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The Characteristics and triggering Factors of the October 2013 Obudu International Tourist Centre catastrophic Landslide South-East Nigeria

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The October 2013 catastrophic landslides at the Obudu international tourist zone south-east Nigeria destroyed resources worth several millions of dollars and trapped international tourist who were later rescued by a helicopter. Intense rainfall caused several slope failures on the steep slopes of the hills. These landslides occurred after several days of heavy rain (> 600 mm) and were the first reported slope failures in this region. The failures were on a predominantly metamorphic terrain and only on slopes adjacent to the main road. They occurred as slides, not debris flow, but produced a wide range of casualties. The failures were of residual materials (about 1 m thick) obtained from weathering of schist. One of the landslides involved the movement of about 70,000 m3 debris for 8.6 m with depth of slip surface of 6 m. Another, which produced the most fatality initiated on a slope greater than 40o and displaced about 77, 000 m3. It had a runout length of 60 m, width of 98 m, depth to slip surface of 8 m and depositional area of about 2,500 m2. Had the opposite slope bounding the other side of the road not hindered the movement of debris, the runout distance could have been larger. The research found that all the landslides occurred on slope-portions composed of schist rather than gneiss or granite. Slip surfaces developed within the regolith and the shear zone was characterized by the presence of silty materials supported by clayey matrix. Field observations indicated that the failures generally developed as localized translational slides within the semi-consolidated, cohesive soil units (with high plasticity and low strength) within the upper to middle weathered zone of the schist. The increase in pore pressure arising from elevated water table during rainfall created instability by weakening the shear strength along the failure plane. However, differences in permeability favored the formation of perched water table which eventually triggered sliding.