B-51 Studies on the evaluation of estimation of Anthropogenic Sources and Sinks of Greenhouse Gases

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This research project involved the organization of existing knowledge and collection of new data needed to permit estimates of the quantities of CO_2, CH_4, and N_2O emitted and the quantities of these substances absorbed with the high precision needed for the establishment of future policies and the performance of analyses and evaluation to contribute to forecasts incorporating the effects of new kinds of policies and measures based on past trends and present estimates of the quantities of these substances emitted and absorbed.

Research on the emission and absorption of CO_2 related to changes in land use included a survey in Indonesia, the clarification of the mass balance of CO_2 based on the results of the survey, the development of a data base to be used for integrated management of data of various kinds such as the GHG balance from field observations and land use change data obtained from artificial satellite observations, and an overall evaluation of the effects on global warming of GHG caused by changes in land use performed by combining a planetary boundary layer model with a global atmospheric environment model. On the subject of the forest sector, longitudinal profiles of continuous vegetation were measured, Siberia and North America extending along the dryness incline from dry to wet zones, with the results obtained used for a comprehensive evaluation of carbon sink functions of the temperate and sub-arctic forests. Overall evaluation of forest sector greenhouse effect mitigation measures have been performed by evaluating environmental and non-environmental externality accompanying the introduction of LCA of biomass integrated systems, large scale biomass production and biomass energy, by comprehensively evaluating total systems using biomass, and by collecting and organizing various kinds of scenario configuration data applied in the forest sector.

Research on the emission and absorption of CH_4 and N_2O has included field surveys of the emission and absorption of these substances from agricultural land in India, China, and Thailand, the clarification of their production mechanisms through laboratory experiments to estimate the total quantity emitted from agricultural land throughout Asia based on existing data, and the measurement of the flux in nitrogen oxides caused by feed the different type of fertilizer to clarify factors behind their emission. A water culture test using wet land rice and other varieties was performed to clarify differences in activation according to the transport process and variety in order to study the effects of fertilization on the environment of the soil and rooting zones. Based on the CH_4 emission mechanism that has been clarified for ruminant livestock in Japan, the total quantity emitted in South-east Asia where environmental conditions are different was estimated and water buffalo were studied. Differences in the quantity of CH_4 and N_2O generated according to the method used to apply feed excreta have been clarified through corroborative experiments at the same time as the optimization of excreta control methods has been studied. Artificial control is considered to be relatively easy, but a field survey was conducted to gather data regarding the balance of CH_4 and N_2O from contaminated water and waste material: an area in which many factors are still not clear.

Regarding research on the comprehensive evaluation of greenhouse gas emission and absorption inventory preparation methods, in order to collect GHG related data and, through the comparative study of IPCC/OECD guidelines that are international standards for inventory preparation, improve Japan's GHG etc. emission/absorption inventory that has received favorable international evaluation for its emission factors, emission and absorption source activities, its more appropriate estimation methods, and for other features, studies of specific methods of improving gasses and categories that are not adequately understood at this time have been performed at the same time as a preliminary study of the application of these methods to developing countries in Asia and the Pacific has been carried out.