

Reviewer 1: **Accepted as is**

Reviewer 2: **Accepted subject to technical corrections**

I found the manuscript 'Bayesian analysis of early warning signals using a time-dependent model' by Myrvoll-Nilsen et al. to be an interesting read, especially as someone who uses these types of generic early warning signals often, and has to make decisions over the length of a window used to calculate them on. Furthermore, any method that can provide a sense of certainty through Bayesian statistics is building upon current techniques.

I realise I am seeing this manuscript for the first time after a round of revisions and after looking through the authors' responses I can see that the manuscript has been improved greatly. I only really have very minor suggestions which I have detailed below:

Generally: It is for sure a personal choice, but I would find 'autocorrelation parameter' rather than 'correlation parameter' throughout the manuscript to be easier to follow, particularly in the abstract.

Reply: We agree and will change the use of 'correlation parameter' to 'autocorrelation parameter' throughout the paper.

Generally: Don't forget to update the access dates, on the R package particularly.

Reply: These have been updated.

Figure 1: It might be worth making clear in the figure caption that for panel b, the red and black points are on top of each other in the part where you say they eventually collapse into each other. Also, here the 3rd from bottom line at the end should say 'The red line represents', the s is missing.

Reply: We will add a small comment to make it more clear that they are coinciding and we will address the missing 's'.

Figure 2: The start of the caption says 'n=500' but it is actually for n=500 and n=1000 for the figure overall so perhaps refer to these only for the specific panels later in the caption. It is worth noting that the outliers are shown as points too.

Reply: We have removed 'n=500' from the beginning of the caption, as suggested by the reviewer. We have also expanded the sentence describing outliers to mention that they are also included in the plot.

Section 4.2: Most likely as part of Figure 5, it would be good to know how many data points are used in the analysis for each event.

Reply: We appreciate this suggestion and we will add this to table 2.

Figure 5: Again personal choice but I would swap the top and bottom rows so the figure reads from earliest in the top left to latest in the bottom right, this may also mean reordering Figure 6.

Reply: We agree with this suggestion and have reordered both Figure 6 and Figure C1. We also removed the  $P(b>0)$  value from Figure 6 as it is also shown on Figure 7 where there is more space.

Line ~265: Is it possible to delve into how much agreement there is between the Rypdal and Boers results in Table 2? Clearly there is agreement with Event 2, and with Rypdal in Event 5 etc. There is a similar level of agreement with both papers, compared to the agreement the Rypdal and Boers papers have themselves. Without fully counting the instances myself, comparing these agreements across all 3 looks like it could show this method finds things that the other papers themselves disagree with on a number of occasions.

Reply: We added a comment about the agreements between these two studies and ours.

Line 375: Need an 's' on represents.

Reply: There appeared to already be an 's' on 'represents'.

Line 380: Need an 's' on depends.

Reply: Fixed.

Additional changes:

We also fixed a small error in Eq. (25), and capitalized some words.