GCOS implementation issues- additional national activities with respect to GCOS implementation plan.

(Russian Federation)

Chapter 1: Common issues

The Russian climate observing systems relevant to GCOS consist of:

- Surface and upper-air meteorological networks
- Oceanographic network
- Terrestrial network.

Surface meteorological network

The surface meteorological network (Roshydromet) consists of 458 - Reference Climatological Stations, including 235 - Regional Reference Climatological Stations (RA II and RA VI WMO Regions) and 135 GSN stations. The lengths of the observation period for GSN stations are the following:

100 years and more - 44 stations
75 years and more - 79 stations
50 years and more - 130 stations
30 years and more - 135 stations.

The observed data are regularly transmitted to the National Climate Data Center (WDC in Obninsk) for quality control and archiving. But a number of GSN stations still have gaps at the GCOS Global Data Centers. The information provided by NCDC (September 2008) listed these gaps from Russian GSN stations in RA II region as follows:

10 stations - 5 years and more with missing data
1 station - 2 years with missing data

The National Climate Data Center are working to fill these gaps, but some additional funds are still needed.

The National Hydromet Modernization Project (supported by the World Bank) is now being implemented and includes, among others, sub-projects for updating of ground-based observational networks (1600 stations including GSN), namely, installation of modern semiautomatic weather stations with new telecom facilities and 30 stationary and mobile automatic testing laboratories for Regional Hydromet Centers.
These AWS will replace manual observing systems which have been in operation for a long time, a sufficient overlap in observation systems will be carried out to facilitate maintaining the homogeneity of the historical records. The overlap time for different measured variables plan to be as recommended by the WMO Guide to Meteorological Instruments and Methods of Observation (WMO-No.8, 2006).
In the framework of the bilateral cooperation with USA for the International Polar Year the climate observatory was open in the Rassian Arctic in Tiksi, north of the Arctic Circle at latitude 71.50 degree north.

Upper-Air Network (GUAN)

At the GUAN network in Russia 12 stations operate twice a day (2 stations in Antarctica).
The new ground station systems will be installed at all GUAN stations together with modern telecom, energy-generated and hydrogen generated systems. This project as part of National Hydromet Modernization Project will be implemented during 2-3 years with priority to GUAN and Regional Reference Climatological Stations.

Oceanographic Observing System

Sea surface temperature

The Russian network includes 180 littoral stations and 280 volunteer observing ships. Measurements are made 4 times a day - 0, 6, 12, 18 UTC.

Sea level

In the Arctic these observations are carried out at littoral sites:

13 stations - Barents Sea
15 stations - Kara Sea
6 stations - Laptev Sea
5 stations - East Siberian Sea
3 stations - Sea of Chukotsk

At these stations the measurements include sea level, sea surface temperature, sea surface salinity, sea state, sea ice. Sea surface observations are also carried out in Caspian Sea (4 stations), Black Sea (5 stations), Baltic Sea (7 stations), Sea of Japan (17 stations) and Sea of Okhotsk (39 stations).
All data from these stations are transmitted to WDC (Obninsk) on a monthly basis. Sea level monthly data of 5 stations (Barentsburg, Murmansk, Nagaevo, Tuapse and Petropavlovsk-Kamchatski) are transmitted to WDC PSMSL (UK), and monthly sea level data from Petropavlovsk-Kamchatski are transmitted to GCOS Center for Pacific Ocean in Honolulu (USA). Under the GLOSS International Programme Russia is responsible for 14 stations including Mirnyi (Antarctica). Transmission of sea level data is planned to start from 5 additional Russian stations to WDC PS MSL.

Research ships

The oceanographic expeditions are carried out by Roshydromet and Russian Academy of Science. Each year 32 research ships made measurements at seas and oceans. Complex oceanographic observations are made once or twice a year in the Sea of Japan. Sea of Okhotsk, Caspian, Black, Baltic and Barents Seas.

Terrestrial Observing systems

GIN - H (Hydrology)

The hydrological observing network with standard programme of measurements consists of 3085 stations (2732 for rivers, 353 for lakes; the data for 2005).
Specialized hydrological network on Russian territory includes :

8 stations at swamps,
203 stations with measurements of evaporation
6 water balance stations.

In 2007 the Global Lakes Data Center was officially established at the State Hydrological Institute (St. Petersburg) and start to be operational.
The Roshydromet Modernization Project includes also modernization of hydrological observing network for 3 river basins: Oka-22 hydrological posts with modern instrumentation, Kuban – 67 hydrological posts , Ussury river-65 hydrological posts. This will be implemented during 2-3 years

GIN - P (permafrost)

Permafrost refers to the earth materials that remain at or below 0 degr.C for at least two consecutive years. Permafrost monitoring is conducted mainly through ground-based, point measurements. The permafrost thermal state (i.e. ground temperature) and active layer thickness are the key permafrost variables identified for monitoring under the GCOS/GTOS programmes.

On the Russian territory there are several regions where the permafrost monitoring is conducted:

Anadyr (tundra)	- Research Institute, the Far East Branch of Russian Academy of Science (RAS);
Yakutia (Yakutsk, Tiksi, Cherskiy)	- Permafrost Research Institute, Siberian Branch of RAS;
Nadym (West Siberia)	- Research Institute of Cryosphere, Siberian Branch of RAS;
Yamal (tundra, West Siberia)	- Hydrogeology Research Institute, Moscow;
Vorkuta (polar tundra station)	- "Polar Ural Geology", Vorkuta.

All these regions participate in the Circumpolar Active Layer Monitoring (CALM) programme. The Russian Federation is responsible for 25 permafrost monitoring stations.

Glaciers (GIN - G)

The GCOS Essential Climate Variables for glaciers and ice caps are mass balance and length/area. The following institutes participate in GIN - G: RAS Institute of Geography, University of Tomsk, Volcanology RAS, Roshydromet (North Caucasian Branch). Information on 5 glaciers is available at the World Glaciers Monitoring Service (Zurich). The Arctic and Antarctic Research Institute (St.Petersburg) is actively involved in the WCRP - CliC programme for monitoring glaciers in the Arctic and Antarctica.

Chapter 2: Atmospheric essential climate variables

Table 1 a. National contributions to the surface-based atmospheric essential climate variables

Contributing networks specified in the GCOS implementation plan	ECVs[a]	Number of stations or platforms currently operating	Number of stations or platforms operating in accordance with the GCMPs	Number of stations or platforms expected to be operating in 2010	Number of stations or platforms providing data to the international data centres	Number of stations or platforms with complete historical record available in international data centres
GCOS Surface Network (GSN)	Air temperature	135	135	135	135	124
	Precipitation	135	135	135	135	124
Full World Weather Watch/Global Observing System (WWW/GOS) surface network	Air temperature, air pressure, wind speed and direction, water vapour	457	457	457	457	
	Precipitation	457	457	457	457	
Baseline Surface Radiation Network (BSRN)	Surface radiation			1		
Solar radiation and radiation balance data	Surface radiation	186	186	186	11	11
Ocean drifting buoys	Air temperature, air pressure					
Moored buoys	Air temperature, air pressure					
Voluntary Observing Ship Climate Project (VOSClim)	Air temperature, air pressure, wind speed and direction, water vapour	280	280	280	280	
Ocean Reference Mooring Network and sites on small isolated islands	Air temperature, wind speed and direction, air pressure	180	180	180		
	Precipitation	180	180	180		

Table 1b. National contributions to the upper-air atmospheric essential climate variables

Contributing networks specified in the GCOS implementation plan	ECVs	Number of stations or platforms currently operating	Number of stations or platforms operating in accordance with the GCMPs	Number of stations or platforms expected to be operating in 2010	Number of stations or platforms providing data to the international data centres	Number of stations or platforms with complete historical record available in interna-tional data centres
GCOS Upper Air Network (GUAN)	Upper-air-temperature, upper-air wind speed and direction, upper-air water vapour	12	12	12	12	12
Full WWW/GOS Upper Air Network	Upper-air-temperature, upper-air wind speed and direction, upper-air water vapour	98	98	98	98	

Table 1c. National contributions to the atmospheric composition

Contributing networks specified in the GCOS implementation plan	ECVs	Number of stations or platforms currently operating	Number of stations or platforms operating in accordance with the GCMPs	Number of stations or platforms expected to be operating in 2010	Number of stations or platforms providing data to the international data centres	Number of stations or platforms with complete historical record available in international data centres
World Meteorological Organization/ Global Atmosphere Watch (WMO/GAW) Global Atmospheric CO2 & CH4 Monitoring Network	**Carbon dioxide**	**2**	**2**	**2**	**2**	**2**
	Methane	**2**	**2**	**2**	**2**	**2**
WMO/GAW ozone sonde network"	Ozone					
WMO/GAW column ozone network[b]	Ozone	27	27	27	27	27

Chapter 3: Oceanic essential climate variables

Table 3a. National contributions to the oceanic essential climate variables – surface

Contributing Networks specified in the GCOS implementation plan	ECVs	Number of stations or platforms currently operating	Number of stations or platforms operating in accordance with the GCMPs	Number of stations or platforms expected to be operating in 2010	Number of stations or platforms providing data to the international data centres	Number of stations or platforms with complete historical record available in international data centres
Global surface drifting buoy array on 5x5 degree resolution	Sea surface temperature, sea level pressure, position-change-based current	5	5	5	5	
GLOSS Core Sea-level Network	Sea level	14	**14**	14	5	5
Voluntary observing ships (VOS)	All feasible surface ECVs	280	**280**	280	280	
Ship of Opportunity Programme	All feasible surface ECVs					

Table 5. National contributions to the terrestrial domain essential climate variables

Contributing networks specified in the GCOS implementation plan	ECVs	Number of stations or platforms currently operating	Number of stations or platforms operating in accordance with the GCMPs	Number of stations or platforms expected to be operating in 2010	Number of stations or platforms providing data to the international data centres	Number of stations or platforms with complete historical record available in international data centres
GCOS baseline river discharge network (GTN-R)	River discharge					
GCOS Baseline Lake Level/ Area/Temperature Network (GTN-L)	Lake level/area/ temperature	353	353	353	353	
WWW/GOS synoptic network	Snow cover	457	457	457	457	
GCOS glacier monitoring network (GTN-G)	Glaciers mass balance and length, also ice sheet mass balance					
GCOS permafrost monitoring network (GTN-P)	Permafrost borehole-temperatures and active-layer thickness	34	34		34	