which leads to rapid formation of discontinuities in the most weak interfaces in the process of shear deformation. At high degrees of constraint formation of these "mesoscopic" flaws and their association into interblock cracks become the dominant deformation mechanism in the block-structured medium. Changing of the dominant mechanism of deformation is manifested as a change of the trend and in some cases of the sign of the integral characteristics of the deformation response of the medium, such as shear strength, the ultimate value of shear strain and changing of the width of shearing zone. In general, results suggest the possibility of introducing of some dimensionless parameter characterizing regime of the mechanical response of the medium during shear deformation. This parameter should be a function which links the applied stresses and rheological characteristics of the medium (in particular, the elastic limit of the material of interblock interfaces).

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# Recent stress deformation in disjunctive zones on the base of remote sensing data

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It is identified that by their formation mechanisms the known and forecasted fracture dislocations at a recent stage of their geotectonic development manifest themselves mainly as the zones of stretching. The disjunctive structures of this type are always well decoded on different-scale remote sensing data (RSD) of any region of study. Their geoindicators are characteristic of zones of increased fluid-geological permeability.

Let's consider a territory of the Chernobyl Exclusion Zone and an adjacent region of the Korosten pluton. For its landscape-geological conditions the geoindication constituents of fractures are represented usually by the negative relief forms, super-humid sites with developed species of hygrophilous vegetation, elongated lines of anomalous phototone change to darker hues, etc. At once for mentioned region as an example (specifically for the Tovstyi Lis site within its borders) we classified the basic landscape geoindicators of the discriminating geodynamic fields at the recent tectogenesis stage. The fields are related to the Earth's crust disjunctive structures. Peculiarities of the fields' reflection in the RSD are characterised too [Azimov, 2008; 2009].

During investigation first of all it was taking as a base the framework of a tectonic structure of the studied area (Fig. 1, 2) chosen in the course of the regional research stage [Azimov, 2001; 2002; 2003]. It was worked out in detail within the Tovstyi Lis site and its adjacent areas [Azimov, 2004; 2006; Geological …, 2006]. For example, determination of the rectilinear known and forecasted structural elements of disjunction character (or structural lines, lineaments) on the remote images of high space resolution and topographic materials was performed with using a set of criteria (geoindicators): boundaries of sites with a different degree of the relief dissection and dynamics of erosion processes; rectified boundary segments of hypsometric benches, gradient steps of the relief, river valleys, banks of small lakes and swamps, erosion network, troughs, grooves, gullies, water divides, bent water courses and valleys, linearly elongated chains of suffusion depressions, mikrodepressions, erosion-denudation bodies, sandy ranges, as well as boundaries of the Quaternary deposit complexes and their lithofacies, sections with specific facies of hygrophilous vegetation, elongated lines of anomalous variations of image phototone, etc.

A location scheme for the lineament structures obtained by decoding show high lineaments density, for this reason direct identification of the fracture dislocations is difficult. For finding regularities of the lineaments distribution, their typification was done according to their manifestation indicators at remote images or the site, their relation with geological objects and inter-correlation between each other, elongation, width, etc. Usually zones of decoded lineaments appear to be wider than zones of fractures revealed by geological-geophysical methods. The latter ones are located in the middle of linea-

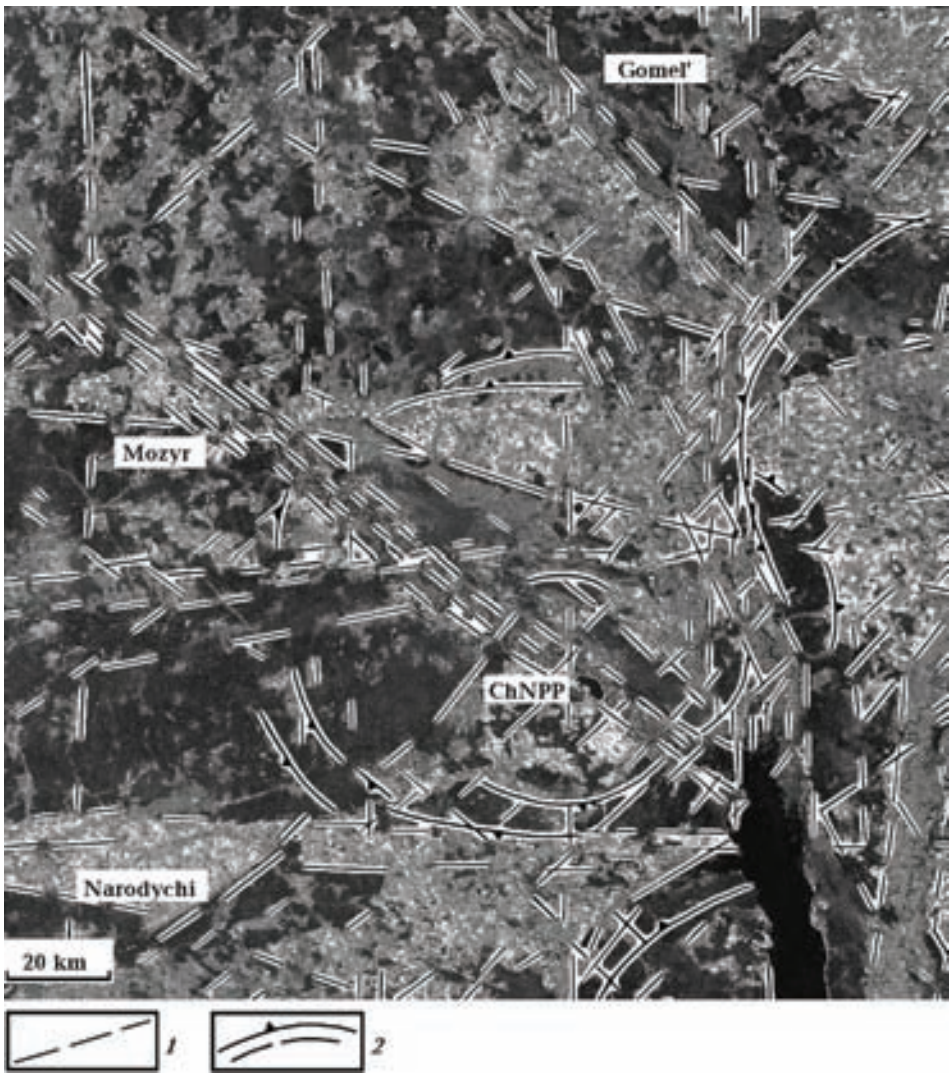


Fig. 1. General synthesized multiband space image LANDSAT MSS (07.09.1977) on the ChNPP Exclusion Zone territory and adjacent regions with elements of the regional structural decoding: *1* — lineaments and their zones depicting the fault-block frame of the crystalline basement and sedimentary cover, *2* — contours of ring-type and arc-type landscape elements conditioned of the presence of deep lithosphere structures.

ment zones. This gave possibility to refine the areas of anomalous geodynamic influence of fractures activated at the recent stage of the Earth's crust evolution.

In the course of direct study of the general structure of an elementary lineament field within studied the Tovstyi Lis site it was found that differently oriented separate elementary structural lines are grouped in lineaments and their zones, saturating and depicting their internal construction. They are grouped into regularly built systems of definite directions, mainly diagonal with prevailing azimuths from 40 to 50° (north-eastern), and 310° (north-western), and orthogonal ones directed with azimuth 0±5° (submeridional), and 270°±5° (sublatitudinal). These systems control each other by stretch and size. Practically each of them finds its orthogonal system, forming with it a dynamic pair, and one system from this pair prevails in its development. Within boundaries of the definite site the structural lines of definite direction dominate (Fig. 3). Linear elements correspond well by their directions to the main fracture systems of Ukraine revealed by different methods [Chebanenko, 1977]. The latter ones during the platform stage had been developing in correlation, forming the entire dynamic system of co-subordinated stably coupled fractures of diagonal and orthogonal orientations.

The above data enable to conclude that the majority of lineaments and their zones decoded from

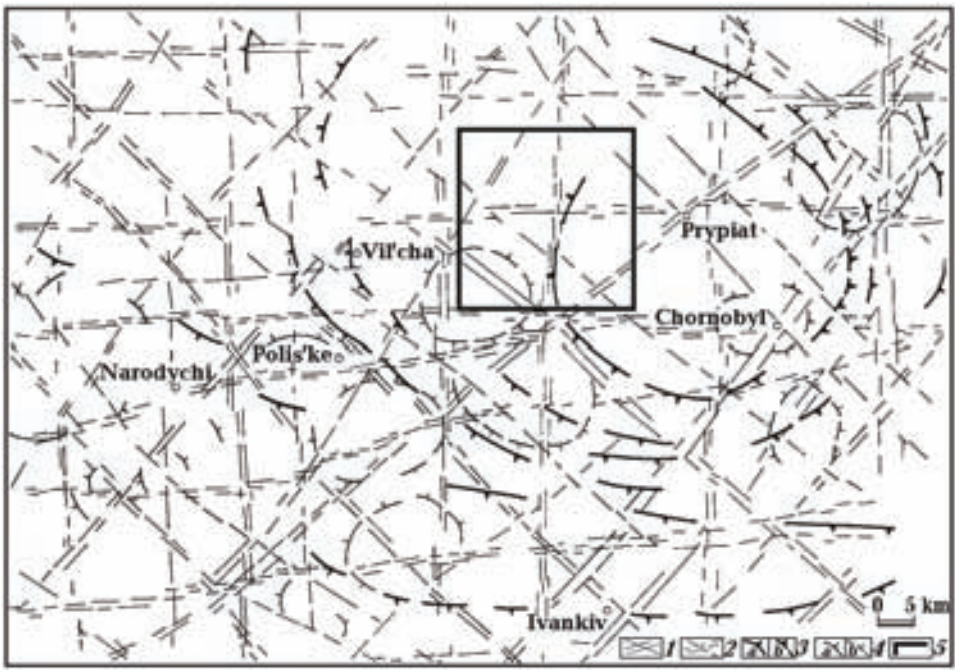


Fig. 2. Scheme of lineaments and ring-type structures of the Chornobyl NPP Exclusion Zone and adjacent region of the Korostensky crystalline massif (on the basis of the results of remote sensing data decoding): *1*, *2* — lineaments and their zones depicting the fault-block frame of the crystalline basement and sedimentary cover (*1* — confidently recognized, *2* — indefinitely recognized); *3* — contours of ring-type and arc-type landscape elements decoded on space images of high generalization level, depicting probably structures related with the under-crust magmatism (*a* — confidently recognized, *b* — indefinitely recognized); *4* — curvilinear landscape elements decoded on middle- and large-scale space images, depicting blocks of the crystalline basement activated at the recent tectogenesis stage (*a* — confidently recognized, *b* — indefinitely recognized); *5* — contour of the Tovstyi Lis site of detailed investigation.

the RSD come along the axes of discharge of stress-deformed rock state, that indicate a presence of the local disjunctive fractures or components of break structures of various lower-rank morphogenetic types developed in the Earth's crust within studied area. They represent the boundaries of main block fields within which the localization of anomalous geodynamic stresses takes place.

In the course of interpreting the neo- and recent geodynamical situation the known facts were taken into account [Chebanenko, 1977; Pavlinov, 1977; Geodynamic …, 1989] stating that during the tensile deformations the fractures are formed followed by faults, separations, rifts, combined shift-faults, and during the compressing stress deformations — by uplifts, joints, thrusts and coverings with combined forms of shift-uplifts and shift-thrusts.

Linear contraction zones within the Tovstyi Lis site are of significantly scarcer occurrence, or their distinguishing by aerospace decoding materials is difficult (see Fig. 3). This is obvious. Structures of this type are indicated mainly by additional relief forms, such as: rectified sections of water divides, erosion-denudation bodies, sandy ranges, etc., which are often distinguished in the aerosurvey data by the anomalous (lighter) image phototone. Sometimes fractures change their characteristic along their stretching direction from strain to contraction zones, that is evident from the interaction of stresses and location of axes of regional and local stresses in each particular tectonic block formed by the disjunction system.

According to morphological assessments, the majority of fracture deformations studied in more detail are represented in plane by typical shift faults (proper shifts and transformed fractures) related with horizontal movements of rock masses. This follows from the analysis of an internal structure of zones represented by bands of shingling longitudinal separate chips, and their spatial relation. The latter is most prominently seen in the regions of intersection nodes of these dislocations.

At the Tovstyi Lis site right shears prevail (except for zones 4—4, 5—5, 7—7, the south-eastern part of zone 6—6 and the submeridional zone without number located to south-east from Tovstyi Lis village). Some elongated shear dislocations in their stretch direction change their movement sign to the

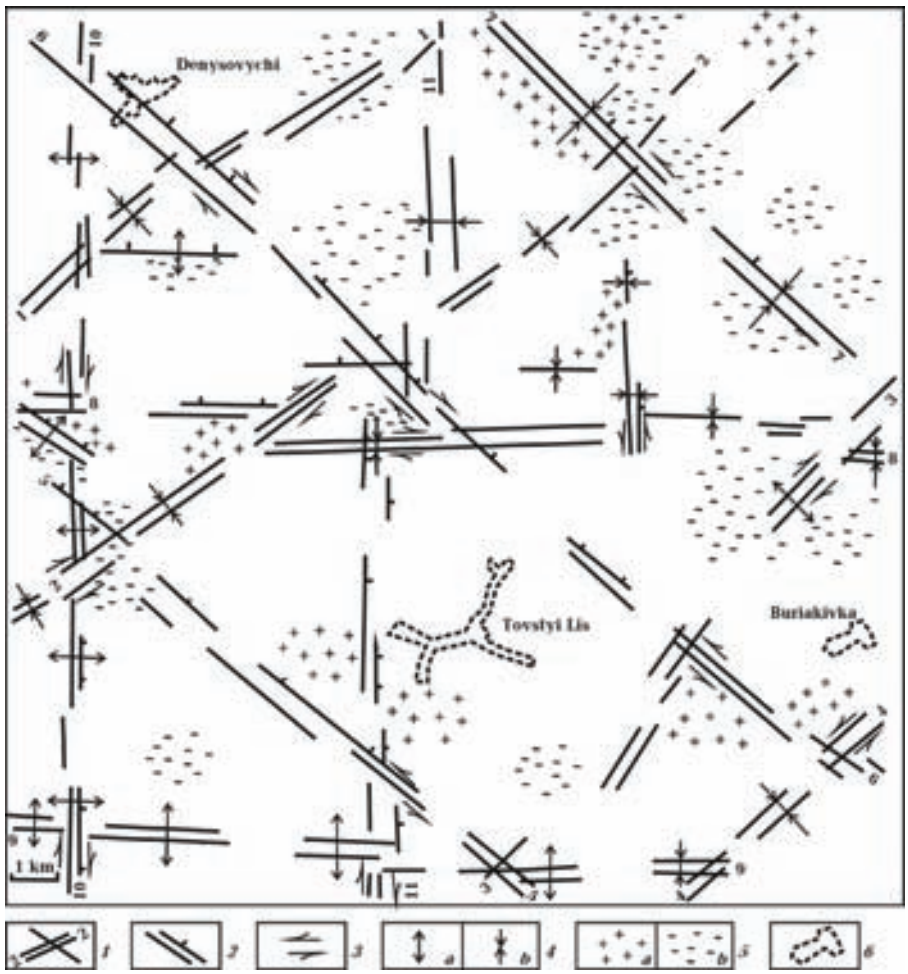


Fig. 3. Scheme of the fault-block structure of the Tovstyi Lis site with elements of the recent geodynamics (via results of remote sensing data decoding): *1* — lineaments and their zones depicting the fault-block framework of the crystalline basement and sedimentary cover; *2* — forecasted direction of descending of the disjunctive structures area; *3* — sections of revealed and forecasted fractures with the clearly distinguished shift component; *4* — forecasted linear zones of stretching (*a*) and contraction (*b*); *5* — local areas of stress (*a*) and strain (*b*) deformation development; *6* — settlement borders.

opposite (from left to right and vice versa). This is caused also by changing the active direction of shear stresses.

Hence, based on the tectonic-physical interpretation of available aerospace image decoding materials and geological-geophysical survey data, within the studied area the regularities of a systematic hierarchy of the fault-blocked structures are revealed. More detailed analysis of the distribution of different-directed deformations at the studied site enable to separate the local areas of predominant development of the strain and compression stresses which concentrate around the nodes of intersection of paragenetically related diagonal and orthogonal fractures (see Fig. 3).

Characteristic landscape elements of the local blocks areas subjected to compression forces are the positive relief forms (mainly water divides), increasing of the part of sandy litho-facies, etc. Characteristic for the areas of dominating development of the strain deformations are the negative relief forms manifesting in swamped areas, small lakes, reservoirs, homogeneously distributed microdepressions, suffusion forms, etc., determined by runoff-less character of surface waters. On the aerospace images they can be identified by presence of characteristic soil-geobotanic features manifesting themselves mainly by anomalous (darker) image phototone, as compared to neighboring areas.

Thus, considered aspects of RSD using are evidence of the high geologic unformativity of aerospace survey materials. Methodological techniques of RSD using can be employed efficiently for solving a whole number of the interiorusing problems.

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# Drake Passage: crustal structure, tectonic evolution and new prognosis for local HC accumulations along the Antarctic Peninsula margin


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New geological and geophysical data that have been obtained during last years for bottom structures of West Antarctica are of particular importance for evolution and geodynamics processes of this region understanding. The 2004 (9th) and 2006 (11th) Ukrainian Antarctic expeditions acquired new geo-