



Seismic analyze of satellite image and tomographic model: an example of the Nagano fault zone

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The Nagano fault area that appeared after the 1984 Western Nagano earthquake (M6.8) is the distinctive example of the complex tectonics. The main shock has been determined as the fault of right lateral strike slip (JMA, 1986). However, the most part of huge number of earthquakes, which occurred after the main shock, had a reverse fault type (Ito et al, 2001). The goal of our study is to analyze details that observable in the satellite image, to compare them with the high resolved tomography result and find an evidence of the fault type. We have used maps that constructed from photos of the NASA satellites launched during 2001-2010 years. The decoding revealed sub-latitudinal fault. Mega joints along this fault are well determined by small rectilinear elements of relief. They can be interpreted as off shooting fractures that appeared as result of right-shear displacement along the main fault. The shear displacement has been determined by using of the structural-geomorphologic method that has been introduced by Sim, 1991 and developed by Sim&Sergeev, 1996. Mutual orientation of mega joints and their location with respect to the main fault plane clearly showed that the relief detects the evidence of the right-shear displacement. Next, we have compared the satellite data and seismic tomography images that have been constructed applying the differentiated approach by Smaglichenko T. et. al., 2011. The analyzing of seismic velocity distribution revealed high velocities in the southern wing of the fault plane mainly in deep layers (from 0.9 till 4.2 km of depth). This can be explained by the presence of vertical component of displacement. Namely, the southern wing dropped and this led to compaction of rock fragments and consequently to the increasing of velocity there. The increasing of density of micro-earthquakes in the southern wing has to be in favor of this version. The satellite image also shows us that the southern wing is omitted. Hence the kinematic type of displacement can be interpreted as right lateral type of strike slip. However at the same time we should notice that the tomographic image of surface contains elements, which are not in contradiction with reverse fault type.