# Parameters in ensemble predictions

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# Description of ensemble forecasts

How are ensemble forecasts made?

1. Different point predictions collected
2. Fraction of point predictions predicting event calculated
3. Fraction used as probabilistic forecast for event

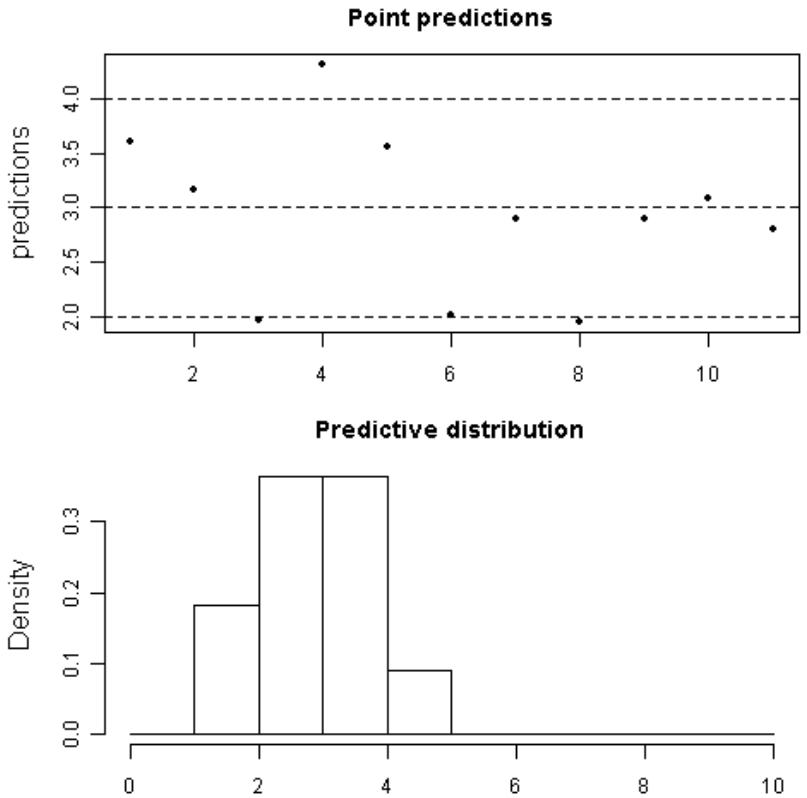



Figure: Generation of predictive distribution from point predictions.

# Limitations of ensembles

- Finite precision forecast
- Precision dependent on number of point predictions
- More point predictions better
- Computational power

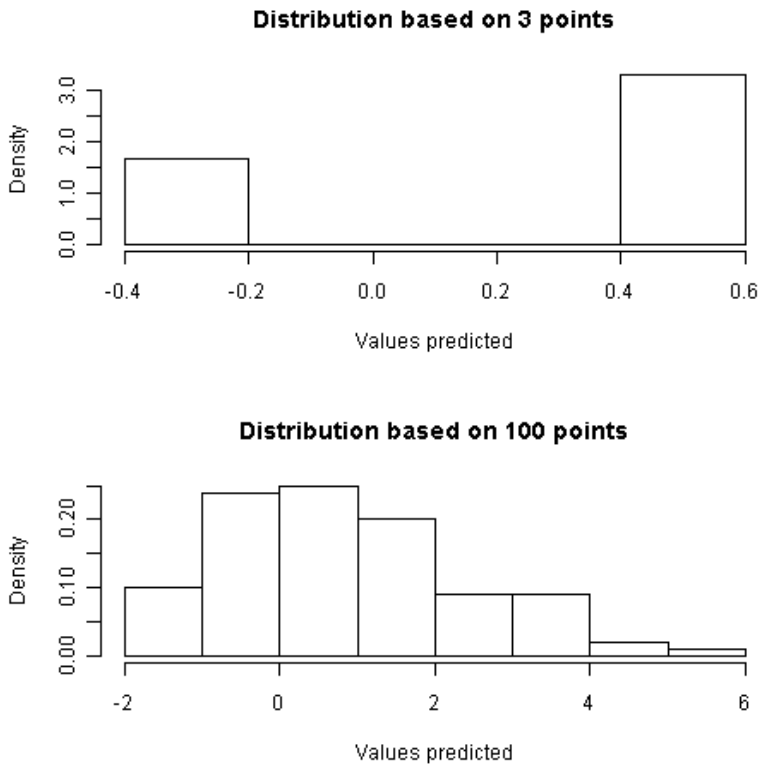



Figure: More point predictions give better predictive distributions.

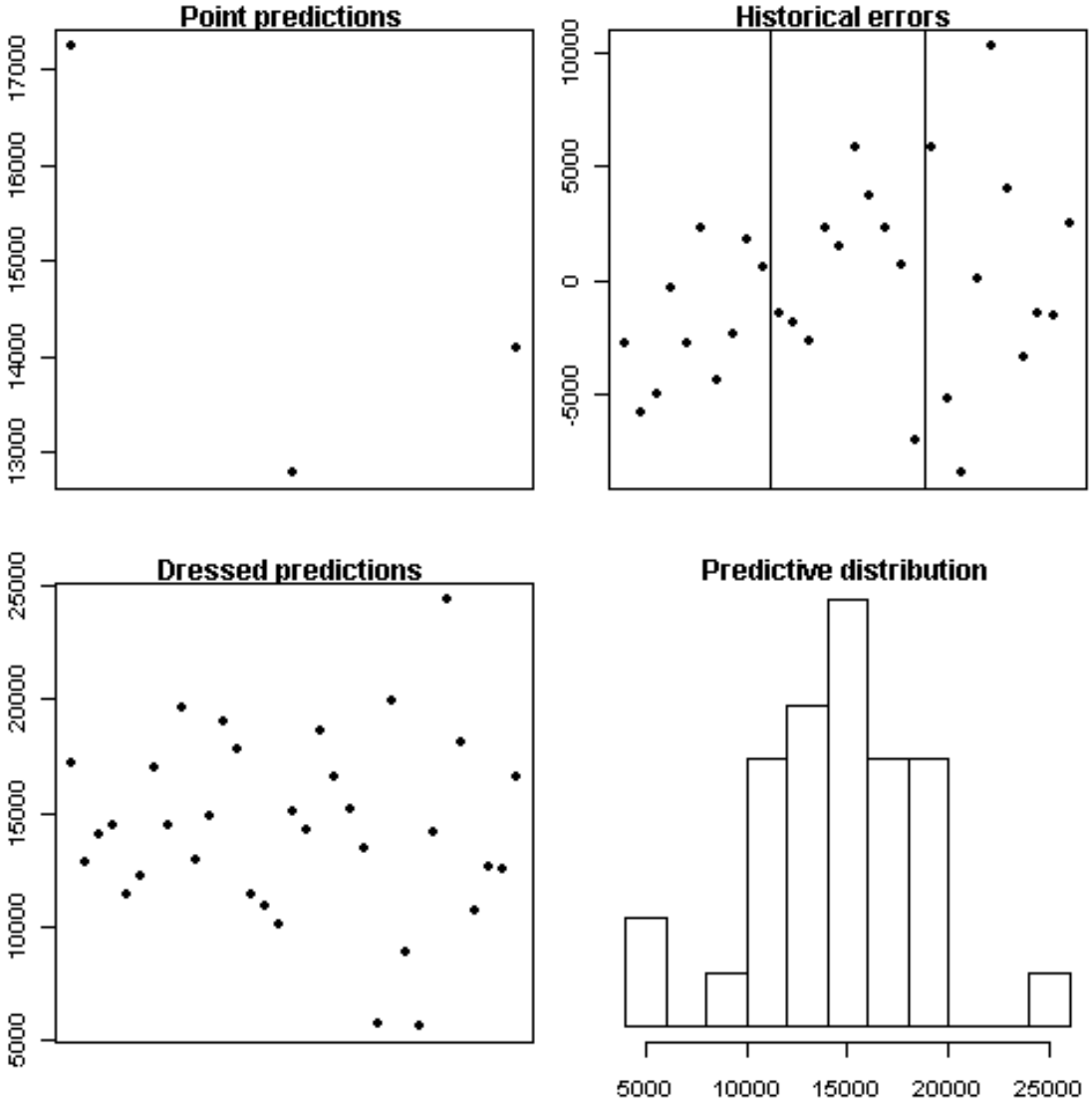



Figure: Limitations overcome through dressing.

# Parameters investigated

- Error extraction method
- Dressing
- Intervals: number, equal size
- Adaptivity

errors by horizon:
prediction made at horizon $h$ + errors from previous predictions made at horizon $h \Rightarrow$ daughters.

# Optimal parameter settings

- Error extraction: Best Member
- Error groupings: model and horizon
- Number of dresses: ten
- Prediction intervals: four equal size intervals
- Adaptivity: no weighting, inclusion of new errors insignificant

Data from four parks, all situated in Spain, was used.

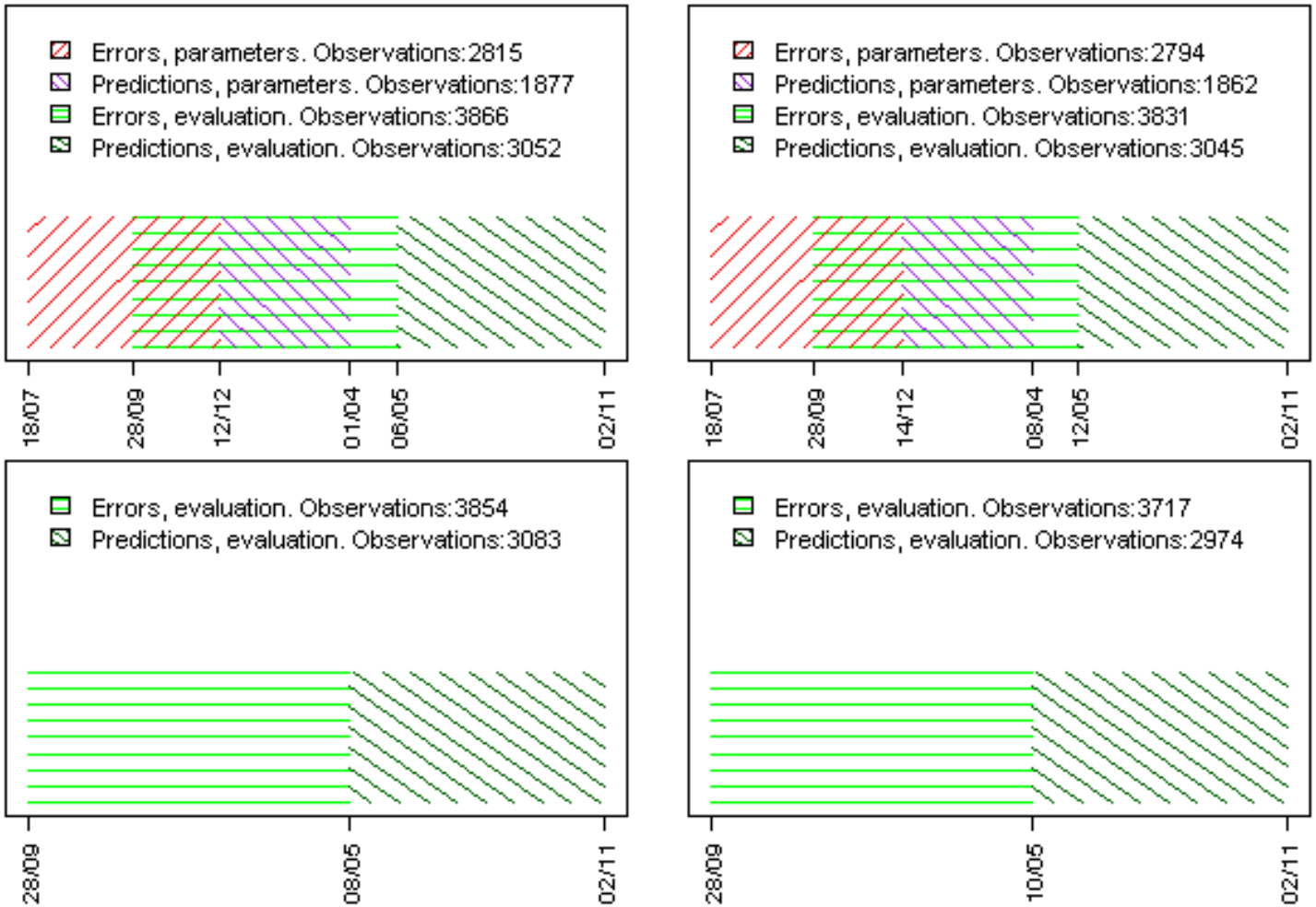



Figure: Partition of available data for each park.

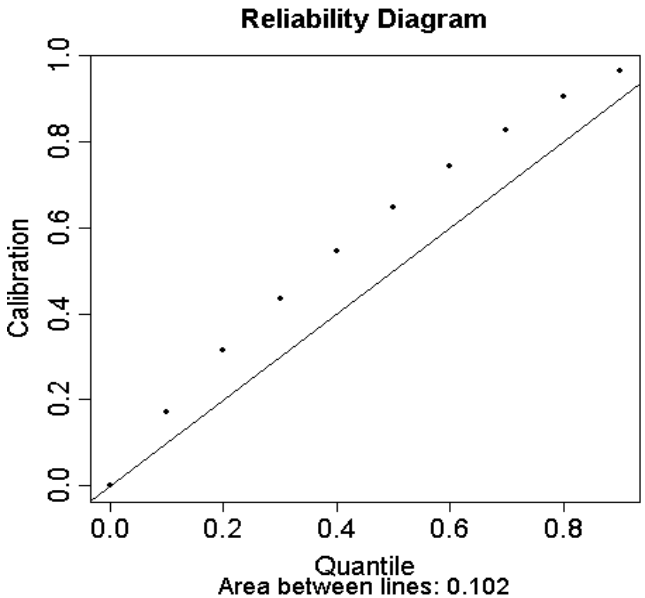
# Evaluation of resulting forecasts

Improvement over climatology: 0.14-0.30 (RPSS)

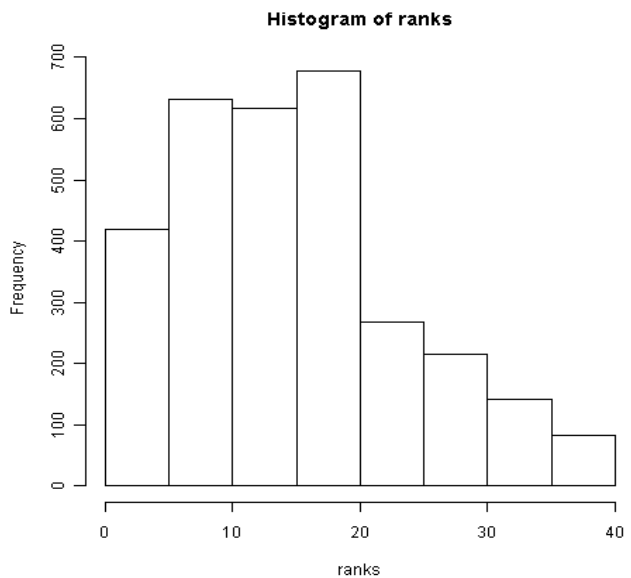
| | Mean | Standard Deviation |
|---|---|---|
| Ranked probability score | 0.28 | 2.9e-04 |
| Zero probability observations | 22 | 0.60 |
| Reliability | 0.11 | 2.9e-04 |
| Ignorance | 0.69 | 9.8e-04 |
| Ranked probability skill score | 0.14 | 1.4e-03 |
| Squared error, mean | 1.8e+07 | 2.1e+04 |
| Squared error, median | 1.7e+07 | 2.1e+04 |

Table: Evaluation results.

Figures based on 3051 observations between beginning of May and November 2008.




(a) Reliability




(b) Rank histogram

Figure: Reliability diagram and rank histogram.

Figures based on 3051 observations between beginning of May and November 2008.

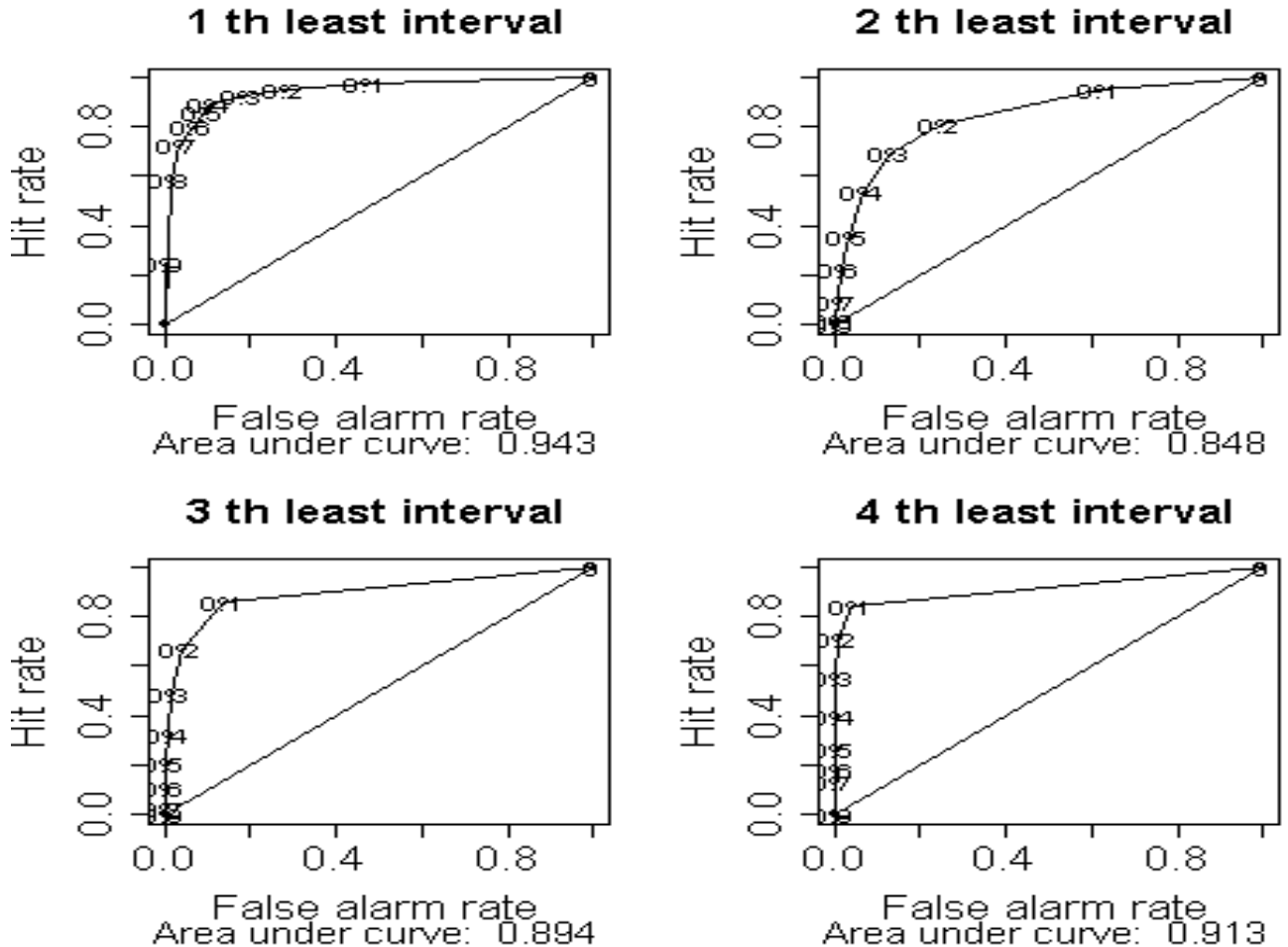



Figure: Relative operating characteristic curves.

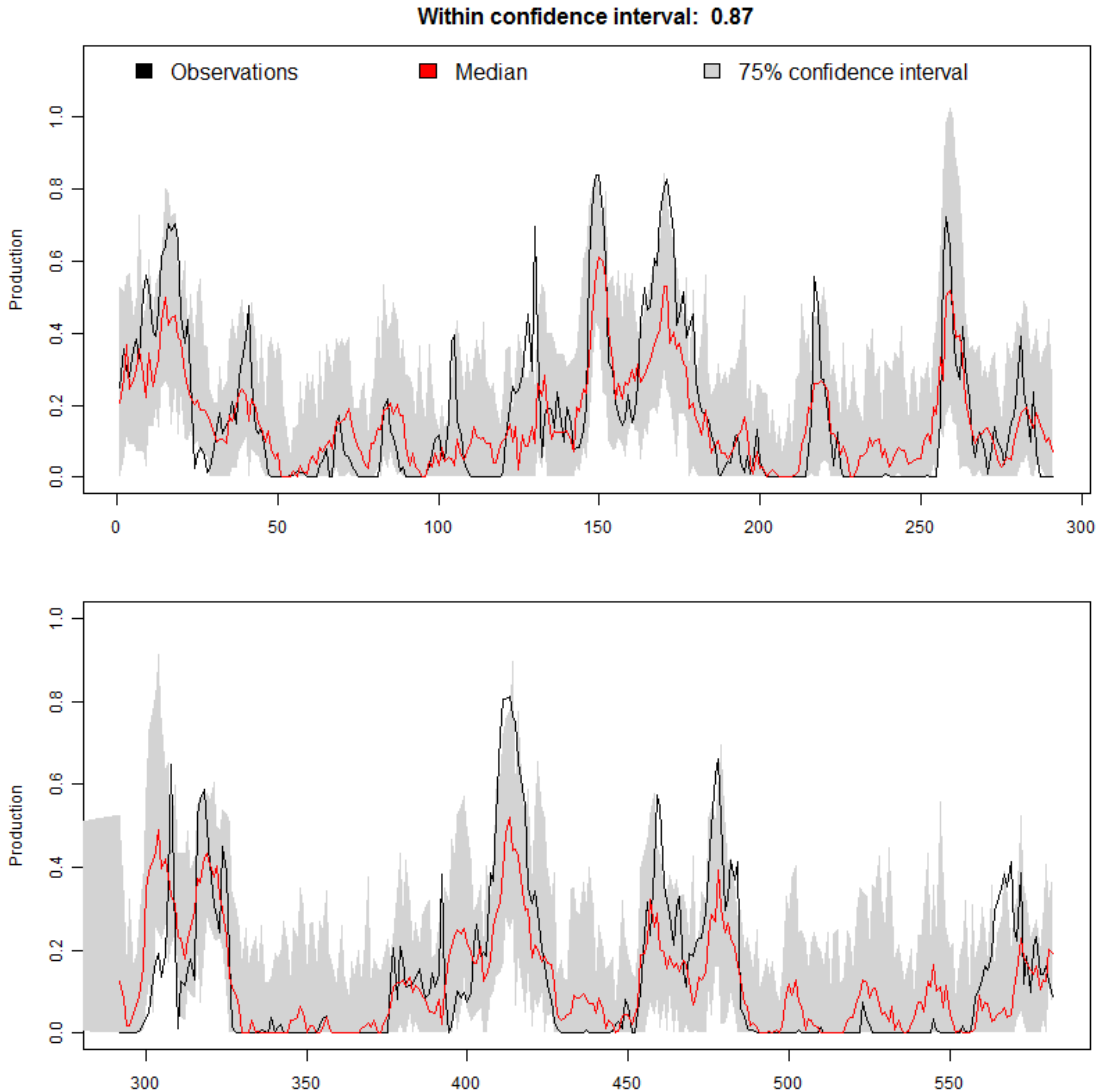



Figure: Confidence intervals, point and probabilistic predictions, and observations from 600 predictions from August 2008.

# Future investigations

- Group errors according to atmosphere state
- Reduce variability in predictions
- Use errors from nearby horizons in addition to same horizon

# Conclusion

- Forecasts perform well
- Parameters do affect forecast skill
- Width of quantile confidence intervals reflect uncertainty
- Little computational power necessary
- Method is robust regarding missing point predictions