

EXPERIENCE IN INTERNATIONAL BALLOON CAMPAIGNS IN RUSSIA

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Russian scientists have been involved in international balloon programs of studying the Arctic and mid-latitude ozone layer since 1991 (EASOE campaign). Specialists from the Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet) took part in organizing and implementing investigations in the Arctic and mid latitudes, including the Russian territory, under 11 research projects. Within the research period, over 40 balloons of various types were flown over Russia to study atmospheric properties and validate satellite-borne instruments. The flights were fulfilled jointly with CNES within the framework of the governmental agreement between the Republic of France and the Russian Federation on Cooperation in the field of exploration and peaceful uses of cosmic space.

This paper gives an outline of the future international balloon projects to be undertaken on the Russian territory jointly with CNES, SSC, and ASI. Special attention is given to the main formal requirements to be met in implementing international balloon flights over Russia.

Regrettably, due to some actual problems of the last 18 years, only specialists of Roshydromet (Central Aerological Observatory) have got sufficient experience in organizing and carrying out international research balloon flights in Russia. In the last years, space agencies and research institutes of France, Italy, Germany, Sweden, Norway applied to Roshydromet for assistance in and joint implementation of balloon experiments on the Russian territory. Unfortunately, almost no positive solutions have been found. Nearly all the requests on the possibility of organizing circumpolar balloon flights over the Russian territory sent via diplomatic channels in the last 2 or 3 years have been rejected by the Russian authorities. In view of the recently increasing interest of the scientific community in implementing research during circumpolar flights in polar regions and sub-arctic latitudes in different seasons as well as the necessity of solving quite a few problems related to the preparation for and implementing balloon flights over the Russian territory, it seems reasonable to discuss the major organizational and operational issues associated with them.

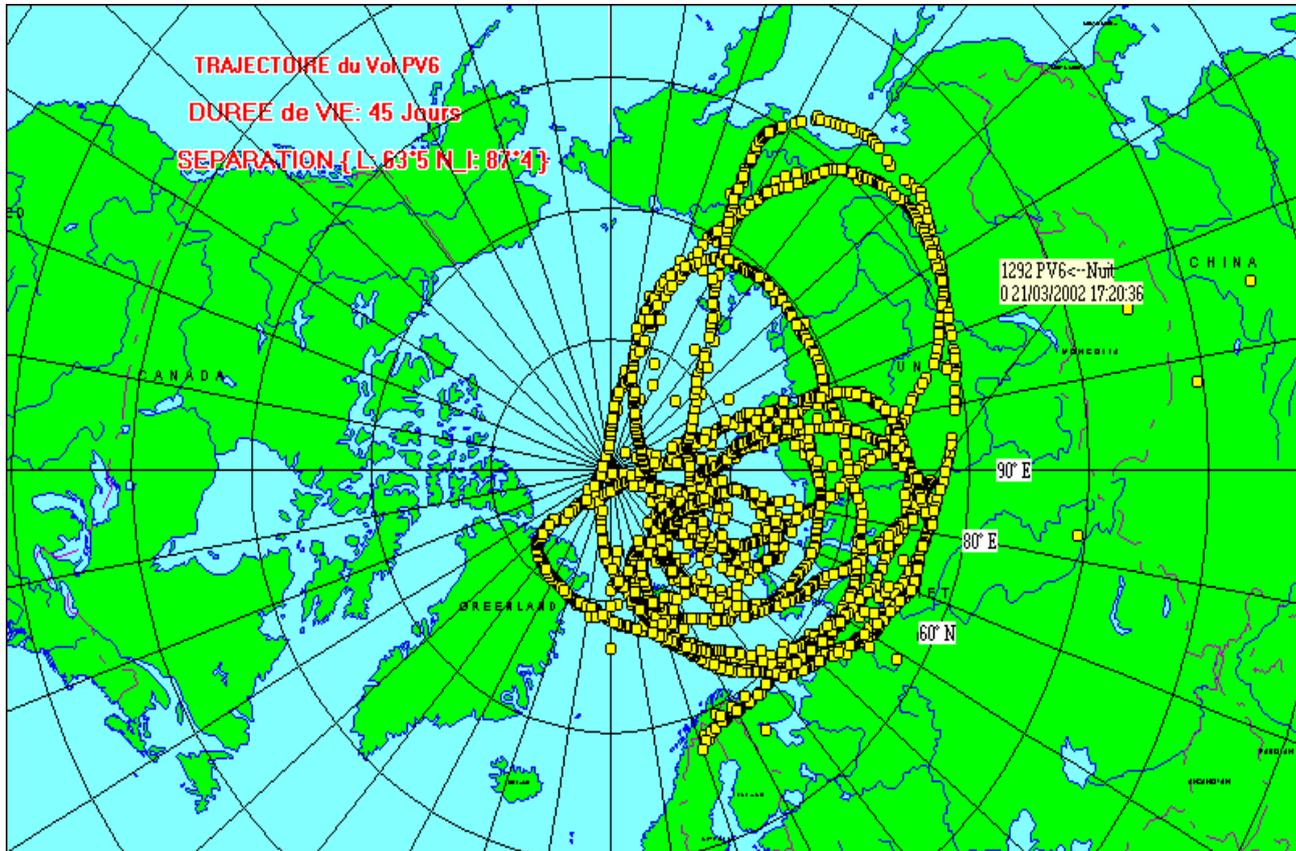
Apart from the requirements provided for in "Appendix D – Unmanned Balloons" of the Convention on International Civil Aviation

Organization (also known as Chicago Convention), there are still more stringent regulations which mainly refer to the control over instrumentation configuration and hard order of the air traffic control in Russia. Due to the large territory, circumpolar flights of stratospheric balloons over Russia may often last over 6-8 days. More over, balloons may considerably depart from the expected path. Therefore the stringent requirements on the part of the related state bodies for organizing and preparing balloon flights, which, in any case, are by no means fully operated, are governed by the provision of air traffic safety and observing the current domestic regulations. Since the time of the EASOE campaign, over 40 balloons of various types – those with an open envelope and flight duration of several hours, with an open envelope and flight distance of over 2000 km, and long-duration balloons with flight duration of tens of days - have been flown over the Russian territory. Figure 1 exemplifies the trajectory of one of the long-duration super-pressure balloons, which required certain effort on the part of the Russian air traffic control services.

Note also that since 1992 there have been cases of departures from the planned programs and cases of emergency. Bearing in mind the continuous air traffic control provided in Russia and the special features of controlling balloon flights, the latter activity being an extra one and quite uncommon for the state bodies involved in organizing balloon flights, the related agreement and coordination procedure is not likely to be very simple and fast. Firstly, the implementation of any activity using foreign observation and control instrumentation requires permission of the Federal Service for Technical and Export Control (FSTEC). The relevant procedure has been approved by the Government and stated in the document to be found at the site <http://www.fstec.ru/>. In conformity with these regulations, 6 months prior to the initiation of research program, a description of the planned research with all related parameters, including all basic parameters of the instrumentation to be used, must be submitted to the FSTEC. In line with the formal regulations, any organization may apply for approval. It is conventional that the cost of all extra work to determine the feasibility of research and get permission (expert examination, test operations, etc.) shall be covered by the applicant. For example, based on experience, simultaneously with the FSTEC resolution it is

necessary to get permission from the State Commission for Radio Frequencies (<http://www.grfc.ru/>), with a contract to be made for expert examination of the accessibility of the required radio frequencies. The whole procedure may take not less than 3 - 4 months. With the FSTEC permission (which has been agreed

upon by all the competent state bodies) obtained, it is then necessary to get the approval of the air traffic control bodies. Generally, to get the approval of the basic controlling agencies it is mandatory for the research activities to have been provided for in a document approved by the Russian Government.



The most straightforward way to the realization of balloon experiments on the territory of Russia is to act within the framework of an intergovernmental agreement on scientific cooperation. Despite the abovementioned complicated organizational procedure, during the last 18 years, 11 balloon campaigns with flights over the Russian territory have been implemented jointly with CNES under the Agreement between the Government of the French Republic and the Government of the Russian Federation on Cooperation in the Field of Peaceful Exploration and Use of Space. Also note that practical realization of balloon flights is impossible without a working agreement between the partners, which must allow for all the majorb) organizational, operational and financial issues such as legalization of all necessary permissions, customs procedures, instrumentation and research activity control, balloon flights support, instrumentation recovery, etc.

To conclude, the long-term experience shows that the implementation of balloon experiments on the territory of Russia would not be possible through one single resolution, whatever the level of decision-making may be, without meeting all the above requirements. Realization of balloon flights is impossible without working agreement between the partners, wich must allow for all the major organizational, operational and financial issues such as legalization of all necessary permissions, customs procedures, instrumentation and research activity control, balloon flight support, payload recovery, etc:

How to proceed with agreement and coordination?

a) *Approval by the Russian Government (> 6 months in advance)*

Generally, to get the approval of the basic competent agencies it is mandatory for the research activities to have been provided for in a document approved by the Russian Government. The most straightforward way to

the realization of balloon experiments over Russia is to act within the framework of an intergovernmental agreement on scientific cooperation. A diplomatic note with request to conduct balloon experiments over Russia should be submitted to Foreign Ministry of Russian Federation.

b) Permission of the Federal Service for Technical and Export Control (min - 6 months in advance)

The relevant procedure has been approved by the Government and stated in the document to found at the site <http://www.fstec.ru/> Six months prior to the start of research program, a description of the planned research with all related parameters, including all basic characteristics of the payload on to be used, must be submitted to the Federal Service for Technical and Export Control (FSTEC).

c) Permission from the State Commission for Radio Frequencies (4-5 months in advance)

At the same time with the FSTEC resolution it is necessary to get permission from the State Commission for Radio Frequencies (<http://www.grfc.ru/>), with a contract to be made for expert examination of the accessibility of the required radio frequencies. The whole procedure may take not less than 3-4 months.

d) Approval of the air traffic and radar control bodies (1-1,5 months in advance)

With the FSTEC permission (this permission has been agreed upon by all the competent state bodies)obtained, it is then necessary to get approval of the air traffic and radar control bodies.