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T1.5-04. Macroseismic Effects of Recently Strong Earthquakes in Uzbekistan

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GEOLOGIC-TECTONIC PECULIARITY OF THE WESTERN TIAN-SHAN REGION.

- **The main regional tectonics structures:** a) Fergana Valley; b) South-Fergana fault; c) North-Fergana fault; d) South and North Fergana flexure-rupture zones; e) Karjantau faults System; f) Western Tian-Shan fault.

1) Right lateral movements of Talas -Fergana transform fault
2) Sub-meridional shortening of Tien-Shan Earth crust (planet’s range).
3) Rotating Fergana Valley with move counter-clockwise (regional range).
4) Forming and modern activity flexure-rupture zones in (regional range).
5) Involving Turan Shan system (Turan Plateau to mountains forming by side Tien-
Fig.1. Map of main faults on Central Asia territory. Part Uzbekistan
Fig.1. Geologic map of the territory Uzbekistan (Edit. Tulyaganov Kh.T., 1980)
Fig. 2. Map of active faults and epicenters of earthquakes in Central Asia on period 2000 B.C. to 2009 (by Usmanova M.T., Nurmatov U.A. et.al., 2011)
Short Seismic History of Strong Events in Uzbekistan in 2011-2015 Years

On the last 4 years on Uzbekistan territory were occurred next strong earthquakes: Kan, 2011, M=6.3; Tuyabuguz, 2013, M=5.6; Marjanbulak, 2013, M=6.2.

All epicenters these earthquakes were located near settlements where frequently densely populated. For research purposes and in order to estimate a damage caused by an earthquake, we are facing a challenge of precise mapping of main shocks epicenters and their aftershock zones. To achieve this goal, we use all available seismological data our IS Uzb. also data of IDC CTBTO including data from Kazakhstan NDC (KNDC).
Kan earthquake, 2011, $M=6.3$

- Destructive Kan earthquake, 2011, was occurred between South-Fergana fault zone and the same name flexure-rupture zone, Fergana province.

- On instrumental data of Institute Seismology AS Uzbekistan parameters of this earthquake: $\varphi_0=40^0,16$ N, $\lambda_0=71^0,42$ E, $H=18$ km, $M=6.3$, $I=8$ balls (MSK-64).
Fig.3. Draft macroseismic map of Kan earthquakes, 20 July 2011, $M=6.3$, $H=18$ km, $I=8$ balls (MSK-64), (Usmanova M.T., Djuraev A., Ziyaudinov F.F. et. all, 2011)
Fig. 4. Macroseismic map of Kan earthquakes, 20 July 2011, M=6.3, H=18 km, I=8 balls (MSK-64), (Nurmatov U.A., Usmanova M.T., 2011)
Fig. 5. South-Fergana flexure-rupture zone.
(Usmanova M.T., 2011)
Fig. 6. South-Fergana flexure-rupture zone. (Usmanova M.T., 2011)
Fig. 7. Macroseismic map of Isfara-Batkent earthquake, 31 January 1977, M=6.3, H=25 km, I=8 balls (MSK-64), φ=40.05° N  λ=70.52° E  
(Kasimov S.M., Djuraev A., et. all, 1981, Uzb.ver.)
Fig. 8. Macroseismic map of Isfara-Batkent earthquake, 31 January 1977, M=6.3, H=25 km, I=8 balls (MSK-64), (Mirzabaev X.M., Djuraev R.U., Shvarts A.V., 1981, Taj.ver.)
Strong Tuyabuguz earthquake, 2013, M=5.6 was occurred between Angren and Nurekata faults zone (one part of Karjantau faults System), Tashkent province.

On instrumental data of Institute Seismology AS Uzbekistan parameters of this earthquake: $\varphi_0 = 40.85$ N, $\lambda_0 = 69.17$ E, $H=15$ km, $M=5.6$, $I=7$ balls (MSK-64).
Fig. 9. Macroseismic map of Tuyabuguz earthquakes, 2013, M=5.6, H=15 km, I=7 balls (MSK-64), (Djuraev A., Usmanova M.T., et. all, 2013)
Marjanbulak, 2013, $M=6.2$.

- **Destructive Marjanbulak earthquake, 2013, $M=6.2$.** was occurred in North-Kuldjuktau-Turkestan-faults zone (one part of Western Tien-Shan fault), **Djizakh province**.

- **On instrumental data of Institute Seismology AS Uzbekistan parameters of this earthquake:**
  \[ \varphi_0 = 39,20 \text{ N}, \lambda_0 = 67,40 \text{ E}, H=15 \text{ km}, M=6.2, \]
  \[ I=8 \text{ balls (MSK-64)}. \]

- **Morphology in focal of earthquake motion upthrust-displacement**.
Fig.10. Macroseismic map of Marjanbulak earthquakes, 25 May 2013, M=5.6, H=15 km, I=7 balls (MSK-64), φ=N λ=E (Usmanova M.T., Djuraev A., et. all, 2013)
Fig. 11. Map of seismogenic zones Marjanbulak earthquakes area, 2013 (Nurmatov U.A., Usmanova M.T., et. all, 2014)
Fig. 12. Scheme of arrangement azimuths of compression and tension axis in earthquakes sources with $M \geq 3.8$ on Uzbekistan territory (Bezrodnii E.M., Tuychiev M.A., 1988)
Fig. 13. Scheme of arrangement azimuths of compression and tension axis in sources earthquakes A) $M=5.0$, B) $M=6.0-6.5$ on Central and Western Tien-Shan territory (Kalmeteva Z.A., 2005)
CONCLUSION

- Isoseismals of macroseismic fields of strong earthquakes with $M \geq 6.0$ of Western Tien-Shan region: Isfara-Batkent, 1977, $M=6.4$; Kan, 2011, $M=6.3$; Marjanbulak, 2013, $M=6.2$ are correspondence the main directions of moving India lithosphere plate on North, North-West.

- These earthquakes reflected geodynamics regime and are evidence shortening Earth crust with involved Western Uzbekistan territory to mountains process in accompaniment high seismicity on Western Tien-Shan region.

- In cases strong earthquakes in Uzbekistan data of IDC CTBTO and data from Kazakhstan NDC (KNDC) are useful and value.
THANK YOU FOR ATTENTION!