



THE UNIVERSITY OF
CHICAGO

Department of Statistics

MASTER'S THESIS PRESENTATION

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A Nonstationary Gaussian Process Model for Forecasting Solar Irradiance at Earth's Surface

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ABSTRACT

Solar power is on the rise, making solar irradiance forecasting essential for ensuring future power grid stability. To forecast solar irradiance, this work proposes a nonstationary Gaussian process model to capture the advection of atmospheric features that affect irradiance. The forecast performs within the range of recent studies, achieving an average RMSE around 100 W/m^2 and predicting the total observed solar irradiance over the patch of interest with 3% error at the one-hour horizon and 9% error at the four-hour horizon. The forecast also outperforms a common baseline forecast (persistence) a majority of the time with a typical skill of 0.1-0.2. Further model developments are suggested.