## 4 Model checking

Several posterior predictive checks have been performed to assess how well the model describes the observed data. These tests take the form of comparing statistics evaluated on samples from the prior and posterior distributions for each additive component. The statistics are derived from autocorrelation function (ACF) estimates, periodograms and quantile-quantile (qq) plots.

Table 2 displays cumulative probability and $p$-value estimates for these quantities. Cumulative probabilities near 0/1 indicate that the test statistic was lower/higher under the posterior compared to the prior unexpectedly often i.e. they contain the same information as a $p$-value for a two-tailed test and they also express if the test statistic was higher or lower than expected. $p$-values near 0 indicate that the test statistic was larger in magnitude under the posterior compared to the prior unexpectedly often.

| | ACF | | Periodogram | | QQ | |
|---|---|---|---|---|---|---|
| # | min | min loc | max | max loc | max | min |
| 1 | 0.501 | 0.481 | 0.543 | 0.497 | 0.223 | 0.776 |
| 2 | 0.501 | 0.479 | 0.723 | 0.500 | 0.858 | 0.192 |
| 3 | 0.959 | 0.898 | 0.734 | 0.229 | 0.368 | 0.792 |
| 4 | 0.564 | 0.486 | 0.393 | 0.371 | 0.790 | 0.812 |
| 5 | 0.605 | 0.465 | 0.409 | 0.455 | 0.204 | 0.732 |
| 6 | 0.516 | 0.477 | 0.412 | 0.396 | 0.477 | 0.674 |
| 7 | 0.456 | 0.510 | 0.461 | 0.480 | 0.498 | 0.561 |
| 8 | 0.584 | 0.638 | 0.585 | 0.526 | 0.012 | 0.697 |

Table 2: Model checking statistics for each component. Cumulative probabilities for minimum of autocorrelation function (ACF) and its location. Cumulative probabilities for maximum of periodogram and its location. $p$-values for maximum and minimum deviations of QQ-plot from straight line.

The nature of any observed discrepancies is now described and plotted and hypotheses are given for the patterns in the data that may not be captured by the model.