



1 Does deep CO₂ Discharge listen to distant and local Earthquakes?

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Numerous observations worldwide show reaction of crustal fluids to earthquake activity. These include both preseismic, coseismic and postseismic anomalies in groundwater level and amount of ascending gases. Monitoring of CO₂ discharge may thus help identify changes of stress state in the crust. We are using the data obtained in swarm earthquake region of West Bohemia/Vogtland (central Europe) during the six years of monitoring of deep-CO₂ ascent to confirm the existence and statistical significance of these effects. More than 100 bursts of CO₂ pressure were identified in the records obtained at the Kyselecký Hamr borehole. Because the expected mechanism of reaction of CO₂ discharge differs for local and distant earthquakes, we analyze these effects separately. We measured the time delay between the occurrence times of the CO₂ bursts with the origin times of local earthquakes and with the times of the passage of seismic waves from distant earthquakes. For this purpose we are using the catalog of the local earthquake swarm activity and the bulletin of maximum amplitudes of seismic waves generated by earthquakes at regional and teleseismic distances measured at the nearby seismic station NKC. We compared the distribution of the time delays between the CO₂ anomaly and the seismic data with the random distribution of time delays. We found an increased occurrence of CO₂ anomalies at about 12 hours after the passage of seismic waves from distant earthquakes. In contrast, the analysis of the effect of local earthquakes showed a minimum occurrence of CO₂ anomalies in the period between three days before and two days after the origin time of the local earthquakes. The Kolmogorov-Smirnov test indicated a high significance level of the

possible effect of local earthquakes. These results point to a different mechanism of the effect of stress accumulation and release close to the focal zone of an earthquake and of the stress transients caused by the passage of seismic waves.