



VSP modeling and imaging for cable-free nodal system

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Land nodal seismic acquisition system uses receivers which are stand-alone without connecting each other. This is a proper recording system for varied geography since it is easy to deploy than conventional acquisition system. Especially, when a survey profile traverses rivers or roads in the mountains, forest, swamp, and urban area, we can acquire seismic data with keeping the survey line. In this study, we applied the cable-free nodal system to seismic exploration for designing a long tunnel. The field site is located in a mountain area with crossing two roads. For determining the acquisition parameters, VSP (vertical seismic profile) modeling was conducted with a topographic velocity model. When we had acquired field data using the nodal system, the sources were in the two boreholes. The interval is 10 m from 230 m of depth (bottom of the borehole) to 30 m of depth (top of the borehole). The receivers were set up on the surface with 40 m distance. 17 shot gathers had acquired from the first borehole and 21 shot gathers from the 2nd borehole. The total number of nodes is 71. For the imaging, we applied prestack reverse time migration (RTM) after basic preprocessing. The velocity model for RTM was calculated by a seismic tomography. If we have a correct velocity model and shot gathers with high signal to noise ratio, we can get the better subsurface image. From the field survey, the cable-free nodal system shows easy deployment of the receivers and acquisition without stopping the survey line when the profile traverse in the mountain area.