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Carbon-dioxide flow measurement in geodynamically active area of West Bohemia

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Geodynamically active area of West Bohemia is interesting not only due to its earthquake swarms occurrence but also due to degassing flux of magmatic origin occurring in natural moffettes and mineral springs. While monitoring of earthquakes is done by a standard local seismic network, monitoring of amount of CO_2 is at its initial stage. Despite lack of data, the 2014 earthquake swarm showed also very interesting increase in CO_2 flow. This correlation with seismicity motivated us to develop robust and reliable methods of CO_2 flow measurement, which would be sufficient to create denser monitoring network. Standard usage of gas-flowmeter for the purpose of gas flow measurement is dependent on the weather and device conditions, which makes the measurement instable in time and unreliable. Although gas-flowmeter is also accompanied with measurement of the gas pressure in the well to check flow rate value, reliability of this method is still low. This problematic behavior of the flow measurement was the reason to test new methods to measure CO_2 amount – the first is based on measuring the density water with bubbles in the well by differential pressure gauge. The second one utilizes electric conductivity measurement to determine the density of bubbles in the water-gas mixture. Advantage of these methods is that their probes are directly in the well or moffette, where the concentration is measured. This approach is free of the influence of moving parts and assures the independence of measurements of environmental conditions. In this paper we show examples of obtained data series from selected sites and compare the trend of the curves, the mutual relations of the measured quantities and the influence of environmental conditions.