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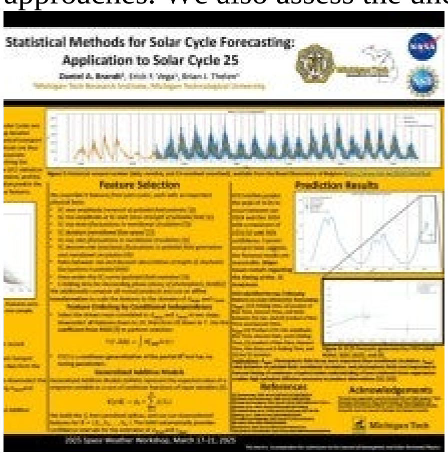
Prediction of the timing and amplitude of future Solar Cycle peaks remains a challenge due to various factors that include lack of sufficient historical data to make predictions of statistical significance and open questions regarding the most relevant features (and combinations thereof) that impact predictions; these questions derive from unresolved modeling issues regarding the physics of the solar atmosphere, such as the problem of unphysical transport coefficients being necessary to produce realistic outputs of solar dynamo models. Accurate prediction of the behavior of the future Solar Cycle provides critical information regarding anticipated solar activity that can significantly impact technologies on which society increasingly depends, but prediction techniques, even when entirely data-driven, ideally must incorporate known behavior and provide insight into the underlying physics of the system they are predicting. To address this need, we present a new statistical technique for Solar Cycle forecasting that involves the assembling of a large suite of physics-motivated Solar Cycle statistical features which are down-selected based on information content, with the result that the selected features are inputs to Generalized Additive Models that predict the behavior of future Solar Cycles as nonlinear functions of these features. The technique provides a statistical estimate of future Solar Cycle behavior, along with insights into how different processes represented by each feature impact future solar behavior. We validate our technique by comparing forecasted maximum amplitude and timing of the Solar Cycle 25 peak with other approaches. We also assess the uncertainty of our forecasts with those of companion techniques.


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