

C budget of ecosystems and cities and villages on permafrost in eastern Russian Arctic

Conference note for COPERA Scientist Meeting

Date: 29 Oct 2015

Place: IBPC at Yakutsk

Aim: General discussion and talks on the COPERA project

Participants

Russia: Trofim Maximov, Mikhail Prisyazhniy, Alexander Kononov, Tuyara Gavriilyeva, Nadezda Stepanova, Nikita Bochkarev, Zhegusov Yuri, Karsanaev Sergei, Pavel Krivoshapkin, Liudmila Tasabukina, Dmitry Osipov, Starostin Egor

Japan: Atsuko Sugimoto, Shinichiro Tabata, Rikie Suzuki, Shin Nagai, Hisashi Sato, Shunsuke Tei

10:00~10:10 Greetings from Atsuko Sugimoto and Mikhail Prisyazhniy

1. Announcements for COPERA engagement meeting on 3 Nov and Northern Forum during 4 Nov ~ 6 Nov from Mikhail Prisyazhniy.
  - a. COPERA engagement meeting with several administrators (SBD Sakha, GBU Sakha and Department of forest relations of Sakha) on 3 Nov will be started from 10:00 at the main building of North Eastern Federal University
  - b. Northern Forum will be started from 9:00 (registration from 8:30) at governmental house No.2
  - c. We will have keynote speech by Atsuko Sugimoto in Northern Forum.

10:10~12:40 Presentation from Japanese Side

1. **Remote Sensing of Geochemical Cycle** by Rikie Suzuki: Introduction of remote sensing studies on the Northern Hemisphere

-Mikhail Prisyazhniy: How does change in permafrost affect that in growing season length?

-Rikie Suzuki: I am not sure about the relationship. But, change in timing of snow melt significantly affects that in growing season length. Probably, we need to investigate relationship between change in permafrost and timing of snow melt.

-Trofim Maximov: You mentioned recent decrease trend in NDVI in some part of the Northern Hemisphere. What is the cause?

C budget of ecosystems and cities and villages on permafrost in eastern Russian Arctic

-Rikie Suzuki: One of the reasons is recent decrease trend in precipitation.

2. **In site and satellite observations for accurate detection of plant phenology in boreal forests, Siberia** by Shin Nagai: Introduction of remote sensing approach to detection of plant phenology in eastern Siberian forests and in pan-arctic ecosystems.

-Trofim Maximov: Does growing season length increase in central part of eastern Siberia?

-Shin Nagai: Remote sensing data from MODIS is available only for past 15 years. Longer record is needed for discussing such trend.

-Atsuko Sugimoto: Does timing of snow melt become earlier in Yakutsk region?

-Shin Nagai: Now I am not sure. But, it is possible to estimate the timing from remote sensing dataset.

-Alexander Kononov: In 1980s, snow melt occurred on first of May. But in 2010, it occurred in the end of April.

-Alexander Kononov: Why did carbon absorption of forest start from April?

-Shin Nagai: I will ask responsible person about it; Ayumi Kotani in Nagoya Univ.

-Mikhail Prisyazhniy: Do you have such flux observation also in tundra site?

-Atsuko Sugimoto: We have flux and also hydro-meteorological observations in forest-tundra boundary area; Chokurdakh.

3. **Self-introduction: Vegetation model SEIB-DGVM** by Hisashi Sato: Introduction of model validation using ground based data set in eastern Siberian forest and of model improvement strategy.

- Trofim Maximov: This study is quite interesting. Probably we need more ground based data set for the model validation for better future predictions.

-Atsuko Sugimoto: There is disagreement between the model based and tree-ring based estimates for past tree response to climate change. What do you think about that?

-Hisashi Sato: More validation of model performance with ground based dataset is needed for improving the model performance for future predictions.

C budget of ecosystems and cities and villages on permafrost in eastern Russian Arctic

-Pavel Krivoschapkin: Ice complex data (published in 1993) in your slide is little bit old. There is updated version of the data.

4. **Observation of CO<sub>2</sub> exchange between forest and atmosphere** by Ayumi Kotani (presented by Atsuko Sugimoto): Introduction of flux observations at two forest sites in eastern Siberia.

5. **Carbon stock mapping in CY using satellite & in-situ data** by Yoshihiro Iijima (presented by Atsuko Sugimoto): Introduction of current state of carbon stock mapping in CY using satellite and in-site data.

-Trofim Maximov: There are two recent publications related with the topic (soil carbon stock) by European Scientists.

6. **Tree-ring and modeling study for past water and carbon cycles in eastern Siberian forests** by Shunsuke Tei: Introduction of tree-ring based reconstruction for plant functions and surrounding environments in eastern Siberian forests, and comparison with results from a DGVM (SEIB-DGVM).

-Alexander Kononov: According to paper from Dr. Fedolov, recent reduction of larch growth is not so serious in central part of eastern Siberia. What do you think about that?

-Shunsuke Tei: Thank you for the information. I will check the paper. And, I think our results should be compared with the estimates from other approach, e.g., remote sensing data.

-Shin Nagai: Are there decadal patterns of climate in the region? If so, what is the driver of the decadal patterns?

-Shunsuke Tei: I could not answer the question. We need climatologist to answer the question.

7. **Mini Green New Deal in Hokkaido** by Masahiko Fujii (presented by Atsuko Sugimoto): Introduction of result from Hokkaido University Sustainable Low-Carbon Society Project.

-Trofim Maximov: How do they estimate regional CO<sub>2</sub> emission in their study?

-Atsuko Sugimoto: They use a mathematical formula.

C budget of ecosystems and cities and villages on permafrost in eastern Russian Arctic

-Alexander Kononov: Do cows and rice productions cause not only CH<sub>4</sub> but also CO<sub>2</sub> emissions?

-Atsuko Sugimoto: CO<sub>2</sub> as well as CH<sub>4</sub> is emitted because several specific machines are used for those productions.

-Tuyara Gavriilyeva: It is also important to estimate CO<sub>2</sub> emission from industry productions.

8. **Research Plan for COPERA** by Shinichiro Tabata: Introduction of Japanese new arctic research project ArCS and research plan for this COEPRA project.

- Tuyara Gavriilyeva: We provide several kinds of co-operations for your study.

-Shinichiro Tabata: Thank you very much. We need your help for the project, especially for data mining.

- Tuyara Gavriilyeva: We can provide several data for your study. But, there is also several data source with a worried quality. We need to consider about this issue together.

14:00~16:30 Presentation from Russian Side

9. **Permafrost Outreach Program in the Republic of Sakha (Yakutia)** by Mikhail Prisyazhniy: Introduction of Permafrost Outreach Program in the Republic of Sakha.

-Mikhail Prisyazhniy: Information of the meeting and also of lectures from Rikie Suzuki and Hisashi Sato (on 28 Oct at North Eastern Federal University) are available on the web site of IBPC and North Eastern Federal University.

-Mikhail Prisyazhniy: Kenji Yoshikawa leads a project, in which school children measure the ground temperature near the school (87 schools joined at the moment. Among those, 5 schools are in Yakutsk) and share the data by web site. He also provides several lectures on permafrost ecosystem for school children and collegers.

-Mikhail Prisyazhniy: We plan to involve school teachers into the project in the future.

10. **C budget of ecosystems and cities and villages on permafrost in eastern Russian**

C budget of ecosystems and cities and villages on permafrost in eastern Russian Arctic

**Arctic** by Tuyara Gavriilyeva: Introduction of current structure and cost for electricity and heating energies in Sakha.

-Shinichiro Tabata: Is energy distribution a closed system in Sakha?

-Tuyara Gavriilyeva: Basically, yes. But, there are 3 areas of exception.

-Shinichiro Tabata: What is the “passport of settlement”?

-Tuyara Gavriilyeva: A kind of document with important information of each settlement; population, energy, employment and so on.

-Rikie Suzuki: Is deforestation a problem in Sakha?

-Tuyara Gavriilyeva: Yes. Government would like to restrict that, but local people need timber as fuel for their energies.

-Tuyara Gavriilyeva: Energy cost in Yakutsk is recently quite expensive.

Atsuko Sugimoto: I would like to request you to show the result of your statistical analysis for population and energy cost in Sakha at next meeting.

**11. Social Indexes: Climate Change and Public Perception** by Zhegusov Yuri:  
Introduction of social scientific survey in northeastern Siberia.

-Atsuko Sugimoto: I guess that your analysis period of 1978-2013 may be a little bit long. Do people remember such past climatic conditions?

- Zhegusov Yuri: I plan to do such analysis again using past 5 or 10 years analysis periods.

-Shinichiro Tabata: Why did you select the two areas in your analysis?

- Zhegusov Yuri: I am interested in arctic regions, which have significant recent climate change.

**12. Carbon budget of permafrost natural and urban ecosystems** by Torfim Maximov:  
Introduction of carbon budget of permafrost natural ecosystems in eastern Siberia.

-Rikie Suzuki: How did you measure the biomass change in the Yakutian forest?

-Torfim Maximov: We made continuous observations in SpasskayaPad station.  
(1 observation per decade from 1960)

-Rikie Suzuki: You said that now Yakutian forest is a carbon sink. Which component of the forest is a carbon sink?

C budget of ecosystems and cities and villages on permafrost in eastern Russian Arctic

-Torfim Maximov: Woody plant.

-Rikie Suzuki: What do you think about CO<sub>2</sub> fertilization effect for carbon budget in Yakutian forest?

-Torfim Maximov: Some control experiments confirmed the effect. But, I think that there are still several possibilities of response of ecosystem to elevated level of CO<sub>2</sub> in natural forest.

-Rikie Suzuki: Does forest fire increase in Sakha?

-Torfim Maximov: Yes.

-Mikhail Prisyazhniy: Key issue in the project is how we estimate CO<sub>2</sub> emission from human societies. The estimation of natural forest is almost done (e.g., Dolman et al., 2012).

**13. Collection of database for the carbon dioxide emissions** by Nadezda Stepanova:  
Introduction of current state of development for database of fuel consumption in Sakha.

-Atsuko Sugimoto: It should be considered how we treat the consumption of a fuel for fuel transportation in the project.

-Atusko Sugimoto: Is data collection already completed?

-Nadezda Stepanova: Not yet. It is still in progress.

16:30~17:30 General Discussion and talks

1. Explanation of target areas in the projects; 4 arctic and 4 central Yakutsk region from Mikhail Prisyanzhniy

-Mikhail Prisyanzhniy: Our target areas have different characteristics in population, heating cost and so on.

-Mikhail Prisyanzhniy: Now we are collecting several kinds of data from those 8 areas. Some ministries support our activity.

-Rikie Suzuki and Hisashi Sato: Generally natural scientists do scientific research without regard to area boundary and therefore the concept is probably unnatural for them. But, among several fields in

C budget of ecosystems and cities and villages on permafrost in eastern Russian Arctic

natural science, remote sensing (GIS study) and modeling (treating gridded data) studies tend to adapt to the concept somewhat.

-Alexander Kononov: We have a specialist for GIS study in IBPC. If necessary, we can ask him for cooperation.

-Alexander Kononov: UST-YANSKIY ULUS, which is included in our arctic target regions, had big development in the Soviet era, and the statistical data is relatively easy to access.

-Alexander Kononov: Ust-Maya region also had big development in the Soviet era.

2. Explanation of future plan for the project from Atsuko Sugimoto.

-Shin Nagai: I think that a geographical map including our target regions is needed.

-Trofim Maximov: Co-operations from the Japanese side are needed in estimate of CO2 emission from human societies. Tatiyana is now trying to calculate the estimate alone.

-Atsuko Sugimoto: We plan to invite Tatiyana to Hokkaido University and to provide opportunity to consult the issue with Masahiko Fujii.

-Alexander Kononov: I guess that direct observations of carbon emission are quite important in the project. What do you think about installation of CO2 analyzers at roofs of taller buildings in cities and villages?

A mobile CO2 analyzer with Apple appreciation is also available.

-Atsuko Sugimoto: I would like to know its measurement accuracy.

- Zhegusov Yuri: How does my social scientific data (e.g., Climate Change Perception Index) contribute to the project?

-Atsuko Sugimoto and Mikhail Prisyazhniy: Your social data is probably useful in final phase of the project, where we have to know how local people feel recent climate change. The result could inspire local people to adapt new social strategies of energy consumption

C budget of ecosystems and cities and villages on permafrost in eastern Russian Arctic

and so on.