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Quarterly Progress Report (Oct. 1- Dec. 31, 2008)

Source characterization and temporal variation of methane seepage from thermokarst lakes on the Alaska North Slope in response to Arctic climate change

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Summary

The goals of this research are to characterize the source, magnitude and temporal variability of methane seepage from two representative thermokarst lake areas within the Alaskan North Slope gas hydrate province and to assess the vulnerability of these areas to ongoing and future Arctic climate change.

Work during the first quarter of this project has focused on organizing the groups first field work in the spring of 2009. The majority of the project's future tasks are contingent on the acquisition of samples to analyze from the proposed field locations. These future tasks will be initiated once samples have been collected from the proposed field sites. In previous months, the group has had a number of project meetings and have presented the concepts and preliminary findings associated with the proposed research (see list of presentations below).

Activities in This Reporting Period

Task 1.0 - Project Management Plan

The Recipient revised the draft version of the PMP that was submitted with their application by including details from the negotiation process and input from the Project Officer (PO). The revised PMP submitted within the last quarter. A TSA was also revised and submitted during this period.

Task 2.0 - Continuous Literature Research and Updating

The Recipient has established a pdf reference library of related and relevant literature using the program "Papers" (see http://mekentosj.com/papers/). 'Papers' synthesizes technologies to give a complete new workflow for reading scientific articles. Articles can be downloaded, archived, and organized within a single application. This program is also compatible with the program 'Endnote' that amongst other resources allows comprehensive reference lists to be drafted. A list of references is available on request. The USGS has been compiling hard-to-obtain North Slope reports from its own national libraries and working on the transfer of a North Slope gas chemistry database from the Central/Western Regions to the Woods Hole office.

Task 3.0 – Develop Data Collection and Sampling Plan

The UAF team is developing a data collection and sampling plan to cover field activities occurring in year 1. The final plan will submitted 20 days prior to the field work (commencing May 7th 2009). Detailed discussions have already taken place between the PIs (notably Wooller, Pohlman and Leigh) to develop an optimal coring plan than will accommodate all of the analyses to be conducted on the cores (i.e. paleo isotope analyses, biomarker analyses, and stable isotope probing respectively).

Status summary of other project related activities that have taken place during the last quarter:

1) DOE-NETL kick-off meeting 10th December, 2008. Wooller attended and presented at the DOE-NETL kick off meeting held in Morgantown, Virginia. Wooller traveled from Alaska to Morgantown to attend the meeting and presented a seminar to NETL and other NETL

funded PIs covering topics requested by the NETL program manager, including the aims and objectives of the project. A copy of the presentation is archived at: http://www.netl.doe.gov/technologies/oil-gas/publications/Hydrates/reports/NT05665_KickoffDec08.pdf.

2) Project meeting: A project meeting to discuss field-work logistics took place in Boston on the 9th December, 2008 and was attended by Wooller, Ruppel and Pohlman. Discussions focused on developing a field sampling plan (notably related to coring lake sediments).
3) Preparations for Task 11.0: Methane oxidation in Alaskan thermokarst lakes. A full UAF job search through human resources for a post doctoral research associate was initiated in Nov. 2008. The aim is to establish the post doc ready to take part in the collection of samples during the May field work. Four qualified applicants have been considered and references are currently being contacted.
4) Preparations for Task 4.0 – Field-work in Alaska (Year 1) (See details below).
5) A project website has been established documenting a pilot field study related to research at Qalluuraq Lake (http://www.uaf.edu/water/ASIF/Methane%20ecology/Introduction.html)

Milestones log - indicate status of milestones.

Preparations are underway for the first field-work (Spring 2009: Qalluuraq Lake seep and Kilarney Lake). Field equipment, which includes coring and seismic imaging equipment, is being purchased and organized. Dates have been discussed between the entire group during conference calls that have taken place during the last quarter and the current agreed spring 2009 field work timetable is: 5-6th May = Fairbanks field-work and testing equipment. 7th May Travel Fairbanks to Lake Qalluuraq. 8th - 13th May Lake Qalluuraq field-work. 14th May, Travel back to Fairbanks. 15th Archive and pack samples ready for further analyses. The geophysical imaging and further biogeochemical sampling will take place at dates to be determined in July 2009.

Issues - summary of any issues that may impact schedule/cost

NEPA forms have been completed by Wooller and Leigh for UAF facilities to be used in the project. Pohlman is in the process of completing the NEPAs associated with the USGS portion. These will be completed and submitted prior to analyses being conducted on the field samples to be collected during the May, 2009 field work.

Planned Publications/conference presentations for the upcoming and past.

1) Deines P., **Wooller M.J.** & Grey J. (2008 in review): Unraveling complexities in benthic food webs using a dual stable isotope (hydrogen and carbon) approach. Freshwater Biology.

2) **Ruppel C.**, **Walter, K.M.**, **Pohlman J.**, **Wooller, M.J.**, (2008): Gas Hydrates and Perturbed Permafrost: Can Thermokarst Lakes Leak Hydrate-Derived Methane? Eos Trans. AGU, 89(53), Fall Meet. Suppl., Abstract U23D-0084

3) **Walter, K.M.**, Vas D, Brosius L, Grosse G (2008): Methane from Arctic Lakes: Observations from 50lakes in Alaska and Siberia. Eos Trans. AGU, 89(53), Fall Meet. Suppl., Abstract B24A-05.

4) **Walter, K.M.**, (2009): Biogenic and fossil methane emissions from thermokarst lakes: Contribution to the global methane budget. Invited talk. Alfred Wegener Institute, Potsdam, Germany Jan. 9, 2008.

5) **Walter, K.M.**, (2009): Biogenic and fossil methane emissions from thermokarst lakes: Contribution to the global methane budget. Invited talk. Max Planck Institute for Terrestrial Microbiology, Marburg, Germany, Jan. 9, 2008.

6) **Walter, K.M.**, Grosse, G. Finlay, J. Chandra, S. Mack, M. Disappearing Permafrost and the response of arctic lakes. January 2009 American Society of Limnology and Oceanography, Nice, France 094-7.

7) **Walter, K.M.**, Smith M., **Wooller M.J.,** (2008): Investigating the Late-Quaternary, paleoenvironmental history of a methane-emitting, thermokarst lake on the north slope of the Brooks range, Alaska. AAAS Arctic Meeting, Fairbanks, Alaska.

8) **Wooller M.J.,** et al. (2009): Establishing records of past methane emissions in arctic Alaska. Utrecht, The Netherlands. Invited Seminar April 9 – 17th 2009

9) **Wooller M.J.,** et al. (2009: abstract submission planned): Paleo methane emissions in arctic Alaska. CANQUA, Vancouver, Canada. Poster May 3-8th, 2009

10 **Wooller, M.J.**, Leigh, M., Pohlman J. Ruppel C. and Walter, K. (2009): Source characterization and temporal variation of methane seepage from thermokarst lakes on the Alaska North Slope in response to Arctic climate change. Poster NIOZ workshop Developing Long Term International Collaboration on Methane Hydrate Research and Monitoring in the Arctic Region, 18 - 20 February 2009 Texel, The Netherlands.

11) **Wooller, M.J.**, **Leigh, M.**, **Pohlman J.,** **Ruppel C.** and **Walter, K.M.,** (2008): Source characterization and temporal variation of methane seepage from thermokarst lakes on the Alaska North Slope in response to Arctic climate change. NETL Kick-off meeting. Morgantown, Dec. 2008.

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