UPPER-AIR STATIONS OF Former USSR: Data availability estimates

by Alex Sterin, RIHMI-WDC, Russia
Workshop Boulder 08-11 Feb 2005
Anniversary of first radiosonde launch

- 30 January 2005 – 75th Anniversary of launch first in the world radiosonde by Prof. Pavel Molchanov in St.Petersburg, Russia
- 75 years ago, there was not idea to use radiosonde for climate studies
- Lots of stations subsets are named “climate subsets” (e.g. WMO RA regional climate networks, etc.) – some confusions appear
- Anyway, success of future U/A Climate Reference Network depends on current status of global comprehensive networks and it’s subsets, especially on GUAN, on actions to improve their operability and data quality and access
General Information as on 01/01/2005

- Current status of Russian U/A network – recovery after deep crisis of late 1990s.
- The total station list consists of 129 stations, among them 19 are announced as “in conserved state”.
- The planned increase of radiosonde launches amount in 2005 is 32% more than in 2004.
- The planned amount of launches per day in 2005 (excluding Antarctica stations): total 204, 00 UTC – 106, 12 UTC – 98.
- The average for all soundings max height of radiosonde flight in Russia was about 24 km.
- Most stations will come back to two-times sounding, and for essential part of them, it will be first time after almost 15 years of interrupts, irregularities and one-per-day sounding schedule.
Sources of Information for estimates:

The following estimates of data availability are based on:

- U/A Global radiosonde data collection at RIHMI-WDCB, Russian Federation, Obninsk:
  - CARDS Data Set (1948-2001)
  - Global U/A Data collected in Russia from GTS (2002-2003)
- IGRA Data Set (NCDC/NOAA)

NOTE: not all observations could come to the archive, so the estimates should be considered as tentative. Nevertheless, the general tendencies are reflected well.
<table>
<thead>
<tr>
<th>Station ID</th>
<th>Station Name</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>20674</td>
<td>OSTROV DIKSON</td>
<td>73 30N</td>
<td>80 24E</td>
</tr>
<tr>
<td>21982</td>
<td>OSTROV VRANGELJA</td>
<td>70 59N</td>
<td>178 29W</td>
</tr>
<tr>
<td>22550</td>
<td>ARHANGEL'SK</td>
<td>64 37N</td>
<td>40 30E</td>
</tr>
<tr>
<td>23472</td>
<td>TURUHANSK</td>
<td>65 47N</td>
<td>87 56E</td>
</tr>
<tr>
<td>24266</td>
<td>VERHOJANSK</td>
<td>67 34N</td>
<td>133 24E</td>
</tr>
<tr>
<td>28698</td>
<td>OMSK</td>
<td>54 56N</td>
<td>73 24E</td>
</tr>
<tr>
<td>30230</td>
<td>KIRENSK</td>
<td>57 46N</td>
<td>108 04E</td>
</tr>
<tr>
<td>32540</td>
<td>PETROPAVLOVS-KAMCHATSKIJ</td>
<td>53 05N</td>
<td>158 35E</td>
</tr>
<tr>
<td>35121</td>
<td>ORENBURG</td>
<td>51 41N</td>
<td>55 06E</td>
</tr>
<tr>
<td>38880</td>
<td>ASHGABAT (Turkmenia)</td>
<td>37 58N</td>
<td>58 23E</td>
</tr>
<tr>
<td>33345</td>
<td>KYIV (Ukraine)</td>
<td>50 24N</td>
<td>30 34E</td>
</tr>
<tr>
<td>34731</td>
<td>ROSTOV-NA-DONU</td>
<td>47 15N</td>
<td>39 49E</td>
</tr>
<tr>
<td>89592</td>
<td>MIRNYJ</td>
<td>66 33S</td>
<td>93 01E</td>
</tr>
<tr>
<td>89512</td>
<td>NOVOLAZAREVSKAJA</td>
<td>70 46S</td>
<td>11 50E</td>
</tr>
</tbody>
</table>
# GUAN GCOS Stations for Russian Federation and Former USSR (Yerevan is not included)

<table>
<thead>
<tr>
<th>Station Code</th>
<th>Station Name</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Mode/Time Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>20674</td>
<td>OSTROV DIKSON</td>
<td>73 30N</td>
<td>80 24E</td>
<td>M2 3 Quarter, 00+12</td>
</tr>
<tr>
<td>21982</td>
<td>OSTROV VRANGELJA</td>
<td>70 59N</td>
<td>178 29W</td>
<td>Not operating</td>
</tr>
<tr>
<td>22550</td>
<td>ARHANGEL'SK</td>
<td>64 37N</td>
<td>40 30E</td>
<td>AVK, 00+12</td>
</tr>
<tr>
<td>27459</td>
<td>NIZHNII NOVGOROD</td>
<td></td>
<td></td>
<td>AVK, 00+12</td>
</tr>
<tr>
<td>23472</td>
<td>TURUHANSK</td>
<td>65 47N</td>
<td>87 56E</td>
<td>AVK, 00+12</td>
</tr>
<tr>
<td>23921</td>
<td>IVDELI'</td>
<td></td>
<td></td>
<td>AVK, 00+12</td>
</tr>
<tr>
<td>24266</td>
<td>VERHOJANSK</td>
<td>67 34N</td>
<td>133 24E</td>
<td>AVK, 00+12</td>
</tr>
<tr>
<td>28698</td>
<td>OMSK</td>
<td>54 56N</td>
<td>73 24E</td>
<td>AVK, 00+12</td>
</tr>
<tr>
<td>29862</td>
<td>KHAKASSKAYA (ABAKAN)</td>
<td></td>
<td></td>
<td>AVK oo</td>
</tr>
<tr>
<td>30230</td>
<td>KIRENSK</td>
<td>57 46N</td>
<td>108 04E</td>
<td>AVK, 00+12</td>
</tr>
<tr>
<td>31088</td>
<td>OKHOTSK</td>
<td></td>
<td></td>
<td>AVK-1M, 00+12</td>
</tr>
<tr>
<td>32540</td>
<td>PETROPAVLOVSK-KAMCHATSKIJ</td>
<td>53 05N</td>
<td>158 35E</td>
<td>AVK, 00+12</td>
</tr>
<tr>
<td>35121</td>
<td>ORENBURG</td>
<td>51 41N</td>
<td>55 06E</td>
<td>AVK, 00+12</td>
</tr>
<tr>
<td>38880</td>
<td>ASHGABAT (Turkmenia)</td>
<td>37 58N</td>
<td>58 23E</td>
<td></td>
</tr>
<tr>
<td>33345</td>
<td>KYIV (Ukraine)</td>
<td>50 24N</td>
<td>30 34E</td>
<td></td>
</tr>
<tr>
<td>34731</td>
<td>ROSTOV-NA-DONU</td>
<td>47 15N</td>
<td>39 49E</td>
<td>??????????</td>
</tr>
<tr>
<td>89592</td>
<td>MIRNYJ</td>
<td>66 33S</td>
<td>93 01E</td>
<td>?????</td>
</tr>
<tr>
<td>89512</td>
<td>NOVOLAZAREVSKAJA</td>
<td>70 46S</td>
<td>11 50E</td>
<td>00, AVK</td>
</tr>
</tbody>
</table>
Data availability for some fUSSR GCOS stations
Annual total of OBS by OBS time (00 UTC –red, 12 UTC – blue) (as in RIHMI-WDC, CARDS +GTS)
Data availability for some fUSSR GCOS stations
Annual total of OBS by OBS time (00 UTC – red, 12 UTC – blue) (as in RIHMI-WDC, CARDS +GTS)
Data availability for some fUSSR GCOS stations
Annual total of OBS by OBS time (00 UTC – red, 12 UTC – blue) (as in RIHMI-WDC, CARDS + GTS)
Mean annual OBS number for non-FUSSR stations (per station, period 1991-2003, 00+12 UTC, max=730 obs):
GUAN GCOS – left group
NOT GUAN – right group
Mean annual OBS number per station for FUSSR stations (period 1991-2003, 00+12 UTC):
GUAN GCOS – left group
NON- GUAN – right group
Mean annual OBS number per station for GUAN stations (period 1991-2003, 00+12 UTC):
Not RF + fUSSR – left group
RF + fUSSR – right group
Mean annual OBS number per station for non-GUAN stations (period 1991-2003, 00+12 UTC):
Not RF + fUSSR – left group
RF + fUSSR – right group
Mean annual 100 hPa T value number per station for GUAN stations (period 1991-2003, 00+12 UTC):
Not RF + fUSSR – left group
RF + fUSSR – right group
Mean annual 50 hPa T value number per station for GUAN stations (period 1991-2003, 00+12 UTC):
Not RF + fUSSR – left group
RF + fUSSR – right group
Mean annual 20 hPa T value number per station for GUAN stations (period 1991-2003, 00+12 UTC):
Not RF + fUSSR – left group
RF + fUSSR – right group
Very old historical radiosonde data

- There are very old radiosonde data (for 30s, 40s and 50s of past century) in hardcopies, in various countries, including Russia.
- The amount of these data is not negligible, and their value for climate studies seems to be considerable.
- Efforts are needed to create, based on digitizing these data, a climate related, high quality data set.
- This must be more than simply digitizing process.
Some concluding remarks

- A dramatic crisis in Russian U/A observational network in second half of 1990s, affected availability of radiosonde obs from russian stations, both GUAN and non-GUAN stations
- Since 1999, Roshydromet did his best to provide recover after crisis for the Russian GUAN U/A stations, and these efforts were successful.
- Serious improvement in functioning russian U/A network, both GUAN and non-GUAN, is expected in 2005 (growth of radiosonde launches amount by 32%, recovery of 00+12 UTC observation schedule)
- Serious gaps in radiosonde data availability remain, both for GUAN and non-GUAN stations, for fUSSR and non-fUSSR stations
Some concluding remarks: on way to U/A CRN

**Priority #1 for future:**
- To provide comprehensive and GUAN networks, as a heritage for future systems, in a better state than they are at this moment.
- To improve the existing procedure of global radiosonde data utilization for climate research goals, including observational schedule, transfer and collection via GTS, quality check and improvement, analysis, etc.
- Progress in this should be maximally rapid.

**Priority #2:**
- To work out requirements for new observational instruments, first of all, for new models of sondes (Priority of Workshop 2).
- To take into account cost considerations and affordability of these new obs instruments for worldwide observers, especially for developing countries and those in transition.
- The implementation of these new instruments must be step-by-step effort, must follow in time the results from Priority #1 efforts, and in no way should not conflict with efforts under Priority #1.
We offer:

- To provide redundancy in efforts to collect, archive, quality assure, assess and disseminate the radiosonde data from global network

- With this in mind, to consider the RIHMI-WDC (Obninsk, Russia) as an additional center to collect, archive global radiosonde data

- To provide radiosonde-based data products that can serve as “bridges” between observational datasets of huge volume, on one hand, and highly averaged spatially and temporally outcomes, on other hand. The extended set of monthly radiosonde statistics (MONADS Version 2) is one of such “bridges” – an experimental fragment may be given to interested persons for critical review
THANK YOU!
Summarizing table: GUAN vs. non-GUAN stations of fUSSR and non-fUSSR (mean annual number of OBS for 00 and 12 GMT per station)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>fUSSR GUAN</th>
<th>fUSSR Non-GUAN</th>
<th>Non-fUSSR GUAN</th>
<th>Non-fUSSR Non-GUAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>359</td>
<td>221</td>
<td>468</td>
<td>360</td>
</tr>
<tr>
<td>2000</td>
<td>420</td>
<td>297</td>
<td>500</td>
<td>352</td>
</tr>
<tr>
<td>2001</td>
<td>568</td>
<td>347</td>
<td>506</td>
<td>356</td>
</tr>
<tr>
<td>2002</td>
<td>557</td>
<td>355</td>
<td>504</td>
<td>375</td>
</tr>
<tr>
<td>2003</td>
<td>535</td>
<td>344</td>
<td>512</td>
<td>391</td>
</tr>
</tbody>
</table>
GUAN GCOS Stations for Russian Federation and FUSSR
Station ROSTOV/DON (34731) Annual total of OBS by OBS time (00 GMT –red, 12 GMT – blue) (as in RIHMI-
GUAN GCOS Stations for Russian Federation and FUSSR
Station KIRENSK (30230) Annual total of OBS by OBS time (00 GMT – red, 12 GMT – blue) (as in RIHMI-WDC, CARDS+GTS)
GUAN GCOS Stations for Russian Federation and FUSSR
Station PETROPAVLOVSK-KAMCHATSKII (32540)
Annual total of OBS by OBS time (00 GMT –red, 12 GMT –blue)
GUAN GCOS Stations for Russian Federation and FUSSR
Station ARKHANGEL’SK (22550) Annual total of OBS by OBS time (00 GMT – red, 12 GMT – blue) (as in RIHMI-WDC CARDS+GTS)
GUAN GCOS Stations for Russian Federation and FUSSR
Station DIKSON ISL. (20674) Annual total of OBS by OBS time (00 GMT – red, 12 GMT – blue) (as in RIHMI-WDC, CARDS+GTS)
GUAN GCOS Stations for Russian Federation and FUSSR
Station VRANGELYA ISL. (21982) Annual total of OBS by OBS time (00 GMT – red, 12 GMT – blue) (as in RIHMI-WDC, CARDS+GTS). Beginning on 2000, not available.
GUAN GCOS Stations for Russian Federation and FUSSR
Station OMSK (28698) Annual total of OBS by OBS time (00 GMT – red, 12 GMT – blue) (as in RIHMI-WDC, CARDS+GTS).
GUAN GCOS Stations for Russian Federation and FUSSR
Station ORENBURG (35121) Annual total of OBS by OBS time (00 GMT – red, 12 GMT – blue) (as in RIHMI-WDC, CARDS+GTS).
GUAN GCOS Stations for Russian Federation and FUSSR
Station TURUHANSK (23472) Annual total of OBS by OBS time (00 GMT – red, 12 GMT – blue) (as in RIHMI-WDC, CARDS+GTS).
GUAN GCOS Stations for Russian Federation and FUSSR
Station VERHOYANSK (24266) Annual total of OBS by OBS time (00 GMT – red, 12 GMT – blue) (as in RIHMI-WDC, CARDS+GTS).
GUAN GCOS Stations for Russian Federation and FUSSR
Station MIRNII (89592) Annual total of OBS by OBS time (00 GMT – red, 12 GMT – blue) (CARDS+GTS, not all years available)
GUAN GCOS Stations for Russian Federation and FUSSR
Station NOVOLAZAREVSKAYA (89512) Annual total of OBS by OBS time (00 GMT – red, 12 GMT – blue) (CARDS+GTS, not all years available)
GUAN GCOS Stations for Russian Federation and FUSSR

Station ASHGABAT - Turkmenistan (38880) Annual total of OBS by OBS time (00 GMT – red, 12 GMT – blue) (CARDS+GTS, not all years available)
GUAN GCOS Stations for Russian Federation and FUSSR
Station KYIV –Ukraine (33345) Annual total of OBS by OBS time (00 GMT –red, 12 GMT – blue, CARDS+GTS)
Technical and technological reconstruction of World Meteorological Center Moscow

- Under Credit of World Bank, the reconstruction is planned to begin in 2005
- It will consider both the operational capacities and archival capacities of Russian world centers, regional centers, as well as of Russian observational network
- This is expected to improve the situation with Russian hydromet service, including radiosonde observations and radiosonde data problems
Concluding remarks:

A serious crisis problem in Russian U/A observational network in second half of 1990s, affected Russian stations, both GUAN and non-GUAN stations.

Since 1999, Roshydromet did his best to provide recover after crisis for the Russian GUAN U/A stations, and these efforts were successful.

In 2000-2003, the mean of OBS per station for 00+12 GMT, for fUSSR GUAN stations exceeded that for non-fUSSR GUAN stations.

This value, however, for non-GUAN stations, still remains low both for fUSSR and non-fUSSR stations.

The average availability of U/A OBS for higher levels of sounding (50 hPa, 20 hPa), in 2000-2003, for Russian GUAN stations, was slightly lower, than that for non-Russian GUAN stations.

The problems to be resolved:

ASHGABAT operating
VRANGELYA ISL. Operating

Further worldwide efforts are needed to improve the operability and data availability from GUAN stations, both fUSSR and