# Understanding solar resource variability: An in-depth analysis, using Chile as a case of study

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## Abstract

Short-term solar radiation variability is a key parameter to understand the solar resource, as it is concerned with describing the dynamic characteristics of irradiance, that have significant transient effects in solar system performance. Worldwide installed solar capacity is consistently increasing and it can considerably affect the dynamics of electric systems. An understanding of resource dynamics and how it affects power forecasts will become paramount for appropriate handling of the solar resource. Chile showcases this scenario, as solar installed capacity is close to 10% of the nationwide total and energy curtailment is occurring mainly due to transmission restrictions. Although several metrics are available in the literature to assess solar resource variability, consensus needs to be stablished, as well as a common framework to evaluate results obtained through the different metrics. This work analyses 1-min resolution data for several years at eight locations in Chile to assess short-term solar radiation variability using 6 well-stablished metrics, compares the information provided by each one and develops correlations to compare results among them. Additionally, high-speed transient phenomena are analyzed and a new metric is defined to assess the solar resource with respect to its quality in static and dynamic terms. Finally, four day classification schemes are developed and evaluated, and results for Chile are shown in the context of its geography and climatological classification.