

## Induced seismicity in coal and iron ore regions of Kuzbass

© 2020 A.F. Emanov<sup>1</sup>, A.A. Emanov<sup>1,2</sup>, A.V. Fateev<sup>1,2</sup>, E.V. Shevkunova<sup>1</sup>, V.G. Podkorytova<sup>1</sup>, O.V. Kuprish<sup>1</sup>

<sup>1</sup>ASB GS RAS, Novosibirsk, Russia; <sup>2</sup>IPGG SB RAS, Novosibirsk, Russia

**Abstract** According to the results of seismicity monitoring in the Kemerovo region, seismic activations are studied near coal enterprises and iron ore mines. Spatial-temporal variability of induced seismicity in Kuzbass is shown. It has been established that the strongest subsoil activations in the area of mining occur as short-term activations lasting 1-2 months and repeated several times in one to two years. The following similar activations are already taking place at other objects. Induced seismicity in Mountains Shoria is considered. The effect of partial synchronization of the development of seismicity was discovered at the mines of Kazsky, Sheregeshsky, Tashtagolsky, located one hundred kilometers apart.

**Keywords** Seismology, induced seismicity, Kuzbass, Mountain Shoria, mining camp, mines.

**For citation** Emanov, A.F., Emanov, A.A., Fateev, A.V., Shevkunova, E.V., Podkorytova, V.G., & Kuprish, O.V. (2020). [Induced seismicity in coal and iron ore regions of Kuzbass]. *Rossiiskii seismologicheskii zhurnal* [Russian Journal of Seismology], 2(3), 88-96. (In Russ.). DOI: <https://doi.org/10.35540/2686-7907.2020.3.08>

### References

- Adushkin, V.V. (2015). [Kuzbass trigger seismicity]. In *Triggernye jeffekty v geosistemah. Materialy III Vserossijskogo seminar-soveshhanija* [Materials of the All-Russian seminar-meeting "Trigger effects in geosystems"] (pp. 8-28). Moscow, Russia: GEOS Publ. (In Russ.).
- Dergachev, A.A., & Filina, A.G. (1990). [Detailed seismological observations in the epicentral zone of the Tashtagol earthquake 02/05/1988]. In *Issledovanija po sozdaniyu nauchnyh osnov prognoza zemletrjasenij v Sibiri. Vyp. 4 / Otv. za vypusk N.V. Solonenko* [Research on the creation of the scientific basis for the prediction of earthquakes in Siberia. Responsible for the release N.V. Solonenko] (pp. 37-42). Irkutsk, Russia: IEC SB RAS Publ. (In Russ.).
- Emanov, A.A., Emanov, A.F., Fateev, A.V., & Leskova, E.V. (2017). Simultaneous impact of opencast and underground coal mining on the Earth's crust and induced seismicity. *Problems of Engineering Seismology*, 44(4), 51-62.
- Emanov, A.F., Emanov, A.A., & Fateev, A.V. [Bachatsky induced earthquake on June 18, 2013, ML=6.1, I<sub>0</sub>=7 (Kuzbass)]. *Rossiiskii seismologicheskii zhurnal* [Russian Journal of Seismology], 2(1), 48-61. (In Russ.).
- Emanov, A.F., Emanov, A.A., Fateev, A.V., & Leskova, E.V. (2016). The technogenic ML=6.1 Bachatsky earthquake of 18 June 2013 in Kuzbass: The world strongest event during mining operations. *Problems of Engineering Seismology*, 43(4), 34-60.
- Emanov, A.F., Emanov, A.A., Fateev, A.V., Leskova, E.V., Korabelschikov, D.G., & Durachenko, A.V. (2015). [Kuzbass induced seismicity monitoring system and trigger effects in the development of the seismic process]. In *Triggernye jeffekty v geosistemah. Materialy III Vserossijskogo seminar-soveshhanija* [Materials of the All-Russian seminar-meeting "Trigger effects in geosystems"] (pp. 190-199). Moscow, Russia: GEOS Publ. (In Russ.).
- Emanov, A.F., Emanov, A.A., Fateev, A.V., Leskova, E.V., Seleznev, V.S., Manushina, O.A., Smoglyuk, A.S., & Shevkunova, E.V. (2012). [Technogenic seismicity of the Raspadskaya mine]. In *Zemletrjaseniia Rossii v 2010 godu* [The earthquakes of Russia in 2010] (pp. 90-95). Obninsk, Russia: GS RAS Publ. (In Russ.).
- Emanov, A.F., Emanov, A.A., Fateev, A.V., Podkorytova, V.G., & Shevkunova, E.V. (2019). [Altai and Sayan mountains]. *Zemletriaseniia Severnoi Evrazii* [Earthquakes in Northern Eurasia], 22(2013), 139-149. (In Russ.). doi: 10.35540/1818-6254.2019.22.12.
- Emanov, A.F., Emanov, A.A., Fateev, A.V., Shevkunova, E.V., Vorona, U.Yu., & Seryozhnikov, N.A. (2018). [The seismic effect of industrial explosions and the basic laws of the formation and development of seismicity around mines and sections of the Kuzbass]. *Vestnik Nauchnogo centra VostNII po promyshlennoj i jekologicheskoi bezopasnosti* [Bulletin of the Scientific Center of VostNII industrial and environmental safety], 3, 57-72. (In Russ.).
- Novikov, I.S., Cherkas, O.V., Mamedov, G.M., Simonov, Yu.G., Simonova, T.Yu., & Nastavko, V.G.

(2013). Activity stages and tectonic division in the Kuznetsk Basin, Southern Siberia. *Russian Geology and Geophysics*, 54(3), 324-334.

Oparin, V.N., Sashurin, A.D., Kulakov, G.I., Leon-tiev, A.V., et al. (2008). *Sovremennaja geodinamika massiva gornyh porod verhnej chasti litosfery: istoki*

*parametry, vozdejstvie na ob'ekty nedropol'zovanija* [Modern geodynamics of the rock mass of the upper part of the lithosphere: sources of parameters, impact on subsoil use objects]. Novosibirsk, Russia: SB RAS Publ., 449 p. (In Russ.).

#### Information about authors

**Emanov Aleksandr Fedorovich**, Dr., Director of the Altai-Sayan Branch of the Geophysical Survey of the Russian Academy of Sciences (ASB GS RAS), Novosibirsk, Russia. E-mail: emanov@gs.nsc.ru

**Emanov Aleksey Aleksandrovich**, PhD, Deputy Director of the ASB GS RAS, Novosibirsk, Russia; Senior Researcher of the Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of the Russian Academy of Sciences (IPGG SB RAS), Novosibirsk, Russia. E-mail: alex@gs.nsc.ru

**Fateev Aleksandr Vladimirovich**, Senior Researcher of the ASB GS RAS, Novosibirsk, Russia; Lead Engineer of the IPGG SB RAS, Novosibirsk, Russia. E-mail: fateev@gs.nsc.ru

**Shevkunova Elena Victorovna**, Researcher of the ASB GS RAS, Novosibirsk, Russia. E-mail: elenash@gs.nsc.ru

**Podkorytova Valentina Grigor'yevna**, Researcher of the ASB GS RAS, Novosibirsk, Russia. E-mail: podk@gs.nsc.ru

**Kuprish Oksana Vital'yevna**, Junior Researcher of the ASB GS RAS, Novosibirsk, Russia. E-mail: kuprish@gs.nsc.ru