R. Ramesh (Physical Research Laboratory, Ahmedabad) reviewed the data available on past monsoons and the ability of climate models to simulate past monsoon. He showed that during the last glacial maximum (which occurred around 18,000 years ago), there was an increase in the salinity of the surface waters in the Bay of Bengal. There is evidence that the surface winds in the Arabian sea were 50% below the present values. This indicates a reduction in monsoon rainfall during the last glacial maximum. Around 9000 years ago the solar radiation incident in the tropics was about 7% more than present and the proxy data indicate that the monsoon rainfall was more than the present. The simulations of past monsoon using general circulation models show a linear relationship between the solar radiation incident at the top of the atmosphere in the tropics and the monsoon rainfall. Some models show that a 1% change in solar radiation causes a 2.5% change in monsoon rainfall.

R. Sukumar (Indian Institute of Science, Bangalore) presented results based on the use of stable carbon isotope ratio as indicators of past climate based on the different ecological requirements of different plant types. He discussed the classification of plants into C_3 and C_4 types on the basis of their photosynthetic pathways of carbon fixation. He showed that C_4 plants (mainly tropical grasses) thrive under arid conditions while C_3 plants dominate when wetter conditions prevail. The ratios of ^{13}C to ^{12}C in the C_3 and C_4 plants are different because of the differences in the photosynthetic pathways of carbon fixation. He showed the variations in the ^{13}C to ^{12}C ratio in peat samples collected from a pit dug in the Nilgiris. He used this data to show that this region had arid climate during the last glacial maximum (about 18,000 years ago) and a wet period around 9000 years ago.

S. W. A. Naqvi (National Institute of Oceanography, Goa) discussed the regulation of the amount of CO_2 in the atmosphere by the oceans. The amount of carbon stored in the ocean is more than 50 times the amount of carbon stored in the atmosphere. Hence the exchange of CO_2 between the ocean and the atmosphere has a profound influence on the concentration of CO_2 in the atmosphere. At the present time around 7 billion tons of CO_2 is pumped into the atmosphere by the burning of fossil fuels and deforestation. Out of the 7 billion tons, 2 billion tons is absorbed by the oceans and 3 billion tons accumulates in the atmosphere and causes an increase of CO_2 in the atmosphere at the rate of around 1.5 ppm per year. Any change in the rate of absorption of CO_2 by the ocean can cause a dramatic change in the CO_2 of the atmosphere. During the last glacial maximum (around 18,000 years ago), the CO_2 of the atmosphere was around 200 ppm which was lower than the pre-industrial value of 280 ppm and the present value of 360 ppm. The equatorial ocean is a source of CO_2 for the atmosphere while the ocean in the southern hemisphere acts as a sink. Naqvi highlighted the effect of deep-ocean circulation and nitrogen cycle on the CO_2 content of the atmosphere.

In the discussions that followed the presentation on palaeoclimate, many participants underscored the need to extend the observations to other regions of India so that the large-scale signal of climate variations can be deduced. Many participants highlighted that corals in the Indian seas may provide high-resolution data on past climate changes in the Indian region. The simulation of past climate using climate models was considered necessary in order to gain confidence in our ability to predict future climate.

J. Srinivasan, Centre for Atmospheric and Oceanic Sciences and Department of Mechanical Engineering, Indian Institute of Science, Bangalore 560 012, India.

National Centre for Ultrafast Processes

During the last decade there has been enormous interest to study processes occurring in the solid state and condensed phase in real time by using techniques particularly in the picosecond (10^{-12} s) and femtosecond (10^{-15} s) domains. Many biological, chemical and other transport phenomena are known to occur from millisecond to a few hundred femtoseconds. In order to understand the fundamental dynamic processes for the development of new materials, study of the fast processes in various areas of physics, chemistry and biology has become important. Towards this, new lasers and techniques have been developed during the last two decades for investigating the dynamics of the ultrafast processes and physical properties occurring in clusters of atoms and molecules in real time in condensed phase and in solid state. Time resolved laser spectroscopic techniques are used in these studies for understanding transient phenomena.

Study of ultrafast processes paves the way to control the product of chemical reactions, angular distribution of photoelectrons and the evolution of vibrational wave pockets of diatomic molecules. During the last two decades, lasers with ultrashort light pulses have been developed which are now available with pulses shorter than 100 femtoseconds. Using these lasers impressive pulse shaping and tailoring techniques have emerged that make it possible to control molecular dynamics. Investigations on ultrafast phenomena are aimed at developing technologies in the cutting edge of materials research: new catalysts for chemical transformation, nanophase materials, biotechnological process materials and molecular electronic and photonic systems.

The Department of Science and Technology (DST), Government of India has established a National Centre for Ultrafast Processes at Madras University. A separate building with laboratories, hostel and other infrastructure will be exclusively established for NCUFP in the Taramani Campus of the University with the support of the Government of Tamil Nadu. The Centre will have major facilities for (i) lifetime measurements by time correlated single photon counting, (ii) nanosecond pulsed laser systems for absorption and emission studies, and (iii) flash photolysis equipment using flash lamps.

Facilities also being established include (i) picosecond emission spectrometer and (ii) picosecond pump probe laser system.

P. Natarajan, Department of Inorganic Chemistry, University of Madras, Guindy Campus, Chennai 600 025, India.