



## Evaluation performance of photovoltaic modules after a long time operation in Saharan environment

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Résumé en anglais	<p>Reliability and lifetime of photovoltaic (PV) systems depend mainly on the energy performance of modules and on their different degradation modes. Accordingly, research must be focused on degradations of PV modules. This paper presents the results of investigations carried out on the degradation mechanisms of PV modules of the Melouka central in the area of Adrar in Algeria after 28 years of exposure in the Saharan environment. Main degradation modes are observed through visual inspection of PV modules: discoloration of encapsulant, broken and abrasion of glass, delamination, discoloration and hot spot of cells, oxidation of front grid fingers and thermal shocks. The current-voltage (I-V) characteristics are acquired with outdoor measurements in the site. The experimental results permit to detect both hot spots and thermal shocks which are the most detrimental total defects visually observable in the site, and to quantify the reduction of electrical performance data correlated with visual degradation data. A maximum power (<math>P_{max}</math>) degradation rate of 1.22%/year is found which is closely related to short-circuit current (<math>I_{sc}</math>) of 0.78 %/year, followed by fill factor (FF) of 0.57%/year and finally short-circuit voltage (<math>V_{oc}</math>) of 0.1%/year. Akin results are reported in literature for PV modules exploited under desert climate for long duration.</p>
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