Spaceborne and Airborne Radar Data for geologic application at the North-West of Russia

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The evaluation of effectiveness of spaceborne and airborne radar data for geologic application was carried out at the North-West of Russia (South Kareliya, Arkhangelsk region). The test sites are situated in different natural (forest-tundra and forest) and tectonic (south of Baltic shield and North-West of Russian plate) zones.

The technology of radar data processing and analysis for geological mapping has been developed. Radar data with different incidence angle, wavelength, polarization, look directions, spatial resolution, seasons of survey (ALMAZ, ERS-1, JERS-1 SAR, RAZREZ, NITH) and multispectral data (RESURS, JERS-1 OPS) were used in investigation. On the first stage special preliminary processing of radar data was made. Then all remotely sensed data was transformed to a map projection and combined with geologic and geophysical data. The following methods of analysis were used: visual interpretation, automatic extraction and processing of lineaments, principal component analysis, correlation analysis, creation of color compositions and others.

It is established that radar sensor can provide useful structural information for geologic work because their backscatter properties are related to ground topography and surface roughness. Maximal information for these areas is contained on the satellite images obtained in spring and in winter. The integrated analysis of radar, multispectral, geologic and geophysical data has allowed to reveal main geological structure and compose geological structural maps for test sites.