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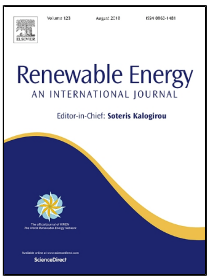

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Prediction intervals for global solar irradiation forecasting using regression trees methods

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Abstract.

A global horizontal irradiation prediction (from 1 hour to 6 hours) is performed using 2 persistence models (simple and "smart" ones) and 4 machine learning tools belonging to the regression trees methods family (normal, pruned, boosted and bagged). A prediction band is associated to each forecast using methodologies based on: bootstrap sampling and k-fold approach, mutual information, stationary time series process with clear sky model, quantiles estimation and cumulative distribution function. New reliability indexes (gamma index and gamma test) are built from the mean interval length (*MIL*) and prediction interval coverage probability (*PCIP*). With such methods and error metrics, good prediction bands are estimated for Ajaccio (France) with a *MIL* close to 113 Wh/m², a *PCIP* reaching 70% and a gamma index lower than 0.9.

Keywords: probabilistic forecasts, bagging, boosting, pruning, mean interval length, prediction interval coverage probability

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