

PREFACE

Only a few decades ago, design of a new aircraft would involve making a series of 'hard' models, making it cost prohibitive, and time consuming, and an assessment of a climate impact a decade ahead would be qualitative at best. Thanks to the advances in Mathematical Modelling and Computer Simulation, there has been a nearly revolutionary change; it gives me great pleasure to write this report for C-MMACS, the premier agency in the CSIR family to bring this revolution to this nation.

The scientific activities over the years have now crystalized to a few organized programmes with strong focus. The C-MMACS Environmental Modelling Programme (CEMP) is an integrated effort to address critical issues in environment and climate through an integrated modelling platform for atmosphere, ocean and hydrosphere. This programme addresses a number of critical problems like ocean state forecasting and oceanic variability (INDOMOD Project), simulation of tropical cyclone (The New Millenium Indian Technology Leadership Initiative Project), assimilation methodology (Indo-French collaboration) and soil moisture variability. The year 2001-2002 has seen a number of important developments such as the simulation of Orissa cyclone using an Atmospheric General Circulation Model and analysis of sub-seasonal variabilities over the Indian ocean (another Indo-French collaborative effort), and modelling of oxygen profiles in upper ocean.

It gives me a sense of pride and accomplishment to record 2001-02 as the seventh consecutive year of successful experimental forecast of all-India summer monsoon rainfall using the cognitive network developed at C-MMACS. In the words of Prof. Tim Brookes, who visited C-MMACS to cover this story for the National Geographical Magazine, the C-MMACS efforts in this direction have now generated international interest and acceptance.

In the area of Earthquake Hazard Analysis, C-MMACS scientists have ventured into farflung areas to set up GPS stations to generate data. The year 2001-02 has seen the setting up of many new GPS stations at various parts of India.

A boost to the C-MMACS modelling programme has come from the enhanced scope of the Industrial Computational Mechanics Group. This Report contains a number of interesting results in the area of Finite Element Method, a versatile and widely used tool in industrial computation.

A Data Organization and Management Group has taken steps to archive, organize and manage the varied and massive data sets required for atmospheric, oceanic and hydrological applications.

A milestone in the development of C-MMACS computing platform, the backbone of C-MMACS strength was achieved during the year with the addition of 03000 16-processor computer. A number of peripherals have also been added including the IDL visualization and analysis software.

Synergy, resource-sharing and effective collaboration are some of the guiding principles of C-MMACS. There has been a focussed and sustained effort to create an enabling environment, which is now paying off. The climate Dynamics group at Indian Institute of Tropical Meteorology, Pune, now successfully uses C-MMACS computing platform through remote login for computing-intensive model simulations. C-MMACS has effective collaboration with a number of universities and national laboratories like IIT-Delhi, Andhra University and Cochin University. Efforts are on to develop such collaboration with Tezpur University to harness the intellectual potential of the North-East region. C-MMACS would like to invite other research organizations and universities to join hands to develop synergy in critical areas.

The proposed Indo-French Centre for Environment and Climate (IFCEC), a multi-institutional research platform, has taken several strides forward in the year 2001-02, including two Indo-French discussion meetings: one on Forecasting Extreme Events (FOXES) and the other on Modelling and Observations of Tropical Variabilities (MOTIV). Both the meetings were attended by groups of scientists from France.

The year 2001-02 also stands out as the year in which C-MMACS has received the prestigious Shanti Swarup Bhatnagar Award in the Earth Sciences. In addition Mr. Anil Kumar has received the prestigious DADD Fellowship.

C-MMACS is a 'young' institute, with the age of the average scientist being less than 35 years! Inspite of its youth, C-MMACS maintains a high per capita scientific output. This is amply borne out by the scientific and meta-scientific activities reported here. In addition, C-MMACS has also

gone out to spread the excitement of mathematical modelling among the younger generation by participating in AWEC-2001 (Awareness of Weather, Environment and Climate) a mega event organized by the Bangalore Chapter of Indian Meteorology Society.

C-MMACS has always been privileged to have its Advisory Committee (AC) chaired by the Director General of CSIR; Dr. R. A. Mashelkar, FRS, continues to chair the AC. C-MMACS expresses its most grateful thanks to the Chairman and the members of the Advisory Committee.

C-MMACS must particularly single out the unstinted support of Dr. T. S. Prahlad, Director, NAL. Department of Ocean Development (DOD) has continued to support

wholeheartedly the scientific work of C-MMACS and, in particular, for the support that enabled C-MMACS to set up the new high performance computing facility. I also express my sincere thanks to Dr. V. S. Ramamurthy, Secretary, Department of Science and Technology for the generous help to C-MMACS activities.

I thank all the members of Team-C-MMACS for continuing to put up an excellent performance. Dr. P. Goswami, Convenor, Knowledge Management, has performed the difficult task of compiling and editing the Annual Report and he has been ably assisted by Mr. Himesh and Mr. Arjun.

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Scientist-in-Charge