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Seismic time reversal experiment in the Low Noise Underground Laboratory, LSBB (France)

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Since the decommission of the underground launching control room of the ground-based component of the French nuclear missile system in 1997, the whole installation has been turned into a cross-disciplinary underground laboratory. The LSBB (http://lsbb.unice.fr) is a unique low-noise underground laboratory because of its initial military conception and its location in the regional park of Luberon (South of France) far from large cities, industry and heavy traffic. The whole tunnel, 3.5 km long, the deepest point being 500 m below the surface, is drived inside the unsaturated Lower Cretaceous limestones of the Fontaine-de-Vaucluse karst. The massif surrounding the tunnel is affected by vertical faults, karstic structures and several temporary water springs that re-appear inside of the galleries.

Taking advantage of the tunnel topology, a seismic time – reversal experiment has been processed in 2004. Two sets of 50 receivers (50 Hz geophones) were distributed in two horizontal and parallel galleries 100 m apart to each other. The source used was a 4 kg sledgehammer applied between each sensor with a separation interval of 1 m. Preliminary data analysis shows that the seismic energy can be re-focused to the shot points and that heterogeneous areas inside of the surrounding karstic massif can be identified in the coda recorded.