GNSS applications in monitoring the movements of the Earth's crust to assess the seismicity of south-eastern Kazakhstan

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An overview map of the location of stationary GPS monitoring points

Map of the distribution of earthquake epicenters over energy class 8.0 for the period 1885-2013 years. within the coordinates 42° N - 45° N and 75° E - 80° E
Level time-series changes in positions of points with daily increments, analysis of variance

Time series points Sele

Density function
The best sites will have values of 3-5 mm, and the worst 7-9 mm. Values between 10 and 15 mm indicate high but acceptable levels of noise.


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<thead>
<tr>
<th>point</th>
<th>precision</th>
<th>classification</th>
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<tbody>
<tr>
<td>SELE_IGS</td>
<td>0.80 mm/year</td>
<td>Best sites</td>
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<tr>
<td>ASTA</td>
<td>9.61 mm/year</td>
<td>Worst</td>
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<tr>
<td>ACT1_Local</td>
<td>13.5 mm/year</td>
<td>Noisy sites</td>
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Time series analysis of displacement (mm) of points CHUM, SELE, URUM
GPS Point - Turgen 2009-2013

Catalogue of velocities and the displacement components

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<th>ID</th>
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<th>Vz</th>
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<th>Δx</th>
<th>Δy</th>
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Table of characteristics: motion parameters of GPS for the period 2009-2013 soms-technological expansion
Defining trend movements of the earth surface of investigated region using data from global and local networks of GNSS stations for the 2000-2012
Vertical velocities of movement

Map fragment of seismotectonics the Northern Tien Shan
by A.V.Timush, T.V.Taradaeva
Interpolated data using global and local GNSS networks

Mapping zoning on the complex data using GIS software for south-eastern Kazakhstan
A calculation the stress-strain state of North Tien Shan region within the parameters of contemporary movements of the earth's surface as a result of GPS-observations.

Diagram of horizontal velocity of GPS-points in the coordinate system relative to the Eurasian continent.

Diagram of divergence of horizontal velocity of GPS-points relative to the Eurasian continent.
Geomechanical modeling

The distribution of the stress state parameters from the forces of its own weight (Pa) at a depth of 15 km from the sea level.

The three-dimensional mesh for the North Tien Shan region

Surface topography (m) and the movement of the earth's surface
The intensity distribution of tangential stresses at the level of 10-15 km
Distribution of shear stress intensity and Lode-Nadai parameter

Shear stress intensity (Pa), layer 10-15 km

Lode-Nadai parameter, layer 10-15 km
Thanks for attention!