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# Increasing Safety and Efficiency of Deep Geothermal Wells with Fiber Optics

Deep geothermal boreholes require robust monitoring of extreme downhole conditions to ensure safe and efficient production. Conventional tools provide only snapshots in time and space, creating an information gap, while fiber optic sensing offers continuous data collection without well intervention. At the Geothermal Site Schäftlarnstraße in Munich, Germany, the fiber optic infrastructure enabled monitoring of primary cementing by tracking different fluid interfaces, allowing for the assessment of displacement efficiency. Furthermore, it can facilitate the profiling of the fluid intake contributions from the deep geothermal injector, down to very low velocities. This work demonstrates how fiber optic sensing can support achieving well integrity and sustainable geothermal reservoir management.

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