The Volvo Environment Prize was formally instituted in May 1988 by the Volvo Annual Shareholders Meeting, with the objective of promoting research and development across the environmental spectrum, by acknowledging people who have made an outstanding contribution to understanding or protecting the environment through scientific, socioeconomic or technological innovation or discovery.

The Prize
With a foundation capital now totalling SEK 20 million, the Volvo Environment Prize is awarded annually to one or more individuals or organisation that the international Prize Committee deems to have made an outstanding innovation or discovery in the environmental field, e.g. in areas such as environmental control, pollution, hazardous waste, food, agriculture or nature and wildlife. Hitherto, the total annual prize sum has amounted to SEK 1.5 million.
The joint recipients of the 1997 Volvo Environment Prize are Dr. Syukuro Manabe and Dr. Veerabhadran Ramanathan, whose pioneering work over several decades has helped us to understand one of the critical aspects of human activity — the climate of the past and present and its effect on the life of future generations. Their research, related to the greenhouse effect — the increased warming of the globe caused by various gases released into the atmosphere by human activities — has been instrumental in finding out how that heating translates into future changes in regional climate.

**Dr. Syukuro Manabe:** Dr. Syukuro Manabe got his education at Tokyo university in Japan. After his Ph.D. in Meteorology in 1958 he moved to the United States, where he since 1968 has worked at the Geophysical Fluid Dynamics Laboratory (GFDL) of the National Oceanic and Atmospheric Administration at Princeton University. He has also been a professor in the Atmospheric and Oceanic Sciences Program. During 1997 he returned to Japan to the Institute for Global Change Research in Tokyo.

**Dr. Veerabhadran Ramanathan:** Dr. Veerabhadran Ramanathan has his undergraduate education from India. His Ph.D. he got at the State University of New York. The subject was Planetary Atmospheres and some of his papers do not deal with the Earth's climate, but that of Mars and Venus.

Dr Ramanathan has held research positions at NASA and different universities, among them Colorado State University and University of Chicago. Since 1990 his is a

Dr. Manabe has greatly contributed to the scientific understanding of climate changes, which threat present and future generations. He has played a major role in the advance of theoretical climate research, involving the complex interactions between solar input, energy transfer and dynamics in the atmosphere, hydrological and cryospheric processes, as well as couplings with the oceans. Dr. Manabe was the first to explore the climatic effects of an increase in the atmospheric CO2 content using a comprehensive global climate model, showing future temperature rise.

Dr Manabe is one of the foremost pioneers regarding the use of numerical models. Since the 1960ies, he has played the leading role in the development of the global circulation models. Over a period of three decades these models have been at the leading edge of climate research. The results of his early work carried out 2-3 decades ago predicted a temperature increase which still nowadays is Continued on page 4.

Dr. V. Ramanathan is a bright star in climate research. His field of research especially regards the energy budget of the Earth-atmosphere system. His outstanding work on how much of the incoming solar energy that is absorbed by the earth atmosphere system and how the atmospheric water vapour and clouds regulate the flow of energy into the system is central to the global warming problem. He was the first to point out the role of CFC’s and demonstrated that adding one molecule of CFC-11 or CFC-12 can have the same warming effect as adding more than 10000 molecules of CO2. He has also shown that the total warming effect of other trace gasses (methane, nitrous oxide, CFC and tropospheric ozone amongst others) equals that of CO2.

The influence of clouds for the radiation processes has been a special interest for Dr Ramanathan. In particular, Continued on page 4.
Dr. Syukuro Manabe, continued.
in the middle of the range of estimates made by various modeling groups around the world. In addition, Dr Manabe has studied in best available detail critical issues in the Earth hydrological cycle, especially related to soil moisture, which is of course a factor of the greatest importance for the biosphere and consequently for the agricultural production. His findings include regional variation of temperature rise.

Dr. Veerabhadran Ramanathan, continued.
as the lead author of a recent study, his interpretations of global satellite observations have been very important to elucidate the critical role of clouds in the climate system, an issue surrounded with the greatest uncertainties. He thus could show that clouds on the whole reflect more solar radiation energy from the Earth-atmosphere system than their contribution to greenhouse warming. The magnitude of the cooling effect is so large that a small change in cloudiness can significantly amplify or decrease global warming depending on whether clouds decrease or increase with warming.

Dr. Ramanathan has also shown from satellite observations, that, contrary to some suggestions by other climate researchers, the water vapour feedback effect, a characteristic feature of many climate models, is indeed confirmed. This implies a considerable enhancement of climate forcing above what could be expected only from the increase in CO₂ and other greenhouse gasses on their own. He also gave a clear explanation of how the water feedback actually works in the coupled ocean-atmosphere system. More recently Dr. Ramanathan has also postulated his highly intriguing “thermostat” hypothesis, implying a largely self-regulatory system in the very warm regions of the tropical oceans which limits upwards temperature excursions. This idea has provoked extensive debates and has led to a major field program in the Pacific now finished.

THE PRIZE COMMITTEE'S CITATION

"The Volvo Environment Prize for 1997 is awarded jointly to Dr. Syukuro Manabe and Dr. Veerabhadran Ramanathan for their pioneering work of outstanding importance to humanity, on how to predict the nature of future changes in the world climate. Dr. Ramanathan has clarified one of the greatest uncertainties—the critical energy-distributing role of clouds and water-vapour in the climate system. Dr. Manabe has played the leading role over the last three decades in the progressive development of increasingly elaborate mathematical climate models. The findings of Dr. Manabe and Dr. Ramanathan are complementary. When combined, they create a powerful understanding of the factors determining climate change, thus laying strong foundations to formulate action plans for urgent implementation by the joint efforts of the international community including national governments, transnational corporations and the public."