay transponders of Kalpana I satellite, for this network is commissioned in the L-Block of the A. P. Secretariat. Details of the type of data collecting sensors installed for the purpose include:

i)	River flow measuring gauges:	49
ii)	Rainfall measuring gauges:	55
iii)	Meteorological sensors comprising high wind speed recorder; barometric pressure; temperature etc.	5

Data from all the remote locations gets transmitted every hour to the ground reception station located at the Secretariat. Currently, the network is commissioned and is undergoing thorough performance evaluation.

- **Commissioning of High-end Computing and Networking Infrastructure:**

The setting-up of the high-end computing and networking infrastructure was essential to meet the computing and communicating needs of the hazard mitigation modelling systems and for supporting real time operations as well. The specifications of this high-end computing and networking infrastructure are appropriately finalised so as to minimise the production time of running the various hazard mitigation models so that the warnings and hazard maps could be disseminated to the affected district authorities with sufficient lead time. Details of the high-end computing and networking infrastructure commissioned for real time operations of the hazard mitigation modelling systems are as follows:

- i) SGI Onyx 3800 Computing and Graphics Server with 10CPUs and 16GB memory with additional slots for adding CPUs and Memory blocks as well
- ii) Storage Area Network(SAN) of 1.4TB storage that can be expandable up to 13TB that can be mapped by systems of heterogeneous operating systems
- iii) Automatic high capacity(up to 200GB each) archival and retrieval system with 20 slots and two tape drives with expandability to 60 slots and 4 tape drives
- iv) Gigabit Ethernet Switch with 16 ports and 5 network switches of 24 ports each
- v) Backup drives(Exabyte; DAT; Zip) on network
- vi) Printers and plotters

vii) UPS and Generator

- **Development of long-term hazard planning, management and vulnerability reduction action plans in respect of Cyclones; Drought and Earthquakes**

Study area on **Cyclones covers nine coastal districts** of Andhra Pradesh namely, Srikakulam, Vizianagaram, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur, Prakasam and Nellore. Study area on **Drought include whole of 23 districts** of the state with special emphasis on Rayalaseema and Telangana regions. The assignment on **earthquakes covers whole of Andhra Pradesh** with a focus on the management of earthquakes risk on known vulnerable seismic zones. Specific tasks have been assigned in respect of each of the studies and the Key elements of the disaster management plans include:

- a) Disaster Risk Identification – Hazard and Vulnerability Assessment
- b) Disaster Risk Reduction - Mitigation and Regulation
- c) Disaster Risk Transfer - Relief and Insurance

Government has received draft final reports(DFR) of all the studies and after the DFRs are thoroughly discussed and finalised in a state level workshop for their finalisation and acceptance by the Government.

- **Research and Development Efforts after Ph.D. at NCMRWF, New Delhi:**

- i) Keeping in view of the requirements of the NCMRWF in providing location specific agrometeorological services to the farming community in India, certain objective methodologies have been evolved involving the analyses and medium range forecast to identify and determine various facets of the summer monsoon viz. Onset and advancement of the summer monsoon; Northern limit of the monsoon; Stagnation of the monsoon; Withdrawal of the monsoon etc. The objective procedures developed at the NCMRWF for determining summer monsoon activities are further subjected to performance verification for the monsoon seasons of 1994, 1995 and 1996[**Implemented on real-time basis from May 1996 and since then these procedures have been utilized for real-time assessment of summer monsoon activities**]
- ii) In an effort to improve the objective procedures for the deterministic prediction of the summer monsoon onset over the south Indian peninsula, detailed examination of certain budget parameters is carried out. It is found that net tropospheric adiabatic production of kinetic energy from the available potential energy display a dramatic increase in its magnitude over the Arabian Sea about 2-3 days prior to the sharp rise in 850hPa kinetic energy is noticed in association with the summer monsoon onset. This provides an additional lead time in the prognosis of the monsoon onset. Further, the increase in the magnitudes of net tropospheric heat and moisture flux convergence, and the diabatic heating over the Arabian Sea in association with the sharp rise of 850hPa kinetic energy confirms the advancement of the monsoon circulation over the south Indian peninsula.
- iii) Detailed examination of the medium range rainfall forecasts is carried out with an objective to study the consistency and reliability of regional scale seasonal/monthly rainfall fields over Indian sub-continent. For this purpose, daily rainfall forecasts

(accumulated for 24 hours) extending from day-1 to day-5 are utilised to compute the monthly and seasonal forecast fields for the principal summer monsoon months (June, July and August) of 1993, 1994, 1995 and 1996. Global patterns of rainfall forecasts and their respective zonally averaged distributions are compared with large scale rainfall climatologies of Jaeger and Legates and Willmott. In addition, observed data from about 350 surface synoptic stations over India are used for regional verification of the medium range rainfall forecasts.

- iv) Intercomparison of the mean monthly analyses-forecast fields of the NCMRWF with the corresponding fields of JMA, Japan; ECMWF, U.K. and Met. Office, U.K. for Monsoon-1995 is carried out.
- v) The satellite data sets (SATEM and SATOB) received on GTS are being routinely used on operational basis. Impact of satellite derived temperature profile data (received at 500Km resolution) on medium range forecasts for a period of 7 days in May 1995 is examined in detail. In particular, the impact of satellite temperature data is studied in terms of standard objective scores viz. anomaly correlation coefficient; RMSE and skill scores for three selected sub-domains of the Indian Ocean and the adjoining region as the circulation characteristics (both of the atmosphere and ocean) of these parts of the tropics are quite different from each other and from the rest of the tropics. The objective scores show that the satellite data bring about a general improvement in the prediction over all the regions considered in this study. Further, a positive impact of the TOVS data is found in the flow characteristics as well. TOVS temperature profile data at its full resolution (85 Km) has become available in India on experimental basis. An attempt is made to examine the quality and impact of this data as well on the medium range forecasts over India and neighbourhood.
- vi) Cloud Motion Vector wind (CMV) data is one of the major products derived from current day operational geostationary satellites and continues to be a useful source of information for global data assimilation systems. An attempt is made to improve the quality of INSAT derived CMVs through the height re-assignment by employing first guess fields (short range forecasts) of a global forecast model operational at the NCMRWF.
- vii) Synoptic assessment of daily weather is carried out through performance evaluation of analysis and medium range forecast products of NCMRWFs global model. Regularly contributing to the verification reports on the performance of the operational analysis-forecast system of NCMRWF successive monsoon seasons since 1994 on the aspects of a) seasonal monsoon circulation characteristics; b) systematic forecast errors in the prediction of summer monsoon and c) onset, advancement and withdrawal of the summer monsoon.

#### **Efforts prior to the joining at NCMRWF at IIT Delhi:**

- i) **STUDIES RELATED TO MONSOON DYNAMICS:** Studies to understand the dynamics and energetics of the Asian Summer Monsoon were undertaken by using the FGGE level-IIIb data sets archived at the European Centre for Medium Range Weather Forecasts (ECMWF), U.K. In order to compare the similarities and

differences seen in the large scale dynamics and the energetics of the Asian summer monsoon during the contrasting years of monsoon activity, data for the years 1979 & 1987 (years of large deficient rainfall) and the data analyses of the ECMWF for the years 1983 & 1988 (years of excess rainfall) are used. Having done the required processing and deriving the various statistics, detailed diagnostic studies with the help of kinetic energy, vorticity, angular momentum, heat and moisture budgets and on the circulation characteristics during various phases of the summer monsoon activity have been carried out.

- ii) **STUDIES USING THE MONTBLEX DATA SETS:** With the help of micro-meteorological tower data recorded at the IIT.Kharagpur during the pilot experiment of Monsoon Trough Boundary Layer Experiment (MONTBLEX), structure and diurnal variation of surface layer has been studied in respect of meteorological and turbulence parameters using similarity profiles.

Using the special radiosonde/slow rising balloon observations over the monsoon trough region collected during the pilot experiment phase of the MONTBLEX, a detailed study has been undertaken to study the structure of the boundary layer and its various sub-layers viz., mixed layer, cloud layer and stable layer, during different atmospheric conditions. Further, with the help of the above data sets, vertical variation of the eddy diffusivity coefficient is determined using several first order closure schemes within the atmospheric boundary layer.

- iii) Numerical experiments with a high resolution limited area model having improved boundary layer physics (turbulent kinetic energy (TKE) formulation) has been performed to study the planetary boundary layer characteristics over the monsoon trough region. Details of the evolution and structure of the atmospheric boundary layer processes in the monsoon trough and adjoining oceanic regions are examined.
- iv) **DIAGNOSIS OF THE NUMERICAL WEATHER PREDICTION PRODUCTS:** The influence of the physical processes of an atmospheric general circulation model (AGCM) in the reduction of the systematic errors of the tropical forecasts in general and the Asian summer monsoon circulation in particular is examined by utilizing the operational medium range forecasts of the ECMWF for the two summer monsoon seasons of 1984 and 1988.
- v) Determination of systematic errors of the limited area model (LAM) of the CAS, IIT Delhi for a representative month of the monsoon i.e. July using the 1988 analyses of the European Centre for Medium Range Weather Forecasts (ECMWF), U.K. has been carried out. The systematic errors of LAM are compared with a state of art operational global model of ECMWF over the Asian summer monsoon region to diagnose the inherent weaknesses in the formulation of the model.

8. **Specific Professional Contributions/Accomplishments outside the scope of Official Duties**

Drafted Framework Document for Global Tsunami and other Ocean Related Hazards Early Warning Systems (GOHWMS) in a IOC Working Group Meeting on Tsunamis and Other Ocean Hazards Warning and Mitigation Systems 3 – 4 Apr 08, Paris, France

Served as Planning Commission's Working Group Member for drafting the XI Plan Report on Disaster Management

Served as Core Group Member for drafting and finalization of **National Disaster Management Guidelines on Cyclones** for the National Disaster Management Authority (NDMA)

Served as Core Group Member for drafting and finalization of **National Disaster Management Guidelines on Floods** for the National Disaster Management Authority (NDMA)

Currently Serving as Core Group Member for drafting and finalization of **National Disaster Management Guidelines on Landslides and Urban Floods** for the National Disaster Management Authority (NDMA)

Serving as a Member of Advisory Board for the Andhra Pradesh State Disaster Mitigation Society (APSDMS), Planning Department, Govt. of Andhra Pradesh

Serving as Joint R & D Partner Member for Implementing the VII Phase of International Hydrology Programme (IHP) of UNESCO on Flood Disaster Mitigation Modelling coordinated by National Institute of Hydrology, Roorkee

## 9. List of Publications

### a) Publications in reviewed journals:

1. U.C.Mohanty, S.K.Dash and **K.J.Ramesh**(1987): STUDIES ON THE MEAN CIRCULATION CHARACTERISTICS IN THE TROPICS USING THE FGGE DECEMBER 1978 ANALYSES, *Proc. of Indian Nat. Sci. Acad.(Physical Science)*,53,A,2,pp 232-240
2. U.C.Mohanty, **K.J.Ramesh** and S.K.Dash(1989): ENERGY TRANSFORMATIONS IN THE TROPICAL CIRCULATION DURING THE FGGE WINTER, *Jour. of Met. Soc. of Japan*,67,5,pp 691-704
3. U.C.Mohanty and **K.J.Ramesh**(1993): CHARACTERISTICS OF CERTAIN SURFACE METEOROLOGICAL PARAMETERS IN RELATION TO THE INTERANNUAL VARIABILITY OF THE INDIAN SUMMER MONSOON, *Proc. of the Indian Academy of Sciences (Earth & Planetary Sciences)*, 102, 73-87.
4. U.C.Mohanty and **K.J.Ramesh** (1994): A STUDY ON THE DYNAMICS AND ENERGETICS OF THE ASIAN SUMMER MONSOON, *Proc. of the Indian National Science Academy{Physical Sciences}, (Part A)*, Vol. 60, No. 1, 23-55.
5. U.C.Mohanty, **K.J.Ramesh**, N.Mohan Kumar and K.V.J. Potty (1994): VARIABILITY OF THE INDIAN SUMMER MONSOON IN RELATION TO OCEANIC HEAT BUDGET OVER THE INDIAN

SEAS, *Dynamics of Atmospheres and Oceans*, Vol. 21, No. 1, 1-22.

6. A.Tyagi, U.C.Mohanty and **K.J.Ramesh** (1994): PLANETARY BOUNDARY LAYER STRUCTURE IN THE MONSOON TROUGH REGION, *MAUSAM*, Vol. 45, No. 3, 213-222.

7. U.C.Mohanty, W.A.Heckley and **K.J.Ramesh** (1995): STUDY ON THE SYSTEMATIC ERRORS OF THE TROPICAL FORECASTS: INFLUENCE OF PHYSICAL PROCESSES, *Meteorology and Atmospheric Physics*, 55, 151-166.

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27. FRAMEWORK DEVELOPMENT OF HYDROMETEOROLOGICAL OBSERVATIONAL NETWORK AND FLOOD HAZARD MITIGATION MODELLING SYSTEMS **K. J. Ramesh**, K. Mruthyunjaya Reddy, A. Ramakrishna Nagaraju, M. V. Ramanamurthy, G. Prasad Rao and Y. Ramesh, Hydrology Review, Vol 21, pp 39-50.



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29. Framework development of hydrometeorological observational network and hazard mitigation modelling systems in respect of floods and cyclones **K. J. Ramesh**, A. Ramakrishna Nagaraju, M. V. Ramanamurthy, G. Prasad Rao and Y. Ramesh , **International Journal of Natural Hazards**, Volume 41, Number 3, 2007, pp 531-548

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Orographic Features on the Short Range Prediction of Rainfall Over India and its Neighbourhood, Proc. of the Int. Symp. on Snow and Related Manifestations [SNOWSYMP-94], Manali, India, 269-282.

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10. O. P. Madan, U. C. Mohanty, R. K. Paliwal, D. R. Sikka, S. R. Kalsi, Gopal R. Iyengar, L. Harendu Prakash, **K. J. Ramesh**, R. S. Pareek, K. S. Zalpuri, P. V. S. Raju, Asit Patra and Sumana Bhattacharya(1999): METEOROLOGICAL ANALYSIS DURING INDOEX INTENSIVE FIELD PHASE - 1999, Vol-I:DAILY WEATHER SUMMARY; Vol-II: WIND ANALYSIS AND TRAJECTORIES & Vol-III: INSAT CLOUD IMAGERY, OLR AND RAINFALL ANALYSIS, **Published under the aegis of the INDOEX India Programme by I.I.T. Delhi**

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***Books/Reports/Abstract Volume/Proceedings:***

1. Report on "Performance Evaluation of the Global Data Assimilation-Forecast System during Monsoon-1997"[Ed. By R. K. Paliwal, L. Harendu Prakash, **K. J. Ramesh** and Akhilesh Gupta], Department of Science & Technology, National Centre for Medium Range Weather Forecasting, August 1998,pp 115
2. Report on "Evolution and Maintenance of the Summer Monsoon-1998 by the Global Data Assimilation-Forecast System of India"[Ed. By R. K. Paliwal, Z. N. Begum, **K. J. Ramesh** and Akhilesh Gupta], Department of Science & Technology, National Centre for Medium Range Weather Forecasting, April 1999,pp 120
3. Abstract Volume of the National Workshop on "Dynamic Crop Simulation Modelling for Agrometeorological Advisory Services" held during 4-6 January, 1999[Ed. By S. V. Singh, L. S. Rathore, **K. J. Ramesh**, S. A. Saseendran, K. K. Singh and Akhilesh Gupta], Department of Science & Technology, National Centre for Medium Range Weather Forecasting, January, 1999, pp 89
4. Proceedings of the International Symposium on Asian monsoon and Pollution Over The Monsoon Environment(INTROMET-97) held at New Delhi during 2-5 December, 1997 [Ed. By U. C. Mohanty, S. K. Dube, **K. J. Ramesh**, Akhilesh Gupta]
5. One of the contributor to the "Guide for Agrometeorological Advisory Service"[Ed. By S. V. Singh et al.], Department of Science & Technology, National Centre for Medium Range Weather Forecasting, Sept., 1999, pp201
6. Proceedings of the International Conference on Forecasting Monsoons from Days to Years(ICOM-2001) held at New Delhi during 20-22 March, 2001 released as a Special Issue of the Bulletin of Indian Meteorological Society – Vayumandal, Vol. 31, No. 1-4, 2001[Guest Editors: Akhilesh Gupta and **K. J. Ramesh**]
7. Pre-Symposium Proceedings of the International Symposium on Natural Hazards(INTROMET-2004) held at Hyderabad during 24-27 February, 2004 organised by the Indian Meteorological Society, WMO, IMD and Govt. of Andhra Pradesh [Edited by **K. J. Ramesh**, CVV Bhadrani, M. Ravichandran, E. Pattabhi Rama Rao and Akhilesh Gupta], pp 365.

**10. SPECIAL CONTRIBUTIONS TO THE ACADEMIC ADVANCEMENT, PROMOTION AND MANAGEMENT OF SCIENCE**

• **Awards and Fellowships:**

- i) Junior/Senior Research Fellowship by the IIT, Delhi for Ph.D.(1982-85)
- ii) Technical Co-operation Training Department(TCTD) Award of Fellowship to work

at the Department of Meteorology, University of Reading, U. K. for 12 months to work on the Monsoon Dynamics(1988-89)

- iii) Dr. B. N. Desai Award by the Indian Meteorological Society for Best Paper Published during 1995-1996 entitled, Objective determination of onset, Advancement and Withdrawal of the Summer Monsoon using large scale forecast fields of a global spectral model over India, published in ***Meteorol and Atmos. Physics,61,137-151.***
  - iv) **Elected Fellow of the Andhra Pradesh Academy of Sciences**
  - v) **Elected Fellow of the Indian Meteorological Society**
  - vi) **Awarded Honoris Causa Doctor of Science (D. Sc.) by Orissa University of Agriculture & Technology for Contributions of Meteorology for Agriculture.**
  - vii) **Ananta Animuthyam (Precious Pearl of Anantapur) Award – 2018 in Science by the Sahiti Gagan Mahal Trust Regd., Penugonda, Anantapur District, Andhra Pradesh**
  - viii) Elected **Member of the National Academy of Sciences**
- Serving as a **Member of Advisory Board for the Andhra Pradesh State Disaster Mitigation Society (APSDMS), Planning Department,** Govt. of Andhra Pradesh
  - **Expert Member** in the **Board of Studies of the School of Environment Management,** Guru Gobind Singh Indraprastha University, Delhi
  - **Expert Member** in the **Board of Studies of the Department of Meteorology & Oceanography,** Andhra University, Visakhapatnam
  - Served as a Member of the Weather Advisory Group for Indian Ocean Experiment[INDOEX-INDIA] and Bay of Bengal Monsoon Experiment[BOBMEX] Observational Field Campaigns during Jan.-Mar. 1999 and July-August, 1999 respectively for Preparation/Dissemination of 3-day Weather Outlook in real-time to the cruise scientists working on-board of the research vessel ORV SAGAR KANYA based on the forecast products of the Global Assimilation-Forecast System(GDAFS) of India operational at the National Centre for Medium Range Weather Forecasting(NCMRWF)
  - Invited for Lectures in SERC Schools/Workshops/ Seminars/Symposia
  - Guest faculty for MTech (Disaster Management) in Indraprastha University, Delhi and various courses of National Institute of Disaster Management (NIDM), New Delhi; Administrative Training Institutes of various States.
  - Joint Supervision Ph. D. Degree awarded to **Dr. PVS. Raju from IIT Delhi** during May,

2004

- Guiding Ph.D./M. Tech. Projects as a Joint Supervisor and Served as Adjudicator for Ph.D./M. Tech. Projects
- Review of research publications submitted to various refereed Journals viz. International Journal of Climatology; Meteorology and Atmospheric Physics; Proc. of the Indian National Science Academy; Indian Journal of Physics; Vayumandal etc. from time to time
- •One of the Nodal Investigators for the real-time utilization projects of IRS-P4 (OCEANSAT-I) data in the GDAFS of India
- •One of the Nodal Investigators for the joint Indo-French research project on Monsoons and the Tropical Intra-seasonal and Interannual Variations Experiment (MOTIVE)
- Elected Member of the National Council of the Indian Meteorological Society during 199-2001.
- Elected Chairman of the Hyderabad Chapter of the Indian Meteorological Society for two terms – 2001-2003; 2003-2005.
- Served as the Chairman, LOC in organizing an International Symposium on Natural Hazards (INTROMET –2004) in Hyderabad during 24-27 Feb., 2004 organized jointly by the Indian Meteorological Society, WMO, IMD and Govt. of Andhra Pradesh
- Serving in the Organizing Committees of various National/International Conferences
- 
- **Associated in the Editorial Board of the following Reports/Volumes**
  - i) Abstract Volume of the National Workshop on DYNAMIC CROP WEATHER MODELLING organized by the NCMRWF in New Delhi
  - ii) Proceedings of the INTROMET-97 held in IIT, Delhi and ICOM-2001 held at India Habitat, New Delhi
  - iii) Contributed to several Chapters in successive Performance Reports Produced for all the Monsoon seasons from 1994 to 1999
  - iv) Contributed to the GUIDE ON AGRO-ADVISORY SERVICE OF NCMRWF