



Fig. 4.9: **Comparing regression forests with Gaussian processes.**

(a,b,c) Three training datasets and the corresponding testing posteriors overlaid on top. In both the forest and the GP model uncertainties increase as we move away from training data. However, the actual shape of the posterior is different. **(b,c)** Large gaps in the training data are filled in both models with similarly smooth mean predictions (green curves). However, the regression forest manages to capture the bi-modal nature of the distributions, while the GP model produces intrinsically uni-modal Gaussian predictions.

Gaussian processes are well known for how they model increasing uncertainty with increasing distance from training points. The bottom row illustrates this point very clearly. Both in extrapolated and interpolated regions the associated uncertainty increases smoothly. The Gaussian process mean prediction (green curve) is also smooth and well behaved.

Similar behaviour can be observed for the regression forest too (top row). As observed also in previous examples the confidence of the prediction decreases with distance from training points. The specific shape in which the uncertainty region evolves is a direct consequence of the particular prediction model used (linear here). One striking difference between the forest and the GP model though is illustrated in