DOSE-RATE ANALYSIS COUPLED WITH HIGH-RESOLUTION SEDIMENTOLOGICAL DATA FOR OSL DATING: THE CASE OF A DUNE SUCCESSION IN LENÇÓIS MARANHENSES (NE BRAZIL)

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Coastal dunes in Brazil formed in the Late Pleistocene in conditions of changing sea-level and climate. Largely, they consist of quartz grains with high luminescence signals, making them ideal for OSL equivalent dose calculation. However, the determination of the dose rate may be challenging due to unusually low sediment dose rates and a proportionally higher cosmic dose rate. Hence modeling timing of vertical accretion and the history of each sample's burial depth over time may help better evaluate the cosmic dose rate and provide more reliable OSL ages. Data from a high-resolution sedimentological and geochronological sampling on a 15m thick stabilized dune succession, adjacent to the active dune field of Lençóis Maranhenses (NE Brazil) were analyzed. Samples for OSL-SAR dating and heavy mineral analysis were collected at intervals of 1m (14 samples). Samples for grain-size, magnetic susceptibility, reflectance and geochemical analyses were collected at 5cm intervals (268 samples). The mineralogical framework throughout the outcrop consists of over 98% of quartz and less than 2% in heavy minerals. OSL quartz grain samples showed good dose recovery results with calculated/given dose between 1.13 and 0.97. All samples comprise bright quartz grains with an OSL signal dominated by fast component and recycling ratio from 0.97 to 1.04. Radionuclides activities were determined using an HPGe detector in an ultralow background shield. Dose rates calculated by 40K and Th-U decay chains show prominently low values, from 0.25-0.63 Gy/ka (avg. 0.42 Gy/ka) and derive primarily from contributions of the Th-U series possibly linked to high radionuclide content from zircon and other heavy minerals. Grain-size statistical analysis coupled with the other sedimentological proxies helped elucidate the timing of variation in the thickness of the overburden and thus model the depth of burial used for cosmic dose rate calculations (values from 0.11-0.16, avg. 0.14 Gy/ka).