# Infectious Disease Modelling Team

The spread of Omicron and replacement of Delta in the UK*
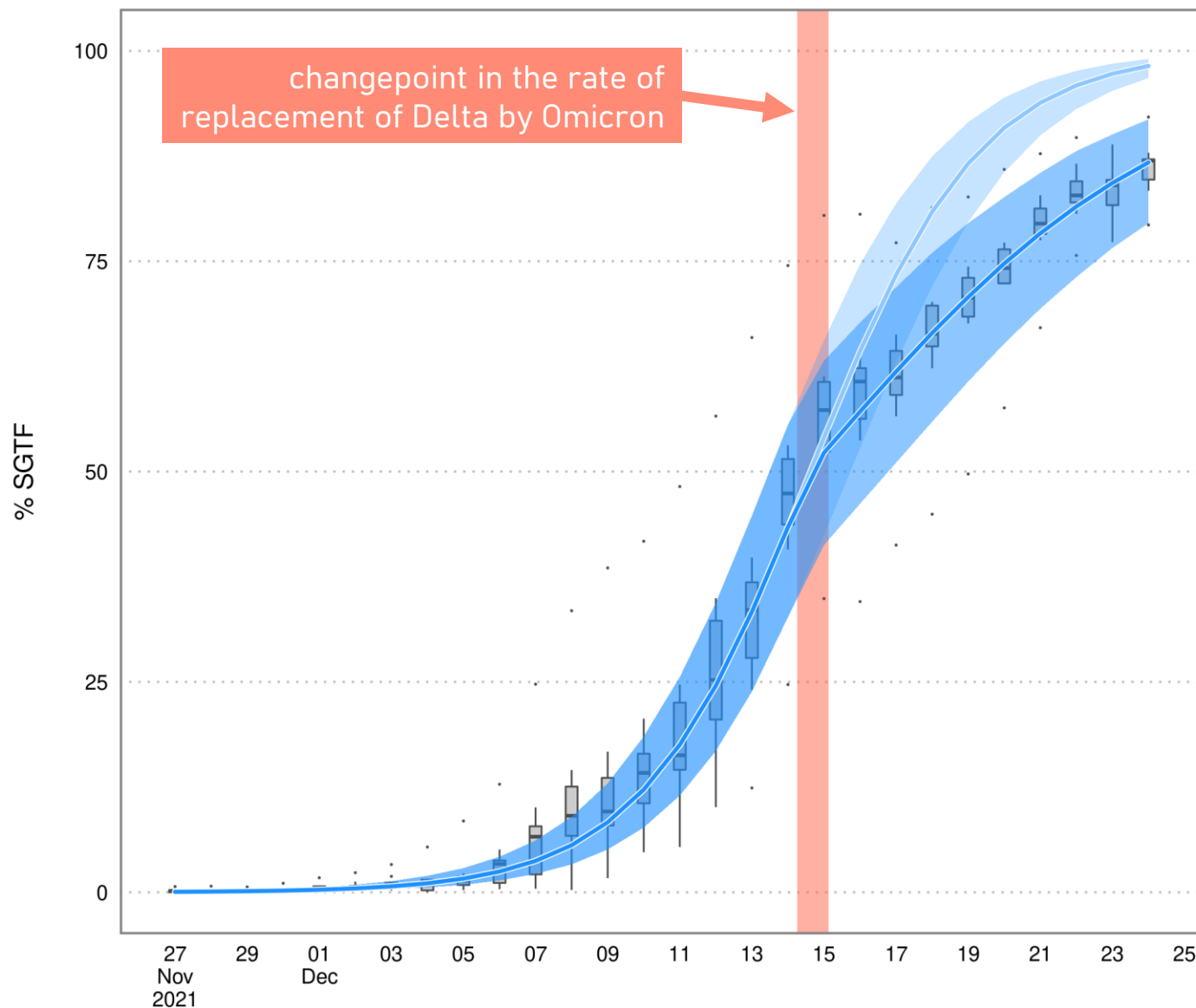
Rob Paton, Chris Overton and Tom Ward

**\* provisional analysis last updated: 5th January 2022**

UK Health Security Agency

# England national time series of SGTF (%)



changepoint in the rate of replacement of Delta by Omicron

**Method:** We analysed the probability of S-gene target failure (SGTF) in tests from labs testing for all three gene targets on SARS-CoV-2. We fit a Bayesian logistic growth model that allowed for a breakpoint in the rate at which SGTF was taking over from triple positive cases (a proxy for Delta). The model was hierarchical and fit to regional and LTLA–level data, accounting for geographic heterogeneity.

**Figure:** The growth rate in the percentage of SGTF cases in England up until the 24th December with model fit.

The blue lines and ribbons denote the median and 95% credible intervals from the model fit.
- The dark fit includes the changepoint, the pale shows the path had the rate of replacement not changed.
- Red intervals show the model-estimated changepoint in the rate of replacement of triple positive with SGTF cases.
- Boxplots show the variation in the percentage of tests with SGTF across the regions within England.

**Narrative:** There was a changepoint – estimated as being between the 14th and 15th of December – where the rate at which Omicron was replacing Delta slowed. This suggests a potential reduction in the relative transmission advantage of Omicron after the changepoint.

- After the changepoint, the coefficient describing the rate of replacement Delta by Omicron was 53.5% lower (51.1–59.0) than before.
- In other words, the growth rate advantage of Omicron over delta was approximately halved.

# England regional time series of SGTF (%)
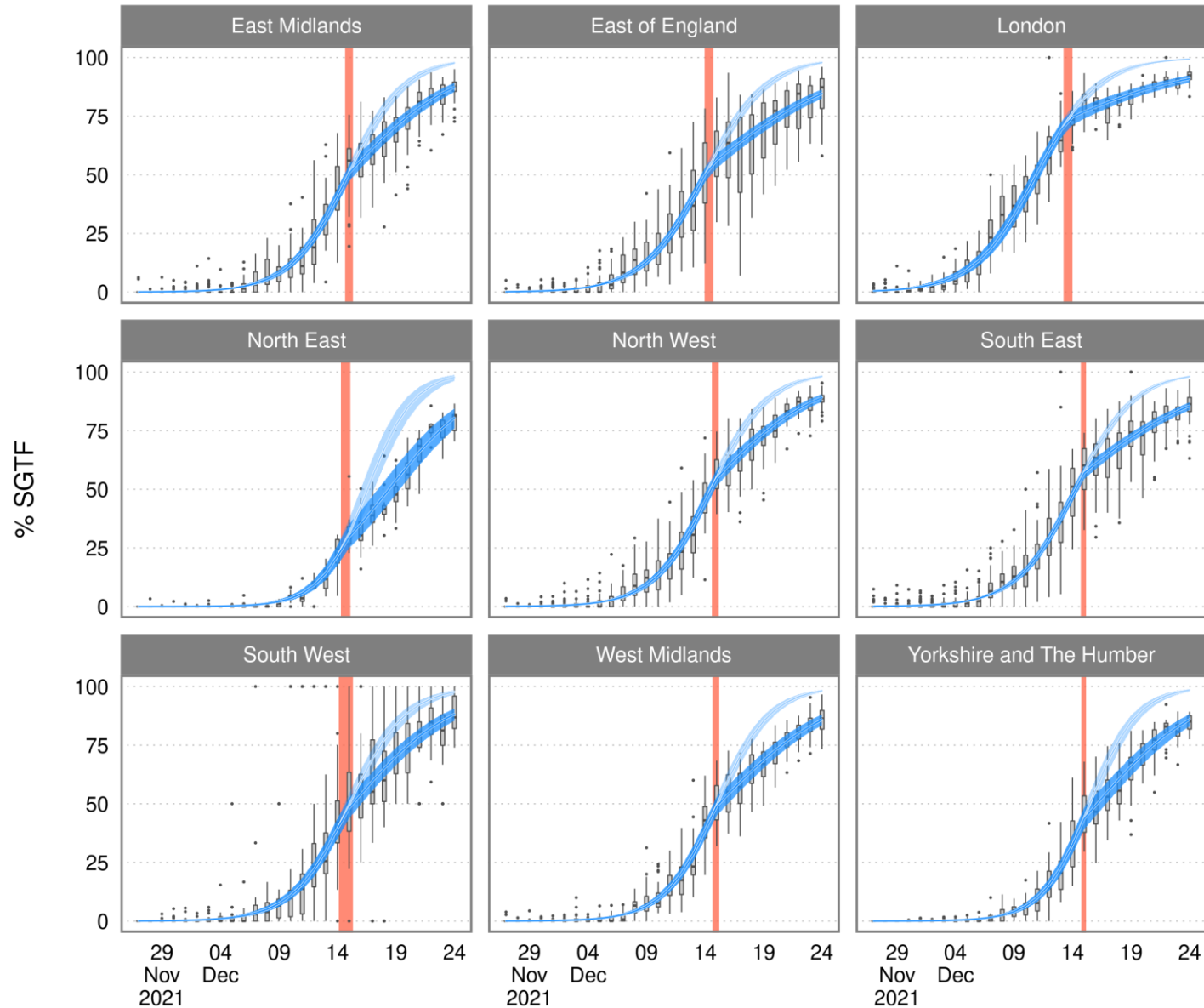


**Figure:** The proportion of SGTF and the growth rate model with credible intervals for each of the 9 regions of England.

- The blue line and ribbon denote the median and 95% credible intervals from the model fit. The dark fit includes the changepoint, the pale shows the path had the rate of replacement not changed.
- Red intervals show the model-estimated changepoint in the rate of replacement of triple positive with SGTF cases.
- Boxplots show the variation in the percentage of tests with SGTF across the LTLAs within English regions.

**Narrative:** We allowed to model to estimate region-specific breakpoints. All regions other than London had a changepoint between the 14th and the 15th of December; London was slightly early at between the 13th and 14th.

- Almost all regions had reached 50% SGTF prior to or at the changepoint (North East and Yorkshire were exceptions).
- All regions slowed, but there is variation in the effect size (see next slide).

# Consequences of the changepoint for regional SGTF trends (1)
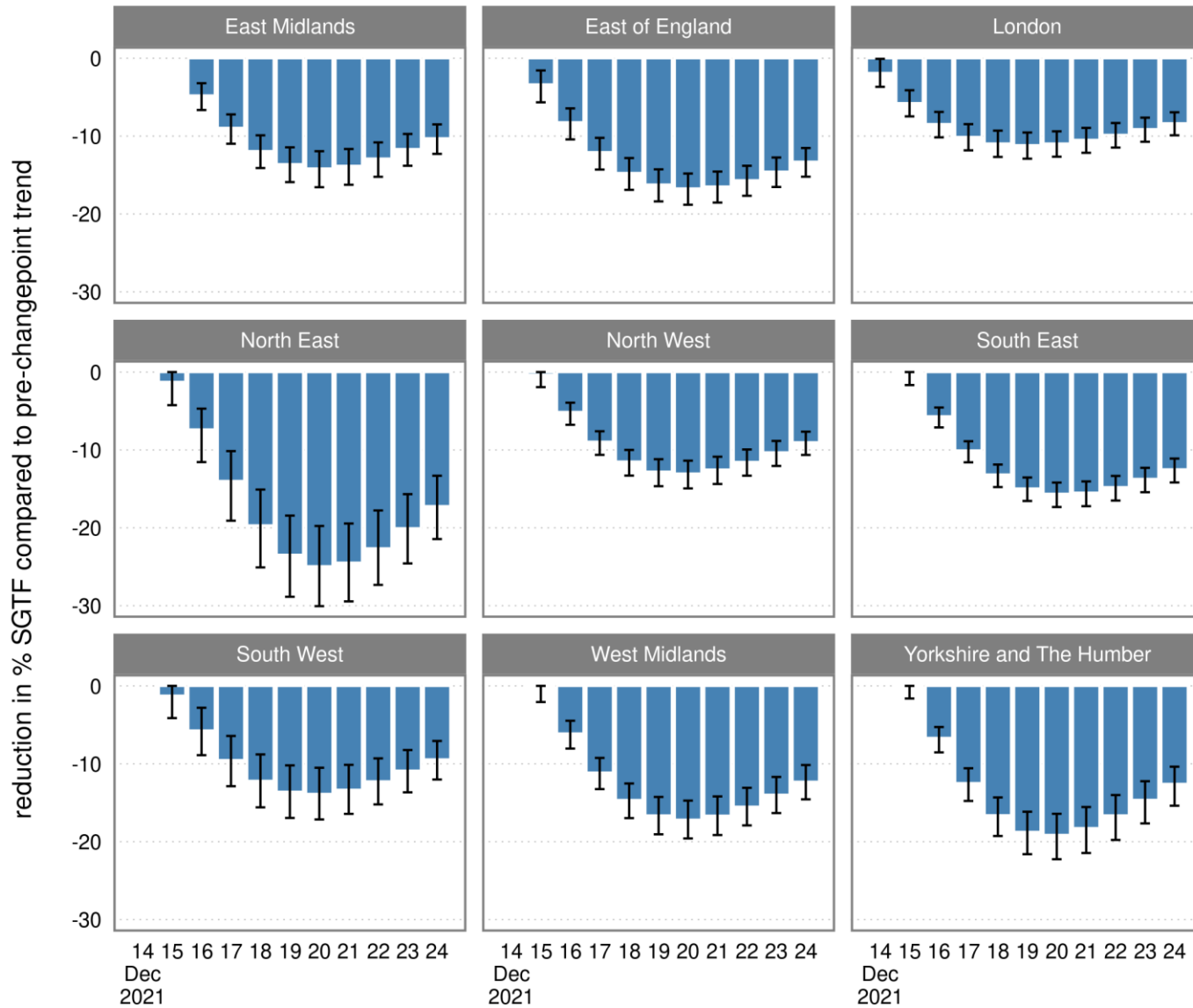


**Figure:** The difference between the changepoint model and the pre-changepoint trend is shown through time (after each of the regional breakpoints).

- Blue bars show the reduction in the % SGTF compared to where the % would have been if the changepoint had not happened. Black error bars give credible intervals.

**Narrative:** The largest difference is observed in regions where SGTF had made less progress in replacing delta prior to the changepoint. By contrast, regions that had already had large Omicron waves prior to the changepoint have smaller effect sizes.

# Consequences of the changepoint for regional SGTF trends (2)
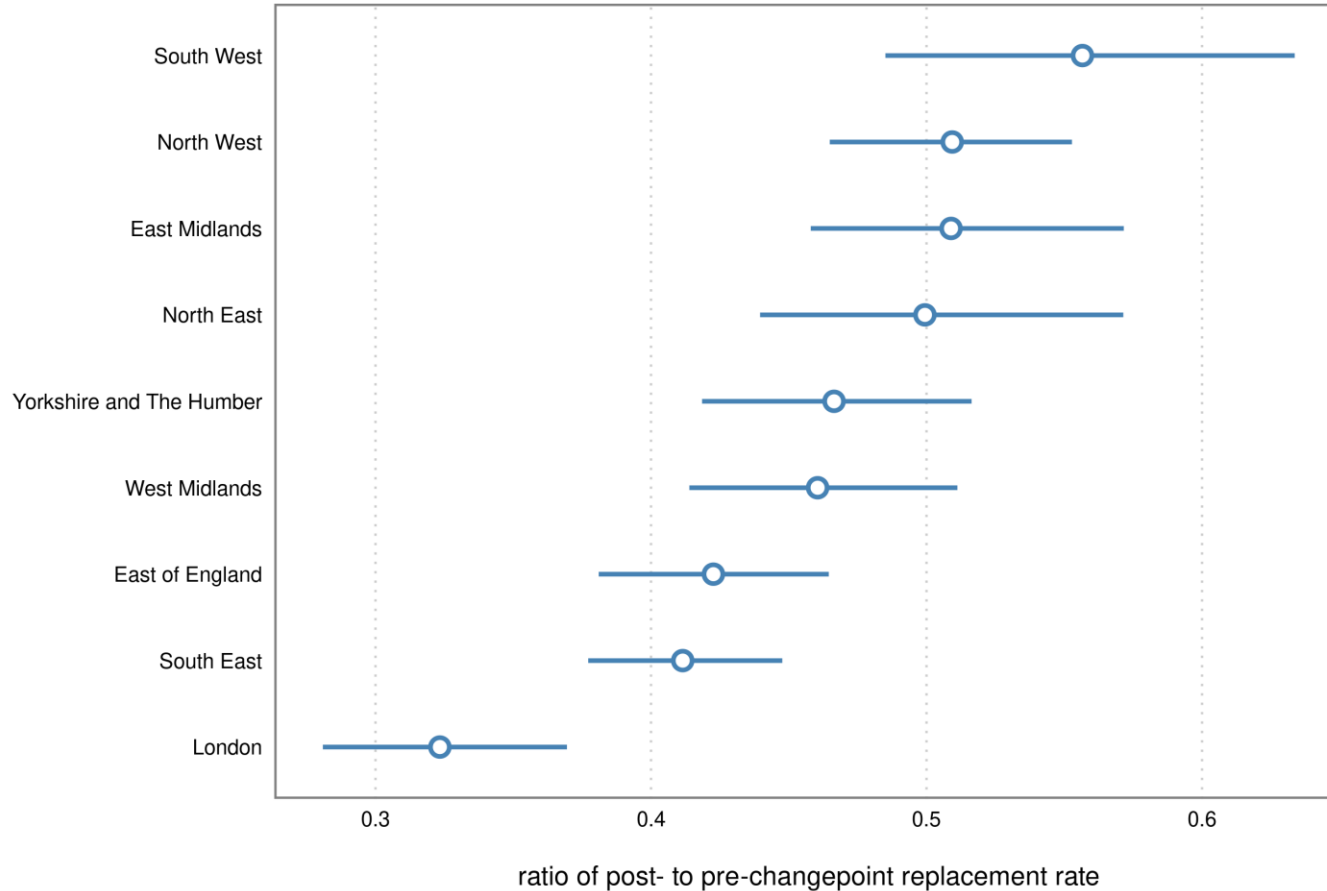


**Figure:** The figure shows the ratio of the post changepoint to pre changepoint rate of replacement for each region.
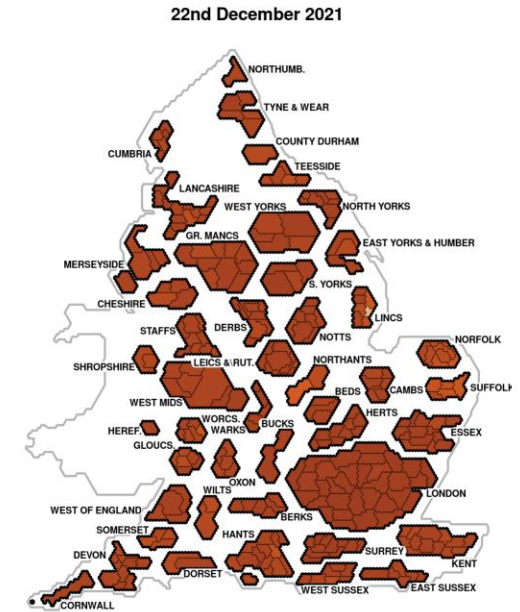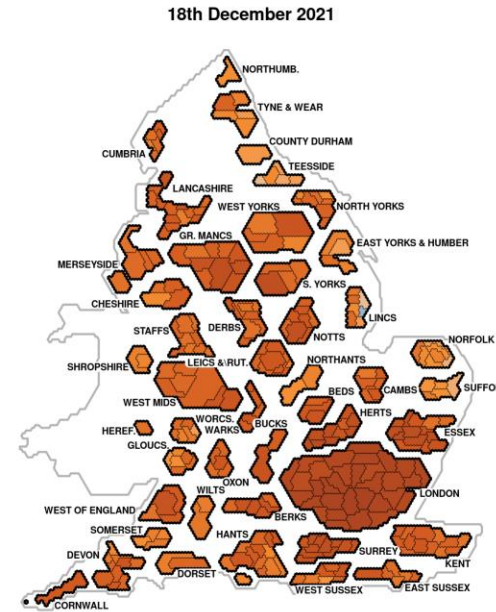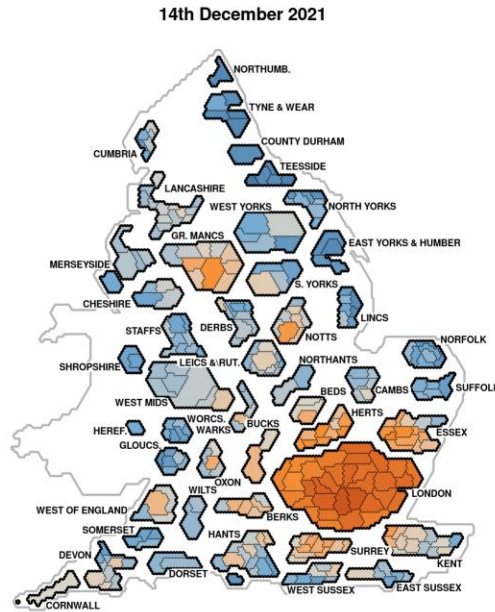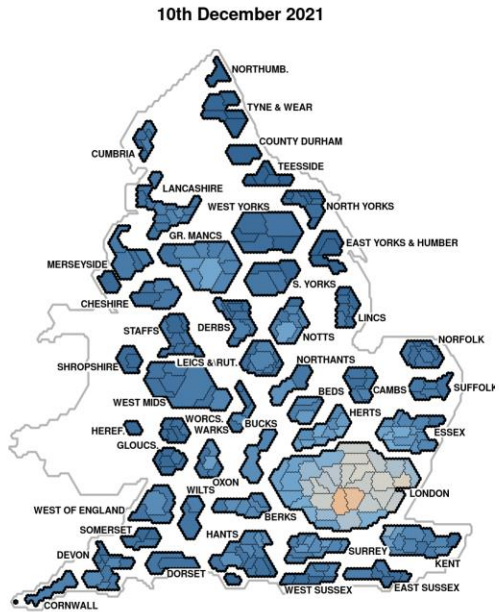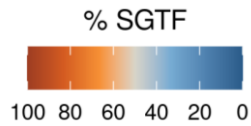
- Blue points give median estimates and lines 95% credible intervals.

**Narrative:** There was a considerable (>50% in all but 3 regions) reduction in the growth rate advantage of Omicron over Delta after the changepoint. This was most pronounced in London, where there was a 67.7% (63.1–71.9) reduction in the growth rate coefficient.

# England LTLA time series of SGTF (%)