1 Executive summary

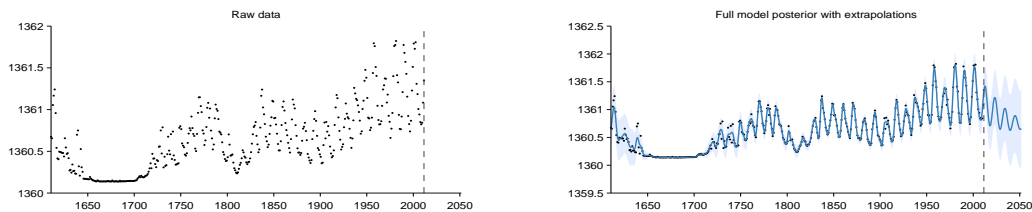The raw data and full model posterior with extrapolations are shown in figure 1.

Figure 1: Raw data (left) and model posterior with extrapolation (right)

The structure search algorithm has identified eight additive components in the data. The first 4 additive components explain 92.3% of the variation in the data as shown by the coefficient of determination (R^2) values in table 1. The first 6 additive components explain 99.7% of the variation in the data. After the first 5 components the cross validated mean absolute error (MAE) does not decrease by more than 0.1%. This suggests that subsequent terms are modelling very short term trends, uncorrelated noise or are artefacts of the model or search procedure. Short summaries of the additive components are as follows:

- A constant.

- A constant. This function applies from 1643 until 1716.

- A smooth function. This function applies until 1643 and from 1716 onwards.

- An approximately periodic function with a period of 10.8 years. This function applies until 1643 and from 1716 onwards.

- A rapidly varying smooth function. This function applies until 1643 and from 1716 onwards.

- Uncorrelated noise with standard deviation increasing linearly away from 1837. This function applies until 1643 and from 1716 onwards.

- Uncorrelated noise with standard deviation increasing linearly away from 1952. This function applies until 1643 and from 1716 onwards.

- Uncorrelated noise. This function applies from 1643 until 1716.