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Optical ages and ground penetrating radar of the sand dunes along the Kankakee River Valley, Midwest USA

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Sand dunes and sand sheets are located along the south side of Kankakee River Valley in Illinois and Indiana, USA, which overlie glaciofluvial outwash, glacial lake sediments and bedrock of Middle Paleozoic shales and carbonates. Dunes are prominent feature of the landscape, and most dunes are 15 to 25 feet high, and some reach 50 feet. Due to the lack of natural exposure and roadcuts, three dunes were sampled by hand augering for OSL (optically stimulated luminescence) dating. Ground penetrating radar (GPR) surveys were conducted for better understanding of the local stratigraphy at the sites of hand augering. Three OSL ages indicate most dune construction occurred during the Younger Dryas chronozone (11.5-12.8 ka). The large error bars of the OSL ages (usually 5-10%, about 900-1200 yrs) usually do not allow for determination of specific climatic events, but multiple ages from multiple sites of these dunes all fall into the range of Younger Dryas. Combined ages using OxCal program reveal that the statistical average of the three is 12.21+/-0.56 ka. Three uppermost ages (<1.3 m in depth) are Holocene. These Holocene OSL ages can be explained by dry climate during Holocene to activate the dunes , but more likely they are attributed to resetting of luminescence signals through near-surface bioturbations in sand. These changes of the ages above and below the Younger Dryas chronozone are consistent with GPR image and lithology changes observed in the field.