

## B-4 Feedback of Global Warming in Siberian Permafrost Area (Final report)

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Siberian terrestrial ecosystem plays an important role in the global carbon cycle because of its vast area and huge stock of carbon. In addition to it, the positive feedback to the global warming is expected because the ecosystem and permafrost there is fragile in coming warmer climate.

The sub-theme are as follows:

1. Feedback to the greenhouse gases emission in Siberian Wetlands
  - 1.1 Total methane emission rate from natural wetland in Siberia
  - 1.2 Methane emission rate from permafrost area
2. Feedback to the greenhouse gases emission/uptake in Siberian Taiga forest
  - 2.1. Primary productivity and CO<sub>2</sub> budget of forest ecosystems
  - 2.2. Analysis on the effect of forest fires in Siberian Taiga on CO<sub>2</sub> budget of forest ecosystems
  - 2.3. Study of the effects of environmental factors on the forest dynamics in northern Siberia
3. Detection of global warming evidence in Siberia
  - 3.1. Climate change and transportation model in Siberia
  - 3.2. Observation of soils and vegetation in Siberia by use of multiple-satellite
  - 3.3. Water circulation study by the <sup>18</sup>O measurement in precipitating water
  - 3.4. International validation of large scale flux measurement method at a reference research field
4. Development of airborne instruments for the greenhouse gases flux measurements

The temperature and other environmental parameters dependence of methane emission, the vertical profile of atmospheric methane concentration trapped in the temperature inversion, the vertical profile of interstitial water, and the vertical profile of methane formation potential have been studied.

The biomass in larch forest has been measured at the down-stream of Kolyma River, and the total carbon contained was found to be 27 t/ha and about 40 % was under the ground. The respiration of trees, the dendrochronological study of trees, the remote sensing study of vegetation, and the adaptation of birch to high CO<sub>2</sub> environment have been studied.

The energy balance in wetland has been studied. The ecosystem classification from SPOT/HRV data (8 categories) suggests the mean methane flux from the mixed area of wetlands and forests to be 52 mg/m<sup>2</sup>/day, which should be compared with 83 mg/m<sup>2</sup>/day from the aircraft measurement. The water sampling network to measure the H<sub>2</sub><sup>18</sup>O ratio in precipitation has been established.

CO<sub>2</sub> and water vapor flux have been obtained on an aircraft by eddy correlation method, and the relation with the surface character has been discussed.