Protocol of
«Results of the first year of atmospheric measurements at the Tiksi Hydrometeorological Observatory (HMO)»
AARI
St.-Petersburg, the Russian Federation
September 18-20, 2012

The meeting "Results of the first year of atmospheric measurements at the Tiksi Hydrometeorological Observatory (HMO)" took place at the Arctic and Antarctic Research Institute (St.-Petersburg, the Russian Federation) on September 18-20th, 2012

Representatives were present from the research branches of the Roshydromet, the Russian Academy of Sciences, the National Oceanographic and Atmospheric Administration, the University of Colorado (Boulder, the USA) and the Finnish Meteorological institute. The list of participants of meeting is can be found in Attachment 1 of this Report. The meeting followed the agenda in Attachment 2.

23 scientific reports were presented that focused on analysis of measurement programs that have operated at the Tiksi HMO since the opening in August, 2010; results were examined in the context of the international network of polar observatories (www.iasoa.org). Reports will be placed on a web site http://www.esrl.noaa.gov/psd/events/2012/tiksi/.

During discussion the requirements to establish the HMO Tiksi as a Global station for the Global Atmosphere Watch (GAW) was discussed. Topics discussed including submission of data from the HMO Tiksi to international databases; responsibility for preparation of the data and future submissions, and establishing a regular program of maintenance and operations by qualified personnel. The work plan to elevate the HMO Tiksi to the status of a global station for GAW is Attachment 3.

The status of the facility infrastructure and required improvements was reviewed and current infrastructure improvement requirements are listed are in Attachment 4. A regular schedule of annual specialist visits to Tiksi and the proposed funding for operations at the Tiksi HMO and the AARI Tiksi Data Center was discussed.

It was noted that HMO Tiksi scientific program contributes to a number of the international programs, such as BSRN, AeroNET, and CRN. The Tiksi data is being reliably transmitted on a regular schedule in to AARI, NOAA and FMI. The BSRN radiation data is being processed to BSRN specifications by AARI and the first data delivery was made to the BSRN archives in September 2011 with a second submission is scheduled for October 2012. Continuation of BSRN grade data will require instrument calibrations before autumn 2013. CRN data has been

compared to standard meteorological measurements and shown good agreement. The CRN station needs to be officially commissioned and procedures for ingest into the NOAA CRN data archives need to be completed by NOAA. There have been difficulties with complying with requirements of the NASA AeroNET program because of problems associated with timely calibration of the device in the USA. In 2012, delays in the delivery of CIMEL instrument to Tiksi after calibration resulted in measurements not resuming until the end of May. This underscored the necessity to develop a program supporting timely calibration schedules for all Tiksi instruments. There was a discussion of the measurements of on annual cycle of surface atmospheric pollutants that were conducted from in 2010 – 2011. The complicated analysis procedures for the samples are in progress and these data will be submitted to AMAP. Continuation of this program will be dependent on identifying additional funding.

NOAA presented a ftp web interface for accessing the data of the HMO Tiksi. http://www.esrl.noaa.gov/psd/arctic/observatories/tiksi/doc/Tiksi.swf
The ftp site will be duplicated at AARI to provide duplicate archives of data. NOAA also noted that the Tiksi data will be accessed through the data portal of the IASOA program which supports cooperative network Arctic science.

For organization of operations of the HMO Tiksi the participants have agreed that the specialists will participate in a schedule of 4 seasonal site visits each year to check instruments and associated data collection and transmission systems.

During the discussion of the infrastructure issues it was agreed that NOAA would determine if it would be necessary for there to be an official inspection by a U.S. entity to determine improvement and repair plans. The group has charged ЯУГМС to prepare an estimate of expenses for repair of infrastructure of the HMO Tiksi.

The Russian side noted that it will be necessary to prepare advance schedules for visiting the HMO Tiksi for Russian and foreign experts, and also to inform Roshydromet regarding visits not less than 60 days in advance.

During the meeting the successful 2011 – 2012 program of training Roshydromet and IFARAN experts by both NOAA and FMI was noted. Participants agreed with necessity of continuing similar training in the future.

Participants of the meeting agreed to expand their efforts to inform the research community about activities at the HMO Tiksi especially in the context of the WMO. It was agreed to prepare an article for submission to The Bulletin of the WMO with contributions of Russian, American and Finnish specialist. The participants have also agreed to prepare for the publication a number of articles devoted to activities at the HMOnTiksi; a list of proposed research subjects are in the Attachment 5.

In summary participants of meeting have emphasized that there has been significant progress in realizing the HMO Tiksi project and have noted that the program is at a critical stage requiring further organization of measurement program to transition into full operations. Finally, all participants have expressed appreciation for the efforts resulting into the preliminary results that are the product of the first year of

On Behalf of Russia

A.I. Danilov
Acting Director of AARI
Observations
Roshydromet

On Behalf of the USA

D. Legler
Division Director of CPO
NOAA

Attachment 1

International workshop
Results of the First Year of Atmospheric Observations at the International Tiksi Hydrometeorological Observatory
Arctic and Antarctic Research Institute, St. Petersburg, Russia
September 18-20, 2012

List of Participants

From Russian Side:

1. Danilov Alexander, Deputy Director AARI; aid@aari.nw.ru
2. Yagubov Ilya, Representative of Roshydromet; aamu@mecom.ru
3. Tsaturov Yury, Representative of Roshydromet; tsaturov@mecom.ru
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From American Side:

1. David Legler, Office of Oceanic and Atmospheric Research, Division Chief, Climate Observation Division; david.legler@noaa.gov
2. Jeffrey Key, National Environmental Satellite, Data, and Information Service, Branch Chief, Advanced Satellite Products Branch; jkey@ssec.wisc.edu
3. Taneil Uttal, Physical Sciences Division, Team Lead, Polar Processes, NOAA; Taneil.Uttal@noaa.gov
4. Ola Persson, Cooperative Institute for Research in Environmental Sciences, Research Scientist, Atmospheric Fluxes, NOAA; Ola.Persson@noaa.gov
5. Andrey Grachev, Cooperative Institute for Research in Environmental Sciences, Research Scientist, Atmospheric Fluxes; Andrey.Grachev@noaa.gov

From Finnish Side:

1. Ari Laaksonen, professor, head of climate change research unit, FMI; ari.laaksonen@fmi.fi
2. Tuomas Laurila, head of greenhouse gas research group, FMI; tuomas.laurila@fmi.fi
3. Eija Asmi, senior scientist, FMI; eija.asmi@fmi.fi
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Attachment 2

International workshop
Results of the First Year of Atmospheric Observations at the International Tiksi Hydrometeorological Observatory

Arctic and Antarctic Research Institute
St. Petersburg, Russia
September 18-20, 2012

Agenda of the meeting

September 18
9:00 – 9:30
Opening of Meeting (5 min A.I., Danilov, AARI)
Welcome from Roshydromet (5 min –Yu. S. Tsaturov)
Welcome from NOAA (5 min - D. Legler)
Welcome from FMI - (5 min - A. Laaksonen)
Welcome from YGMS (5 min Yu. A. Dikhtarenko)

9:30 – 10:00 Goals of the Meeting and Review of the History of the Tiksi Observatory and Current Infrastructure and Operation Status (A. Makshtas, T. Uttal, T. Laurila)

10:00 – 10:30 Coffee Break

Convener A. Makshtas

10:30 – 10:45 Climate of Tiksi region from the historical instrument records of surface and upper air observations (N. Ivanov, I. Bolshakova, O. Zukova, A. Makshtas)

10:45-11:00 Comparison of ozone depletion events between Tiksi and Barrow (P. Sheridan, T. Uttal, L. Patrick, S. Oltsman)

11:00-11:15 The NOAA/ERSL Global Surface Aerosol Monitoring Network: The measurements, relation to the GAW network and future possibilities for Tiksi (P. Sheridan)

11:15 – 11:30 Preliminary results of POPs monitoring in HMO of Tiksi (A. Konoplev, E. Volkova, G. Dydko, A. Kochetkov, E. Pacenkova, A.Ruchkov, D. Samsonov)

11:30 – 11:45 Greenhouse gas observations at HMO Tiksi: Comparison of measurement techniques of NOAA/ESRL, FMI and MGO (N. Paramonova, A. Reshetnikov, A. Zinchenko, V. Ivakov, V. Privalov, K. Kazakova)

11:45 – 12:00 Investigations of methane emission in HMO Tiksi region (A. Reshetnikov, V. Ivakhov).

12:00 – 12:15 Micrometeorological fluxes of carbon dioxide and methane (M. Aurela, T. Laurila, J. Hatakka, A. Laaksonen)

12:15 – 12:30 Atmospheric concentrations of methane and carbon dioxide (T. Laurila, J. Hatakka, M. Aurela, A. Laaksonen)

12:30 -12:45 Measurements of Atmospheric Black Carbon in Arctic Regions (T. Uttal)

12:45 – 13:00 Observations of black carbon in snow in the Arctic (J. Svensson, D. Brus, E. Asmi, H. Lihavainen, A. Laaksonen)

Lunch: 13:00 – 14:00

Convener T. Uttal

14:00 – 14:15 Measurements of aerosol size distribution in the Arctic (E. Asmi, D. Brus, H. Lihavainen, T. Laurila, A. Laaksonen)

14:15 – 14:30 Variability of aerosol optical parameters of atmosphere at the stations of the Southern and Northern polar regions in the first decade of 21 century (V. Radionov, E. Rusina, E. Sibir)

14:30 – 14:45 Characteristics of the radiation balance of the tundra from measurements at HMO Tiksi and Comparison of BSRN and Russian Radiation Techniques (V. Kustov, A. Makshtas)

14:45-15:00 Boundary-layer measurements and surface fluxes in the Canadian Arctic at Eureka observatory (A. A. Grachev, T. Uttal, P. O. G. Persson, R. S. Stone, and R. Albee).

15:00-15:15 The preliminary results of Boundary-layer measurements in Tiksi (A.Artamonov, I. Repina, A. Makshtas, A. Grachev, T. Uttal, and R. Albee)

15:15 -15:30 Processes Affecting the Annual Surface Energy Budget at High-Latitude Terrestrial Sites in the Canadian Arctic (O. Persson)

15:30-15:45 Measurements of the characteristics of tundra plant cover in the vicinity of flux measurements (M. Linkosalmi, T. Virtanen, J. Mikola, M. Aurela, T. Laurila)

15:45–16:00 Observations and of modeling of the thermodynamic processes in active soil layer (P. Bogorodsky, A. Makshtas, V. Kustov)

16:00–16:15 Investigations of fast ice in the Sogo Bay (A. Makshtas, P. Bogorodsky, V. Kustov)

16:15-16:30 Coffee Break

Convener T. Laurila

16:30 -16:45 Polar Satellite Products and Applications (J. Key)

16:45-17:00 The program of atmospheric measurements at the background monitoring IFA RAN Zotino station (K. Moisienko)

17:00 – 17:15 The data collection and transmission system at the Tiksi Hydrometeorological Observatory (D. Apartsev, T. Afanasyeva)

17:15- 17:30 Datagrams: A method for understanding data (Taneil Uttal)

18:30 – 20:30 Banquet

September 19
9:00-9:40 Arctic Research Programs (10 min each)
International Arctic Systems for Observing the Atmosphere IASOA (T. Uttal)
Global Cryosphere Watch (J. Key)
MOSAiC (O. Persson)
North Pole Russian Drifting Stations (A. Makshtas)

9:40-10:10 Agency Missions at HMO Tiksi (10 min each)
Roshydromet missions and Tiksi Observatory (A. Danilov)
NOAA missions and the Tiksi Observatory (D. Legler)
FMI missions and the Tiksi Observatory (A. Laaksonen)

10:10 – 10:40 On the further work to give HMO Tiksi the status of GAW WMO station (A. Reshetnikov, A. Makshtas, T. Uttal, T. Laurila)

10:40 – 11:00 Coffee Break

11:00 -13:00 Small Group Discussions

13:00 -14:00 Lunch

14:00 -17:30 Plenary Group Discussion on the plan of research for the HMO Tiksi and preparation of first version of meeting report

September 20
9:00 - 10:30: Discussion and signing of meeting notes

Close of General Meeting

10:30 -12:30 Meeting of Agency program managers and Tiksi project leaders to draft the plan of operation and responsibilities for HMO Tiksi

Attachment 3

Work Plan for Establishing Tiksi as a Global GAW Station

The GAW site states "The Global Atmosphere Watch (GAW) programme of WMO is a partnership involving 80 countries, which provides reliable scientific data and information on the chemical composition of the atmosphere, its natural and anthropogenic change, and helps to improve the understanding of interactions between the atmosphere, the oceans and the biosphere."

NOAA, Roshydromet and FMI have clearly identified the mutual agency advantages of establishing Tiksi as a GAW station. There are 2 classes of GAW station; regional and global. It is the intention of the science team to establish Tiksi as full global station. This is the work plan for to fulfill this goal:

January 1 2013 - December 31 2013 will be designated the official "Global Atmosphere Watch Year" for Tiksi during which criteria will be met to qualify Tiksi as official Global GAW station.

The work plan is based on the Global GAW station requirements a identified at: http://www.wmo.int/pages/prog/arep/gaw/join_GAW.html

	Requirement	Issues	Solution	Target Date
1	The station location is chosen such that, for the variables measured, it is regionally representative and is normally free of the influence of significant local pollution sources UTTAL AND MAKSHTAS	Local sources of contaminants need to be minimized	Assess level of local contamination with Aethelometer and develop requirements for electric autos and snow mobiles and increased inlet height requirements	December 2012
2	There are adequate power, air conditioning, communication and building facilities to sustain long term observations with greater than 90% data capture (i.e. <10% missing data). KUZMICH	Overheating of CAF in summer and poor interior air quality	Air conditioning needs to be installed in CAF. Air filtration needs to be installed in CAF. Additional infrastructure repairs and improvements are in Attachment 3	May 2012
3	The technical support provided is trained in the operation of the equipment MAKSHTAS AND UTTAL	Current on-site operators cannot provide sufficient technical support	AARI-NOAA specialist trips will be increased to 4 regular visits/year. AARI will add technical specialist available for emergency repair trips. Salary for on-site	November 2012

			operator and exact responsibilities will be established	
4	There is a commitment by the responsible agency to long term observations of at least one of the GAW variables in the GAW focal areas	Ozone – Investigate possibility of ozone sondes	NOAA/YGMS/MGO	IN PROGRESS
		Aerosols	FMI/NOAA	IN PROGRESS
		GHG – Flask sampling shipping problems	MGO/NOAA	IN PROGRESS
		Reactive Gases- Needs to be implemented	TBD	TBD
		UV radiation – Measurement program needs to be enhanced	MGO/NOAA	January 2013
		Precipitation Chemistry – Program needs to be improved	MGO/U.S. Partner TBD	TBD
5	The GAW observation made is of known quality and linked to the GAW Primary Standard	No know issues	Quality assessment will be made	December 2013
6	The data and associated metadata are submitted to one of the GAW World Data Centres no later than one year after the observation is made. Changes of metadata including instrumentation, traceability, observation procedures, are reported to the responsible WDC in a timely manner	No know issues	Timely submissions will be made	Continuous monthly starting in January 2013
7	If required, data are submitted to a designated data distribution system in near-real-time.	No know issues	Tiksi data transmission infrastructure allows real time submission	Continuous monthly starting in January 2013
8	Standard meteorological in situ observations, necessary for the accurate determination and interpretation of the GAW	No know issues	Station meteorology, ancillary tower measurements and CAF tower meteorology	IN PROGRESS

	variables, are made with known accuracy and precision.		available for interpretation	
9	9. The station characteristics and observational programme are updated in the GAW Station Information System (GAWSIS) on a regular basis.	No know issues	NOAA/MGO	To be submitted prior to January 2013
10	10. A station logbook (i.e. record of observations made and activities that may affect observations) is maintained and is used in the data validation process.	Procedure will be established based on NOAA/Barrow GAW station		Continuous monthly starting in January 2013
Additional Essential Characteristics Needed for a GAW Global Station				
11	Measure variables in at least three of the six GAW focal areas	No known issues	(1) aerosols (2) GHG (3) Ozone	IN PROGRESS
12	Have a strong scientific supporting programme with appropriate data analysis and interpretation within the country and, if possible, the support of more than one agency	No known issues	Programme of science analysis is in progress	IN PROGRESS
13	Make measurements of other atmospheric variables important to weather and climate including upper air radio sondes at the site or in the region	No known issues		IN PROGRESS
14	Provide a facility at which intensive campaign research can augment the long term routine GAW observations and where testing and development of new GAW methods can be undertaken	No known issues	Investigation of feasibility with Russian border control and YGMS-Tiksi branch	Before December 2013

Attachment 4

The tasks for improvement of HMO Tiksi infrastructure

1. The 20-m tower is in dangerous state because gauylines, supported the tower can not be tensed due to permafrost melting around ankers. The installation of four concrete blocks will allow to fix tower. (Polar Fund, YUGMS)/
2. For stable and safety electrical supply it is needed to change the power cable from the main electrical box of "Polarka" to electrical box at the main building of HMO and changing of electrical box at the diesel generators, as well as regular checking of phases misbalance and generators diagnostics. (YUGMS)
3. UPS batteries changing (AARI)
4. It is needed to change of existing converters 220\110 to more power (AARI, NOAA).
5. To make new telephone cable for communication between the main building and office of Tiksi Filial of YUGMS in Tiksi. (YUGMS).
6. Maintenance of automatic start of emergency diesel generators. (YAUGMS).
7. Repair of the main building and CAF roofs: painting and elimination of leaks (Polar Fund).
8. Repair of floors in the main building (Polar Fund).
9. Repair a dignity: maintenance of ventilation and repair septic tank (YUGMS).
10. Replacement the automatic electrical switch in CAF (YAUGMS).
11. Making of wooden floor on the metal basis of the tower (YUGMS).
12. Replacement of platforms at tower (YUGMS).
13. Purchase of an electric snowmobile (NOAA).
14. Study the possibility of Installation of new air inlet (30 meters pipe, diameter 25 cm) on the roof of CAF (NOAA, FMI).
15. Creation of the arctic entries in the main building and CAF (YUGMS).
17. Repair water pump and solving the problems with water delivery (YUGMS).
18. Installation of conditioner in CAF-(NOAA, FMI).
19. In ПЧВ 5 kw for installation of devices FMI are in addition necessary.-JAUGMS? ФМИ?.
20. Organization of uninterrupted delivery of glass flasks with air samples between Tiksi – Sankt-Petersburg and Tiksi - Boulder (YUGMS, MGO).
21. Purchase of snow track for transportation of HMO personal from Tiksi.

Attachment 5

List of papers, planning for publications in 2013

T. Uttal General background paper on Tiksi activities

A. Konoplev: Preliminary results of one year POPs studies

T. Laurila: Atmospheric methane concentration variations

A. Aurela: Methane micrometeorological fluxes

A. Makshtas: Climate of Tiksi region

V. Kustov: Radiation balance at Tiksi observatory

O. Persson: Comparisons of surface energy components at Alert, Eureka, and Tiksi

A. Grachev: Turbulence studies at Eureka and Tiksi (longer term plan)

P. Bogorodsky: Soil temperature measurements at Tiksi

E. Asmi: Seasonal variability of aerosol properties and sources in Tiksi

Virtanen: Satellite based vegetation classification

A. Makshtas: Fast ice in Sogo Bay

A. Aurela: Carbon dioxide exchange of vegetation types around the cabin

T. Uttal: IASOA

T. Uttal: Ozone depletion events

T. Uttal: Black carbon (maybe a technical paper)

T. Uttal: Comparison of flux plates & profile flux techniques for conductive flux

I. Repina: Turbulent fluxes and gradient measurements at Tiksi flux tower

(There are the names of first authors).