Land Use/Management Change and Trace Gas Emissions in East Asia (APN 2001-16)

Project Leaders:

Dr. Arvin R. MOSIER
Research Chemist
USDA/ARS
P.O. Box E, Fort Collins
CO 80522
USA
Tel: +1-970-490-8250
Fax: +1-970-490-8213
Email: amosier@lamar.colostate.edu

Dr. Zucong CAI
Soil Scientist
Head of Division of Soil Chemistry and Environmental Protection
Institute of Soil Science
Chinese Academy of Sciences
P.O. Box 821 Nanjing
CHINA
Tel: +86-25-336-0874
Fax: +86-25-335-3590
Email: zccai@ns.issas.ac.cn

Land Use/Management Change and Trace Gas Emissions in East Asia (APN 2001-16)

APN Funding
Year 1 (2000/2001): US $82,700
Year 2 (2001/2002): US $56,400

Participating Countries
China, Germany, Indonesia, Japan, Philippines, Thailand, USA

Introduction/Background
Land use and land management data sets exist for temperate East Asia and for South East Asia but are currently not interactively linked. We proposed the development of a trace gas database (from existing studies) to which we would link to these land use and land management databases. From these databases, an analysis and synthesis of the impact of land management and land use changes on trace gas emissions (CH_4 and N_2O) from terrestrial ecosystems in East Asia are proposed. These analyses would facilitate policy development for land management and atmospheric constituents in the region. The main objectives of the project are to: (a) develop an East Asian trace gas flux database; (b) continue development of temperate east Asia and southeast Asia land cover/use databases; (c) integrate agricultural land management into land use databases; (d) link these databases; and (e) evaluate methodologies, using databases, to project regional trace gas emissions and (f) to consider mitigation strategies.

Outline of activities conducted
The first organizational workshop for the project was held in Nanjing, China, June 19-21, 2000. Funding for the workshop was provided by APN and was hosted by the Institute of Soil Science, Chinese Academy of Science in Nanjing. Eighteen people participated, eight from outside China. Our objectives for the first workshop were for participants to get acquainted and to start forming working relationships, to identify trace gas data sets, and to identify common links for setting up the trace gas database. The processes of linking temperate East Asia and Southeast Asia land use databases and identifying mechanisms of scaling from field to provincial to national and regional projections were begun. Overall, project goals were confirmed and persons listed in the first workshop report were identified as contributors of specific project information.

The initial goal of developing the trace gas database has been completed. Linking this to the land use databases is continuing to progress with plans set for initial analysis. In addition, the main integrative tool to link trace gas and land use/management databases is the DNDC (Gentrification Decomposition model developed by Changsheng Li) model, Jariya Boonjawat volunteered to set up a Project web page through her START office in Bangkok.

The second workshop was held in Bangkok, Thailand, January 19-22, 2001. During this workshop, we evaluated the trace gas and land use data bases that have been compiled. These databases are now held on CD and are available for project use. During the workshop, we identified gaps in the databases and mechanisms by which to

fill the gaps. The trace gas database contains more than 80 data sets from 36 locations in China, Indonesia, Japan, Philippines and Thailand. About 60% of the sets contain only methane flux data and the remainder contains both nitrous oxide and methane data. The majority of the data sets are from agricultural systems, typically rice based agriculture constitutes a significant agricultural practice in East Asia. A workshop was held to conduct an initial DNDC model validation for a test case using Thailand data that was contributed to the databases.

In July 2001, a poster session was held during the International Geosphere Biosphere Program (IGBP) Open Science Conference in Amsterdam, the Netherlands, which highlighted our APN project. Six posters were presented by persons involved with the project.

The third Project workshop was held at the International Rice Research Institute (IRRI) in Los Baños, the Philippines, January 7-12, 2002. The workshop was attended by 19 project scientists and 8 participants from IRRI, Philippine Rice Research Institute and Philippines Agricultural University, Los Baños (UPLB). On January 7, Dr. Changsheng Li conducted a workshop on the use of the DNDC model to integrate trace gas emissions across regional scales, using China as an example. The workshop was attended by 24 persons from the project, IRRI and local scientist. The following three days project progress reports were presented and discussions were held to facilitate finalizing the project products. Five manuscripts were outlined to be included in a special section of the journal, Global Biogeochemical Cycles. On January 11, staff from IRRI presented research goals from IRRI and interacted with project scientists in a lengthy discussion session during the day.

Outcomes/Products

The main goal for the second year was to use the information developed during the first year of the project to conduct integrative analyses using the DNDC model for a number of locations within East Asia. A number of difficulties had to be over come to accomplish these tasks as the land use/management database teams in Beijing and Bangkok determined that the soils databases, and others, for specific countries were not documented in the same format or with the same definitions. As a result, combining land use data sets proved to be much more difficult than expected when the project was initiated. This project brought together scientists who collect trace gas data from the field, remote sensing specialists, and biogeochemical modelers, who previously had not worked together. They found that formatting and availability of information needed to link the biogeochemical models with trace gas database and land use/management change information cannot be completely implemented at the present time. The full effort will take a considerable investment in time and resources, which are far beyond the scope of APN funding. During the 3rd workshop 15 research papers were presented on projects that were conducted with data from the trace gas database and the DNDC model. Success and problems were demonstrated and the combined effort will be documented in the five manuscripts to be prepared for GBC.

Future directions/Follow-up work

The final products for this phase of the project will be the manuscripts submitted for publication in a special section of Global Biogeochemical Cycles. An attempt to locate

funding will be made to conduct two workshops to promote capacity building for biogeochemical modelling and remote sensing database development. Proposals will be prepared within the coming 6-8 months in an attempt to support the training activities.

Project Leaders

Dr. Arvin R. MOSIER
Research Chemist
USDA/ARS
P.O. Box E, Fort Collins
CO 80522
USA
Tel: +1-970-490-8250
Fax: +1-970-490-8213
Email: amosier@lamar.colostate.edu

Dr. Zucong CAI
Soil Scientist
Head of Division of Soil Chemistry and Environmental Protection
Institute of Soil Science
Chinese Academy of Sciences
P.O. Box 821 Nanjing
CHINA
Tel: +86-25-336-0874
Fax: +86-25-335-3590
Email: zccai@ns.issas.ac.cn