have resolved to settle all differences bilaterally and through peaceful negotiations.

(c) Government have taken up with Pakistan, at different levels, the question of their assistance to terrorism and version directed against India. On our side, necessary steps are being taken, *inter-alia,* to secure the border and counter the threats posed by the trained terrorists.

Outstanding features of Ocean Development in the country

2332. SHRI VITHALRAO MADHAVRAO JADHAV:

SHRI H. HANUMANTHAPPA;

SHRI PRABHAKAR B. KORE:

Will the PRIME MINISTER be pleased to state:

(a) what are the outstanding features of efforts for ocean development of our country;

(b) what is its economic viability; and

(fe) the amount of foreign exchange involved in the research on ocean development?

THE MINISTER OP STATE IN THE MINISTRY OF SCIENCE AND TECHNOLOGY (PROF. M. G. K. MENON); (a) The outstanding features of efforts made by the Department of Ocean Development are as follows:

1. *Ocean Information System—Primary) Data Base*

A satellite based ocean information system has been established, to provide management support to navi gation, coastal zone management and design strategies for exploration and exploitation of marine living and non-living resources in the country.

2. Sea *Be a Mining*

A mine site for the exploitation of seabed polymetallic nodules has been secured for the country in the Central Indian Ocean, as a result of extensive marine exploration covering more than 4 million sq. km. With registration of this site by the Preparatory Commission for the International Seabed Authority (United Nations), India became the first country to be registered as a Pioneer Investor.

As a sequel to this, a programme has now been generated to design and develop a test seabed mining system at the Central Mechanical Engineering Research Institute, Durgapur.

Research & Development for the extraction of metals from the nodules has now reached the stage where it is now ready for being upgraded to a pilot plant capable of processing 250 kg. of nodules per day. This is being done.

3. *Antarctica*

Nine expeditions have been sent to Antarctica so far. In addition to continually raising the quality and scientific content of research activities at Maitri, a special exploratory expedition was sent in November, 1989 to the Weddell Sea Region of Antarctica as a part of a programme to develop first hand knowledge and understanding of the critical terrains of Antarctica to guide us in selecting an appropriate site, if it is later decided to set up a second permanent station in Antarctica.

4. *Research and traimng* in *modelling Oceanic* Circulation and Air-Sea *processes*

Recognizing that oceanic circulation plays a dominant role in determining all other oceanic processes, and the critical role of air-sea exchange processes in controlling

weather, a project was especially-generated to develop high level expertise in modelling and experimental design to study oceanic circulation and Air-Sea interface processes. This is being implemented through the establishment of a Cell in the Centre for Atmospheric Sciences at Indian Institute of Science, Bangalore.

5. *Monitoring and modelling of Pollution in the sea*

Systematic monitoring of pollution regimes along! the entire coast of India and Islands has been recently established, to keep a surveillance on the health of our coastal seas and to develop an understanding of the dynamics of the ecosystem on which our near-shore living resources depend.

6. *Sea level variations*

A programme for establishing a network of 9 state-of-the-art tide-gauge stations along our coast and Islands is now underway! towards documenting sea level variations, if any, with a high precision.

7. *Island Centre for Ocean Development*

Steps have been initiated for establishing a Centre for Ocean Development at Port Blair with a view *to* improving the quality of life and of human endeavour amongst the Islanders, whilst preserving the integrity of the fragile eco-system of the Andaman & Nicobar Group of Islands and ensuring a pattern of development m harmony with the environment.

8. *Aquaculture: Action Plan for alleviating poverty*

A projectized Action Plan on aquaculture aimed at developing special assets of the coastal wetlands is being implemented towards improving the quality of life in rural areas. This programme is monitored by a Special Steering Committee.

9. *An Integrated Wave energy generator—breakwater system t< produce 2 MW of power*

Utilizing the experience gaineu KW wave generating Lnit to be installed shortly at Vizhinjam (Trivandrum), a 260 m lonf 20 Caisson wave generating system which will produce 2 MW of peak power has been designed to be incorporated in the breakwater at Thangassery, Kerala.

(b) Whilst most of these programmes have a long gestation period and are at various stages of R&D, short and long term viability of some of these programmes have been worked out. The cost of the integrated wave genera tor-breakwater system is approximately Rs. 20, 000 per KW at an operational cost of Rs. 0. 97 per unit of power. A pre feasibility study of the exploitation programme of polymetal-lic nodule shows that the internal rate of return on investment will be of the order of 15 per cent at the commercial stage of operation.

(c) The budget estimate of the Department of Ocean Development for the year 1990-91 is of the order of Rs. 35 crores which includes an anticipated foreign exchange component of Rs. 20 crores.

Expenditure on Space Research

-2333. SHRI VITHALRAO MADHAVRAO JADHAV:

SHRI H. HANUMANTHAPPA:

SHRI PRABHAKAR B. KORE;

Will the PRIME MINISTER be pleased to state:

(a) what is the total expenditure incurred on Space research;

(b) what have been the outstanding achievement of our space research so far;

(c) by when India would be able to launch satellites by its own space launching vehicles; and