

## **Brief Communication: Forecasting extreme precipitation from atmospheric rivers in New Zealand**

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### **Reviewer Report**

The manuscript, entitled "Brief communication: Forecasting extreme precipitation from atmospheric rivers in New Zealand," examines the forecasting of extreme precipitation from atmospheric rivers in New Zealand. It focuses on the application of the European Centre for Medium-Range Weather Forecasts (ECMWF) Extreme Forecast Index (EFI) for two variables: total precipitation (TP-EFI) and vertically integrated water vapor transport (IVT-EFI). The results indicate that TP-EFI may offer a more accurate representation of extreme precipitation events than IVT-EFI, which is contrary to previous research in Europe. The study analyzes three recent significant extreme precipitation events in New Zealand, evaluating the effectiveness of the EFI in improving medium-term forecasting of these events.

The manuscript addresses an intriguing and, as it states, novel question. The three case studies are thoroughly analyzed, and the databases utilized are of high quality. Furthermore, the topic has a high social impact and the manuscript is well written. However, there are a number of relevant issues that prevent me from approving the manuscript for publication in its current form. These and other issues are detailed in the following paragraphs.

### **Major Comments**

1.- In my view, the most questionable aspect of the article is that it is based on the analysis of only three case studies. I understand that the article is intended as a brief communication, but the authors provide conclusions that seek to analyze the general behavior of the tools evaluated in the region of interest. I believe that with only three case studies, it is not possible to obtain generalized conclusions. Furthermore, the title is overly ambitious for the analysis that has been carried out. I do not expect the authors to perform a climatologically based analysis (although it would be a valuable addition to the study and I do not see any impediment for them to do so). However, if they persist in their idea of using only three case studies, this should be incorporated in the title and it should be made clear that it is a preliminary analysis that should be completed with a much larger database of cases.

2.- Additionally, the authors fail to address another pertinent question: how do they account for the discrepancies observed in previous European studies? It is acknowledged that the authors currently lack an explanation for this phenomenon. However, incorporating a number of potential hypotheses that could elucidate this behavior would be a valuable contribution.

### **Minor Comments**

**L43,44.-** Please confirm whether the result regarding prediction utility as a function of NAO phase is statistically significant.

**L112.-** Do the authors consider the scaling thresholds used by Ralph to categorize AR events to be appropriate for New Zealand? Other authors have had to adapt the thresholds of that scale, as it was shown that they were not the most appropriate for a region other than the American West Coast (see, for example, *European West Coast atmospheric rivers: A scale to characterize strength and impacts*). I am not saying that it is not, I am saying that it might be necessary to determine, based on the climatology, whether the thresholds are the most appropriate for the region.

**Figure 1:** Just out of curiosity, how have the authors made the front maps?