Siberian network to monitor natural and climatic processes

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Goal program

Development of scientific and technological basis and creation of a reference network for monitoring of natural and climatic changes in Siberia (2012-2017)

Main tasks

- Creation of a spatially distributed monitoring network for investigation and forecast of climatic and ecosystems' changes in Siberia
- Creation of a test site for validation of modeling data and results obtained at remote sensing from space
- Improvement of investment appeal and efficiency of international cooperation in Siberia
- Creation of an information basis for valid decision-making on socio-economic development of Siberia accounting for environmental risks

Climate-regulating and environmental factors and phenomena

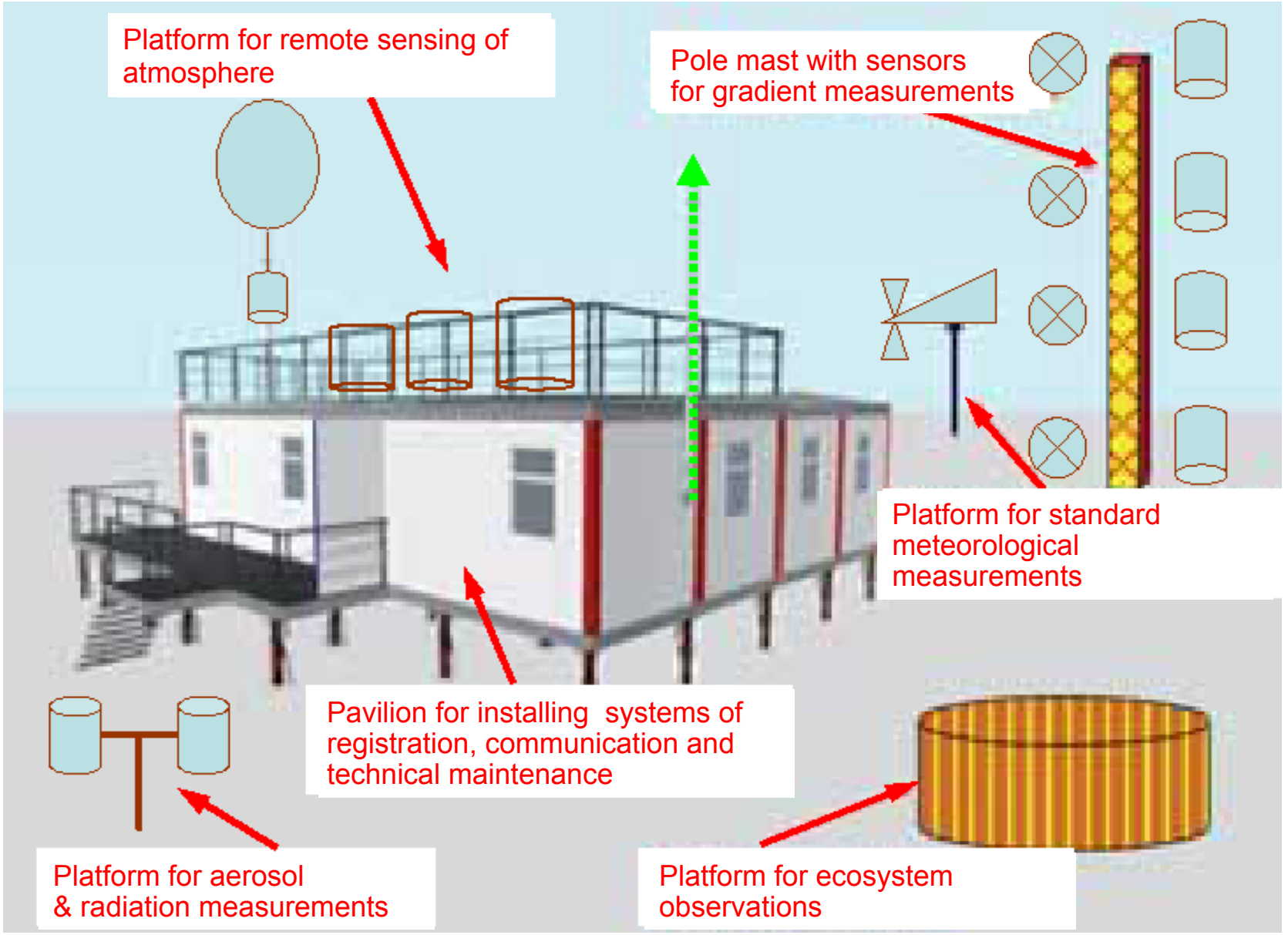
Factors	Main phenomena
Heliospheric	Cyclic variations of solar energy fluxes (Milankovich cycles). Cyclic variations of solar activity (Wolf numbers). Variations of gravity, associated with Solar system dynamics.
Geospheric	Horizontal energy and mass transfer in the atmosphere and oceans, including circulation, cyclones and ocean currents. Vertical energy and mass transfer in the atmosphere and oceans, including convection and turbulent exchange. Evolutionary and sporadic geodynamic phenomena, including volcanism and earthquakes.
Biospheric	Vegetation period phenomena, including changes in respiratory metabolism and radiation balance. Regional succession (change of biocenoses). Biogeochemical variations in atmosphere and oceans.
Anthropogenic	Industrial aerosol and gaseous exhausts, including greenhouse gases. Landscape, hydrological and orographic consequences of economical activity.
Cosmogeneous	Variations of cosmic rays fluxes, including modulation by solar wind. Variations of star showers, including collisions with asteroids.

A network planned for monitoring of climatic and natural processes in Siberia

Reference monitoring stations

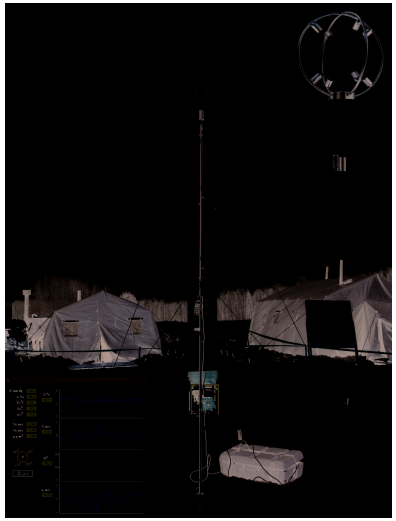
1. Tomsk (city)
2. Tomsk (Vasyuganie)
3. Ulan-Ude (Istomino)
4. Chita (Arakhley)
5. Krasnoyarsk (Zotino)
6. Barnaul (Aktru)
7. Novosibirsk (Chany)
8. Kyzyl (Dolinnaya)
9. Yakutsk (Spasskaya Pad')
10. Irkutsk (Mondy)
11. Khanty-Mansiisk (Muchryno)
12. Nadym (Polyarnaya)

Block diagram of a standard observation site incorporated into regional monitoring network



Instrumentation for monitoring

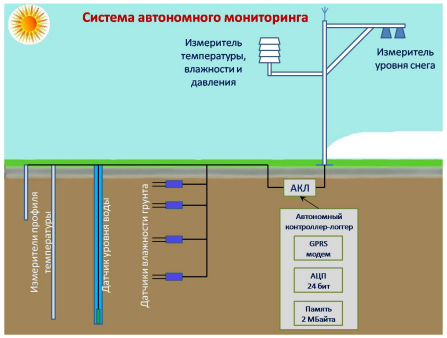
1. Foreign and Russian certified devices.
2. Import-substituting certified devices.
3. Designing and certification of new instruments during project implementation.



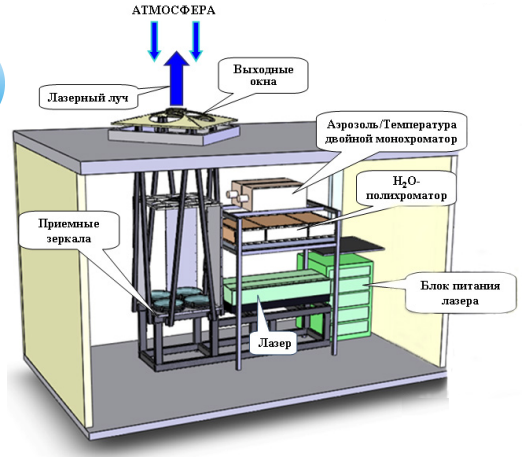
Automated meteorological complex *(IMCES SB RAS)*
Monitoring of meteorological quantities fluctuations in surface atmospheric layer

Aerosol lidar *(IAO SB RAS) Monitoring of altitude profile of troposphere aerosol*

Solar spectrophotometer *(IAO SB RAS) Monitoring of atmosphere optical thickness*



Soil thermal hydrometer *(IMSEC SB RAS) Monitoring of subsurface temperature and soil humidity profiles*



Raman lidar *(IMCES SB RAS, IAO SB RAS) Monitoring of altitude profiles of trace gases in the atmosphere*

Program content

TASK 1. Instrumental and methodical provision of a reference network for integrated monitoring of natural and climatic changes in Siberia *(Leaders: RAS Corr. member M.V. Kabanov, Cand. of Sci. (Phys.&Math.) S.V. Smirnov)*

TASK 2. Development, metrological examination and certification of new information-measuring systems for reference monitoring network *(Leaders: Doct. of Sci. (Phys.&Math.)* V.A. Krutikov*, Doct. of Sci. (Engineering) A.A. Tikhomirov).*

TASK 3. Multifactor analysis of instrumented data acquired, revealing of spatiotemporal regularities, development of scientific and methodical bases for monitoring of natural and climatic processes and risks in Siberia under impact of global and regional factors *(Leaders: Doct. of Sci. (Phys.&Math.)* I.I. Ippolitov*, Cand. of Sci. (Phys.&Math.)* E.A. Dyukarev*).*

TASK 4. Creation of Siberian common usage information analytical center for accumulation, storage and analysis of ground-based and satellite data on natural and climatic processes in Siberia *(Leaders: Doct. of Sci. (Phys.&Math.)* E.P. Gordov*, Cand. of Sci. (Phys.&Math.)* I.Yu. Turchanovsky*).*

Thanks for your attention!