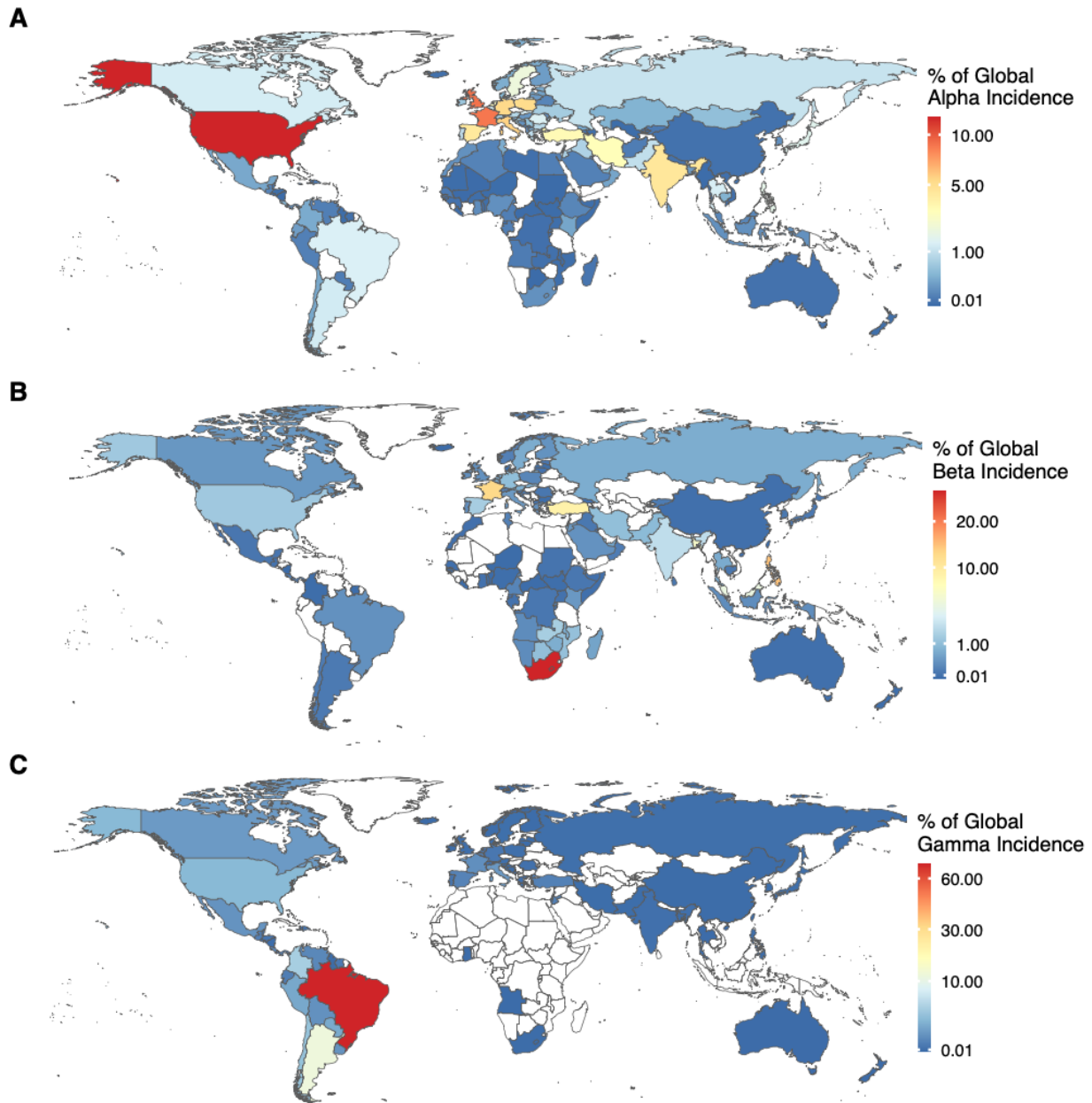
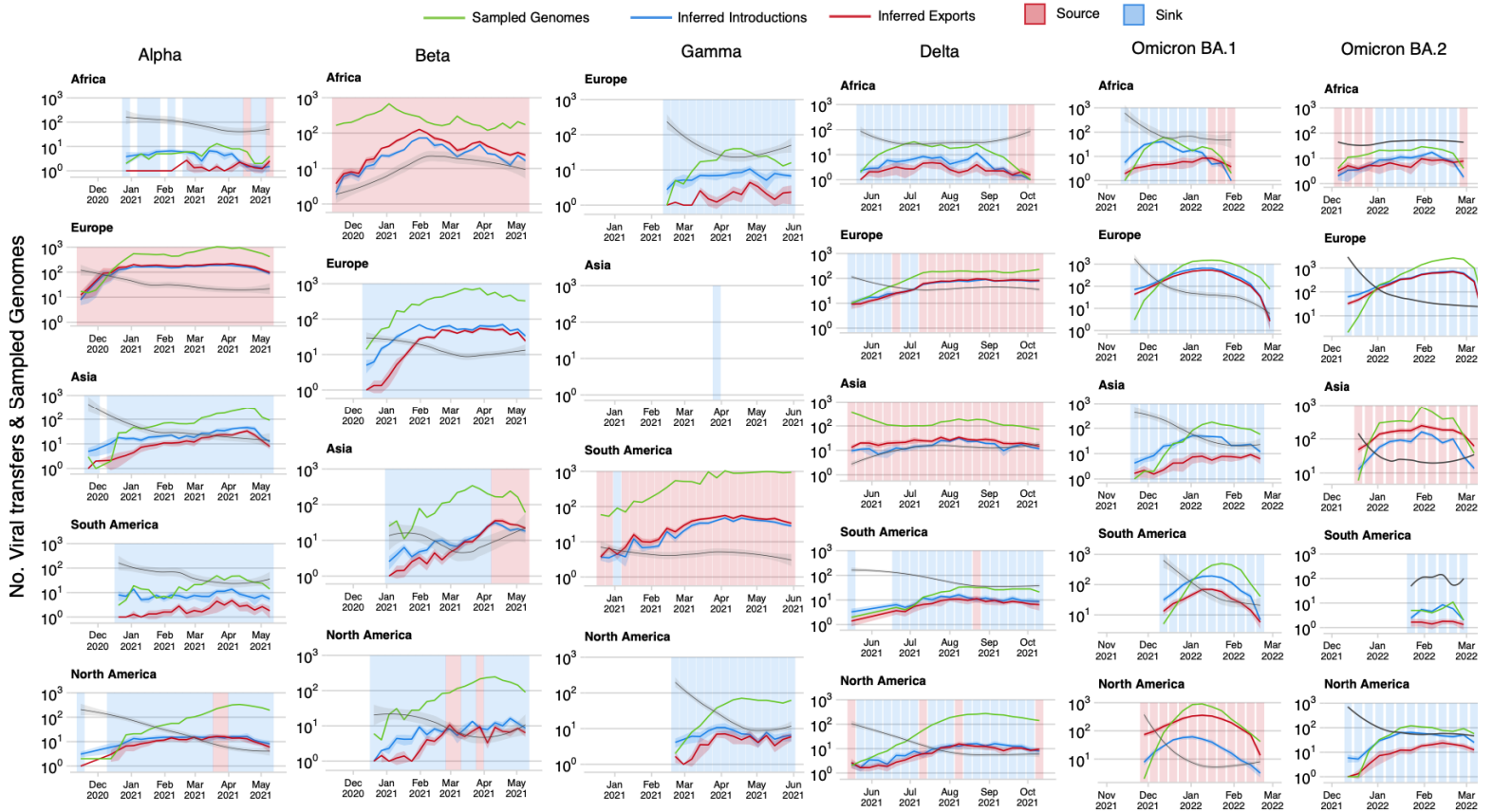


## Supplemental Figures

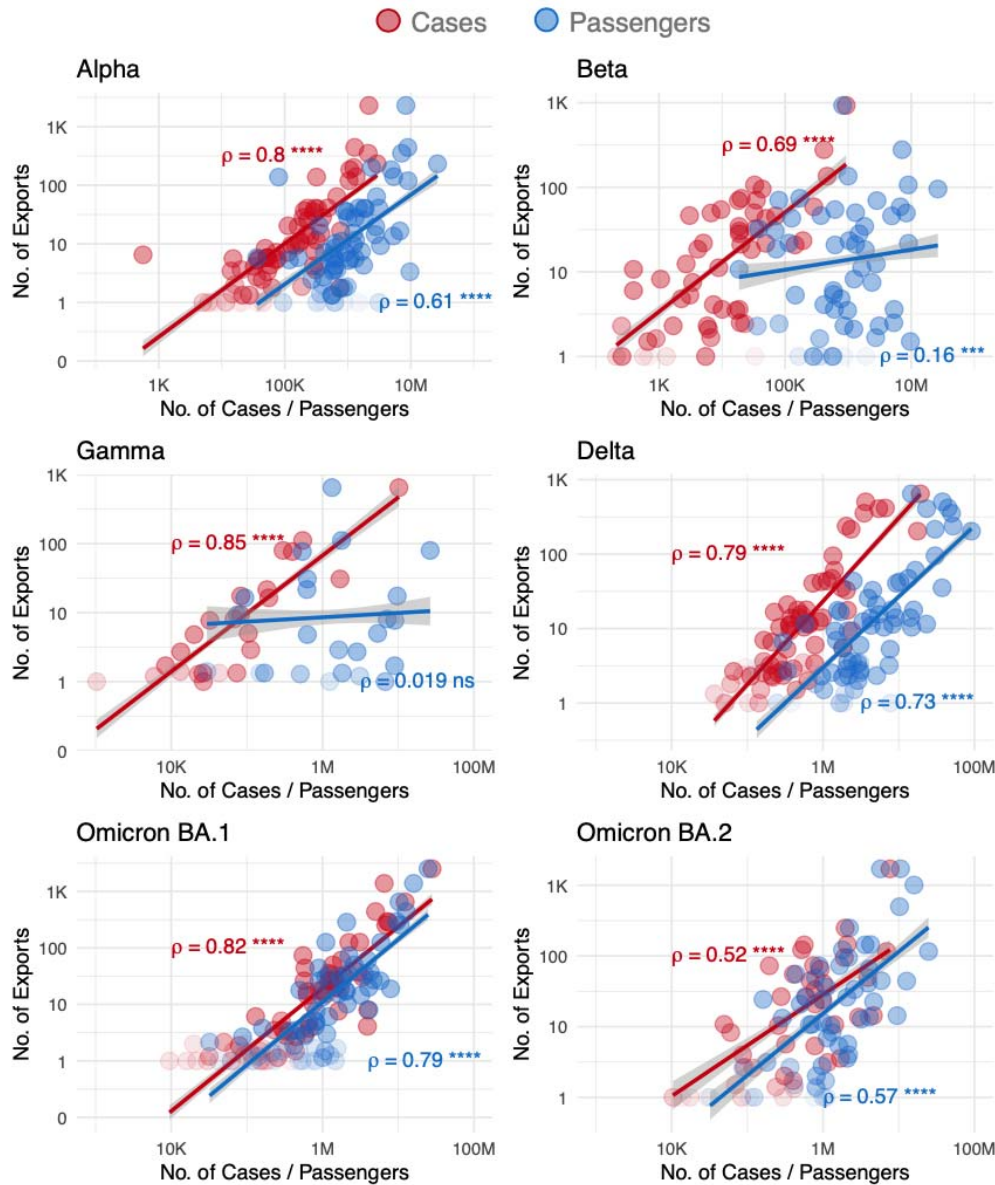


**Figure S1. Alpha, Beta Gamma global distribution.** Maps show countries coloured by their share of total global Alpha (A), Beta (B) or Gamma (C) incidence.

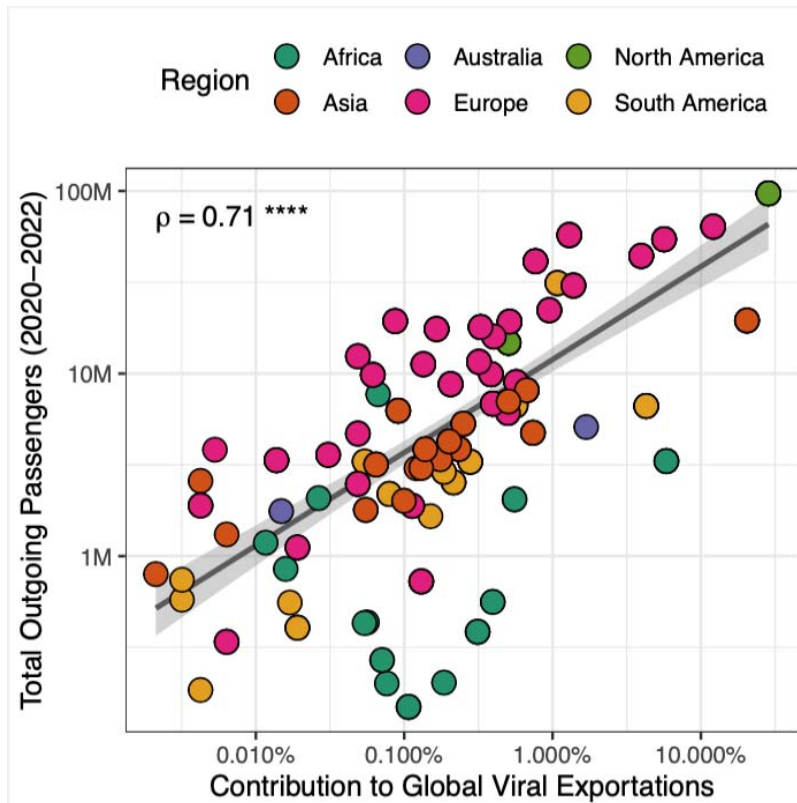
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**Figure S2. Viral sampling, introductions and exportations for various VOCs over time.** Graphs show the time-varying progression of the numbers of sampled genomes in our analysis compared to the numbers of inferred introductions and exportations for Alpha, Beta, Gamma, Delta, Omicron BA.1 and Omicron BA.2 per continent.

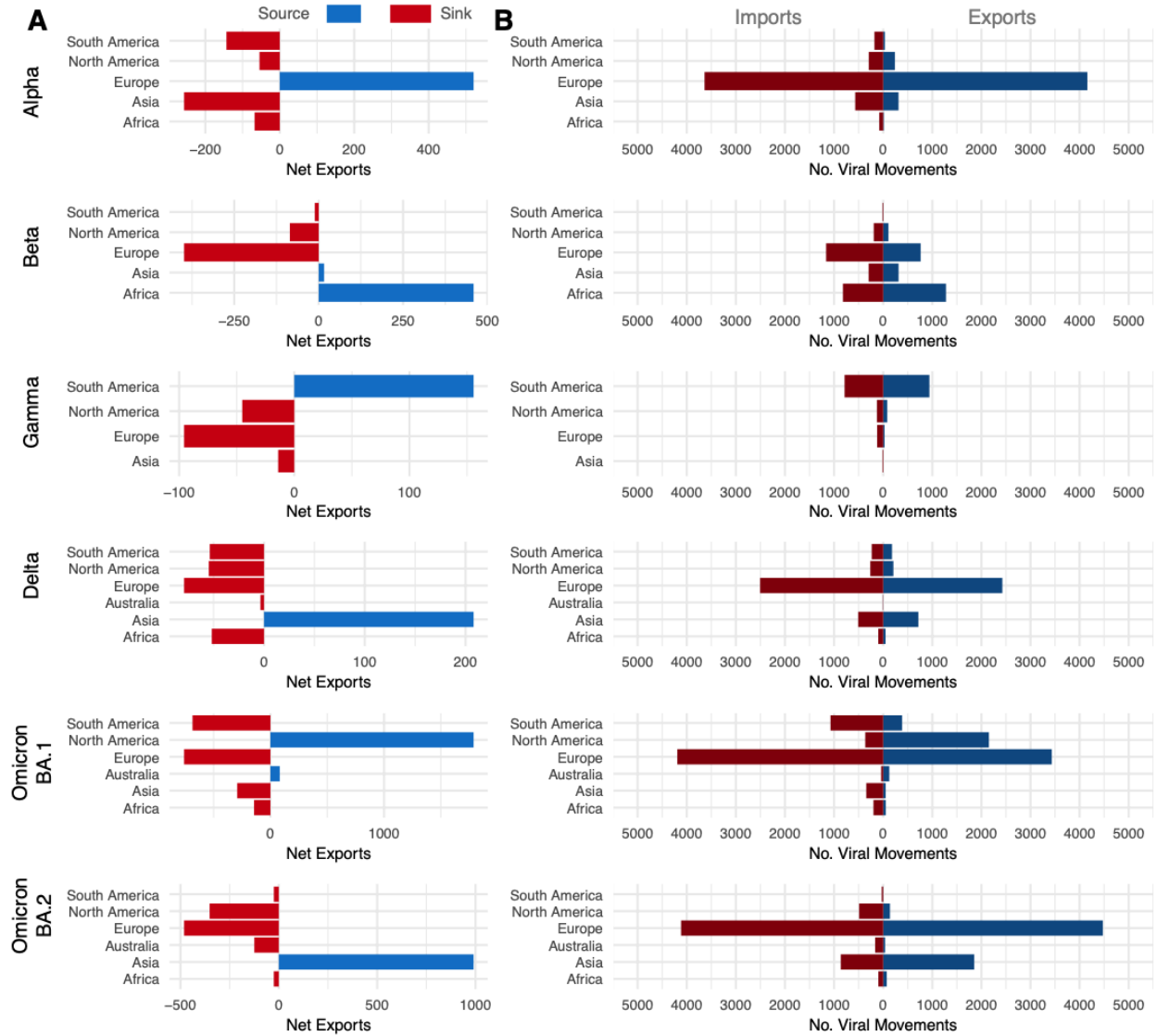


**Figure S3. Correlations of Incidence and Travel to inferred VOC exportation numbers.** Graphs show scatter plots and regression lines denoting the numbers of variant-specific cases, volumes of air travel passengers and inferred numbers of VOC exportations for each country. Spearman rank correlation values are shown, with level of significance indicated.

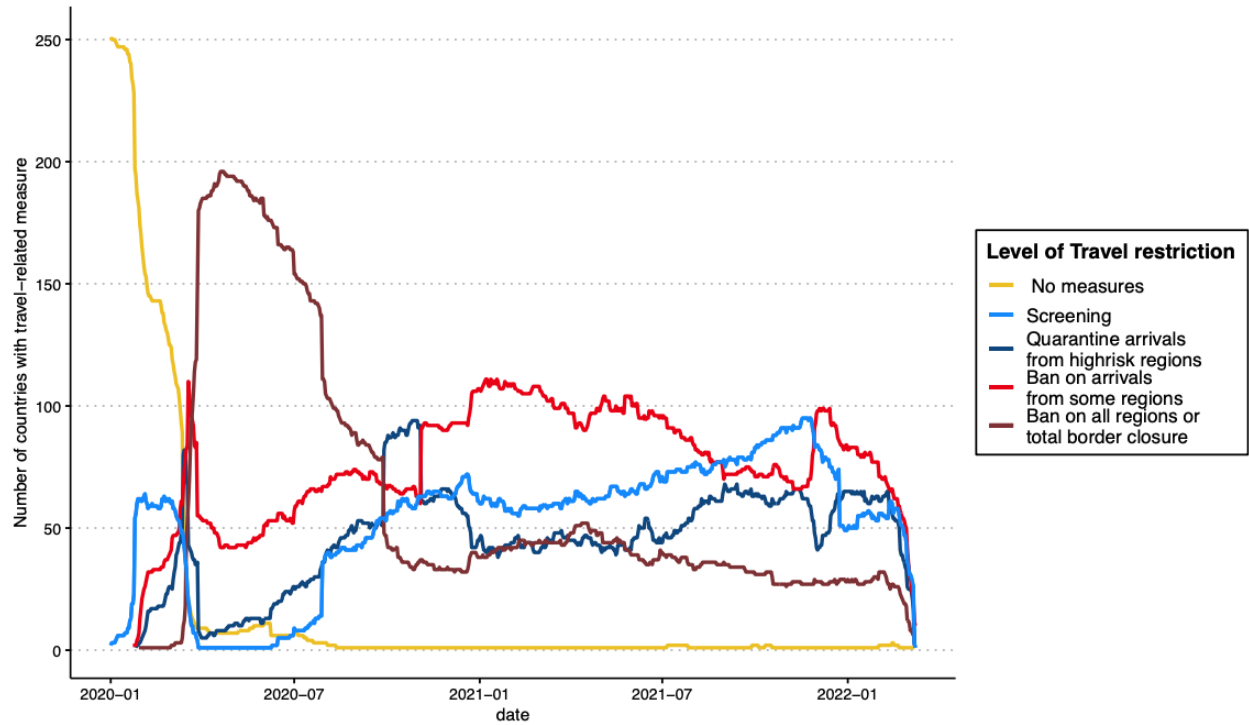


**Figure S4: Correlation of Contribution of Global Viral Exportation Events and Outgoing Travel from Countries.** Graph shows a scatter plot and regression line denoting the share of each country's contribution to global numbers of inferred exportations for all VOCs and the total number of outgoing air travel passengers from 2020-2022. The spearman rank correlation value is shown, with level of significance indicated.

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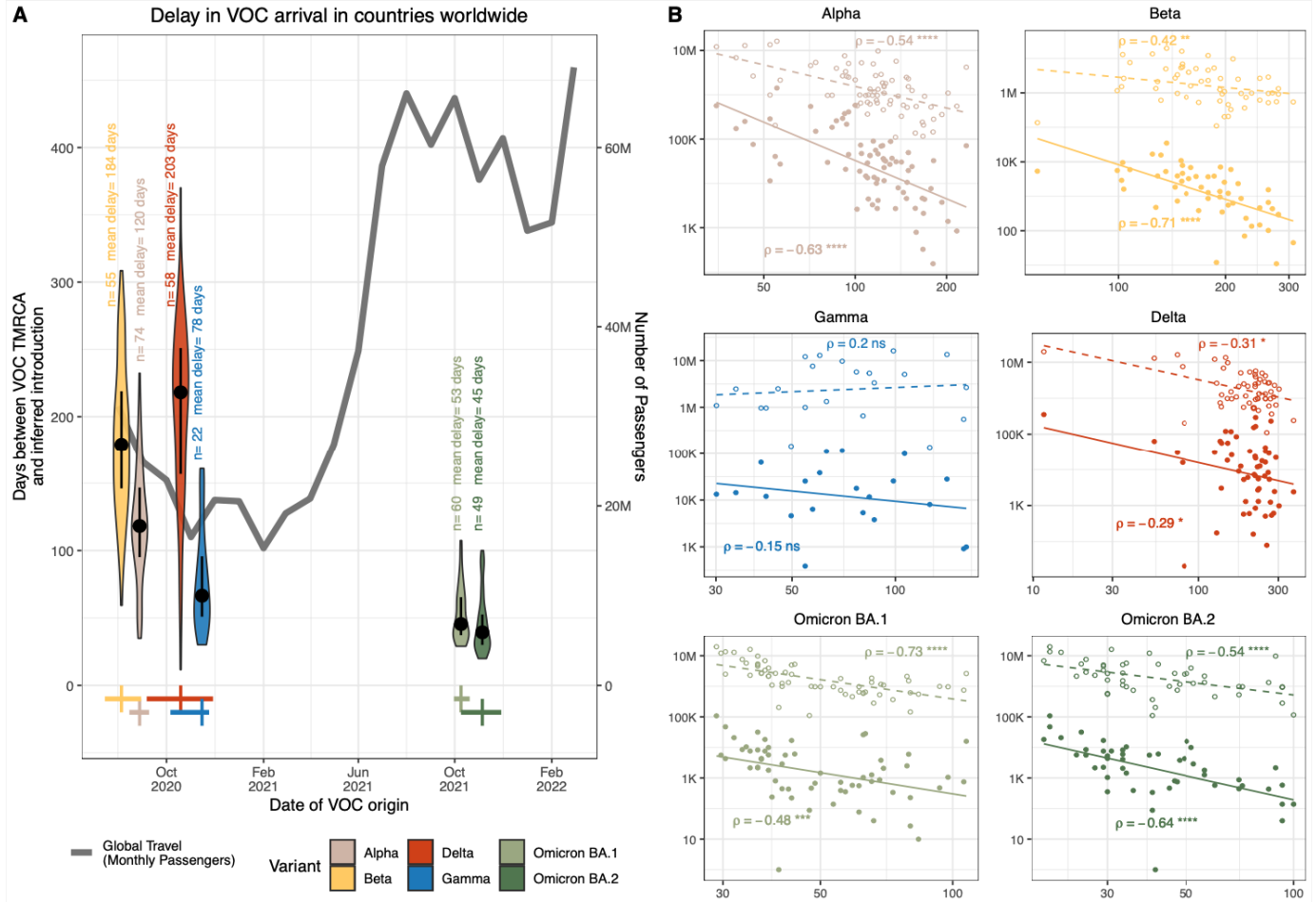


**Figure S5: VOC imports and exports numbers per continent.** A) The net difference between viral exportation and importation events. B) The absolute numbers of exportation and importation events for each continent per VOC.



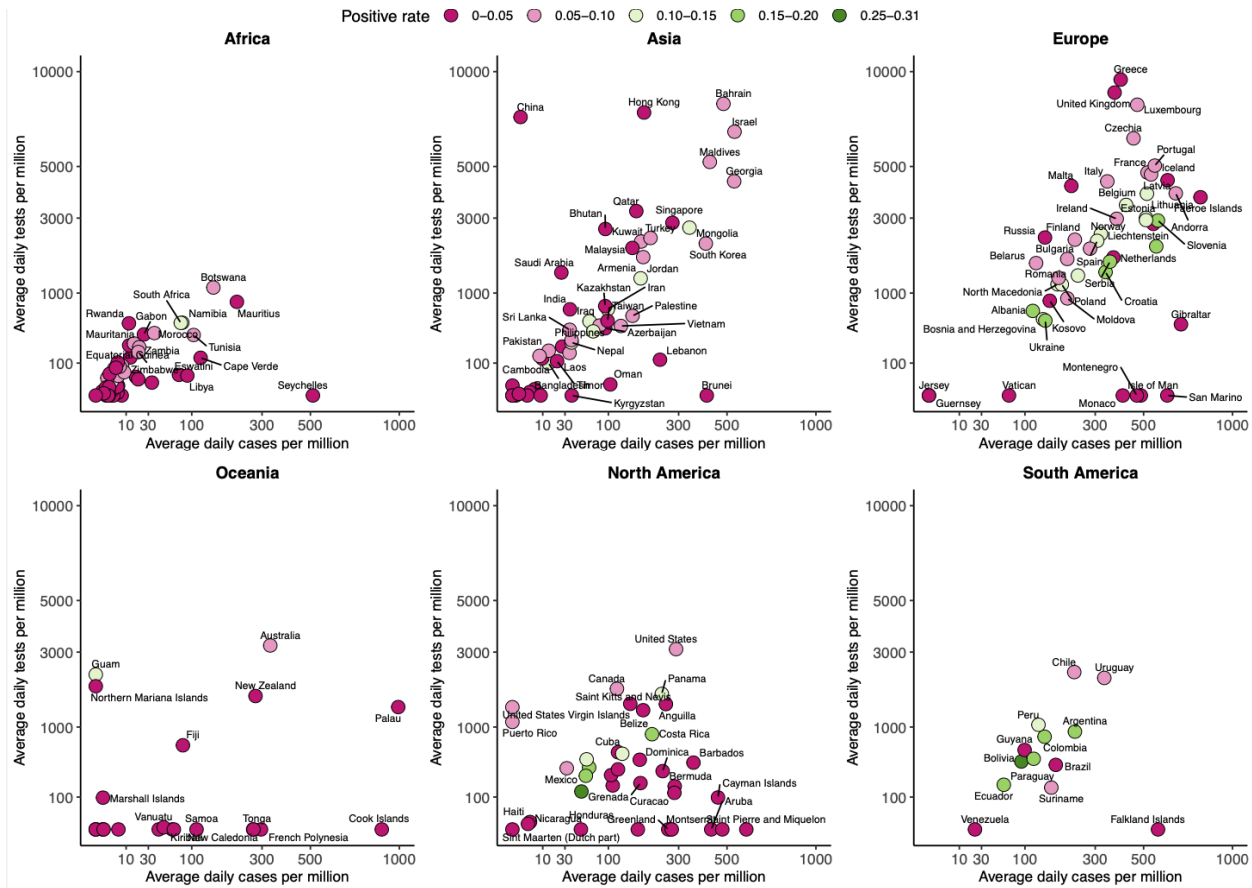
**Figure S6: Air travel restrictions.** The graph shows the time-varying numbers of countries implementing various levels of travel-related restrictions from January 2020 to March 2022.





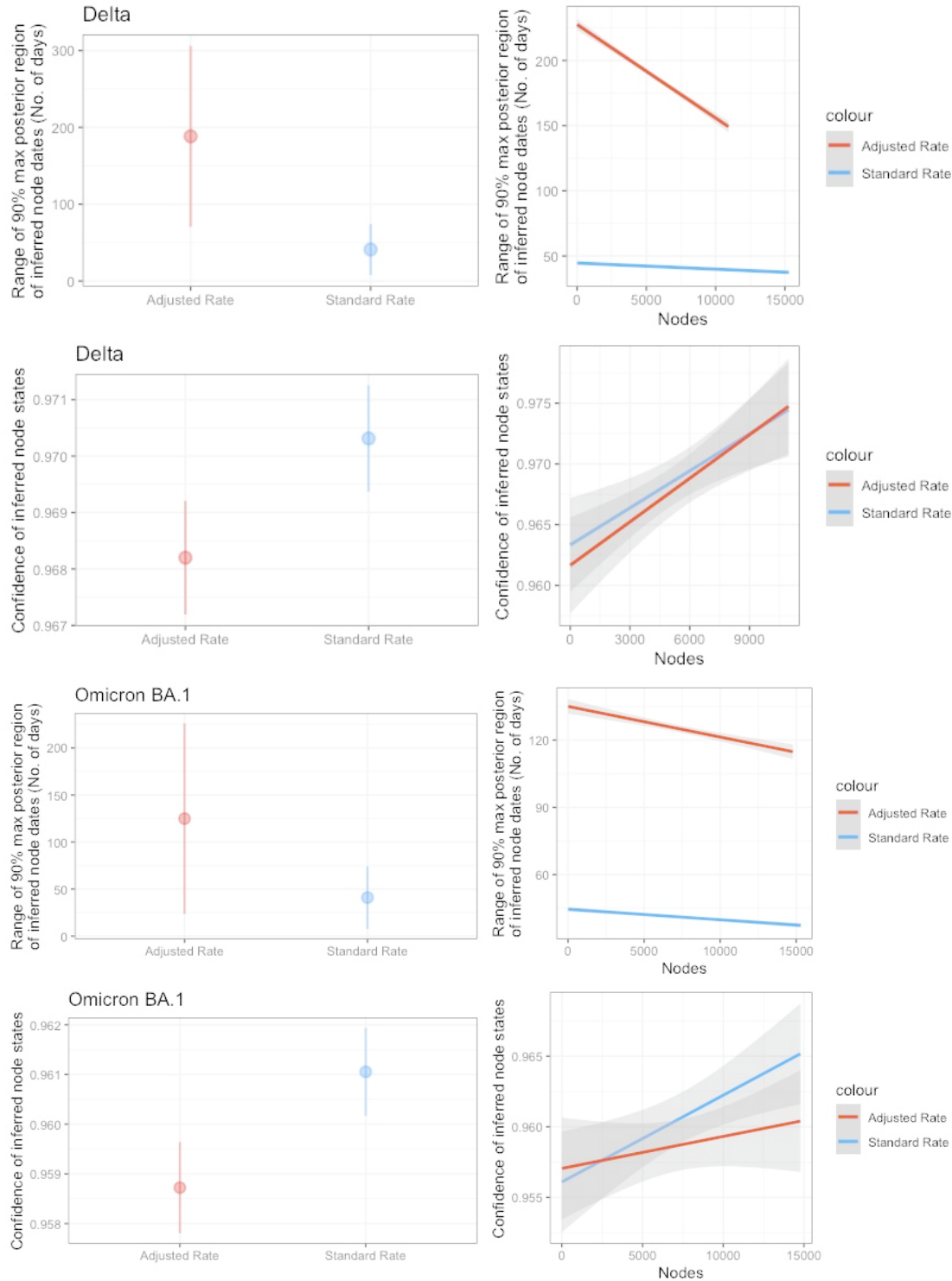
**Figure S7: Impact of global air travel on VOC dissemination.** A) Delay (number of days since TMRCA) of each VOC to first reach other countries around the world (arrival dates inferred as date of first introduction in phylogeographic analysis), and the total global monthly air passenger volumes from September 2020 to March 2022. The number of points and mean of each violin plot are indicated. The dot and error bars inside each group denote the median and interquartile range, respectively. Dates of VOC origin are taken as their published mean estimated dates of emergence (TMRCA), with crosses representing the median and high confidence range values<sup>1-3,6,8,26</sup>. B) Scatter plot and spearman rank correlations of either travel volumes from the first reporting country or total global travel with the delay in first introduction of VOCs in countries globally. Spearman rank correlation values are shown, with level of significance indicated.

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**Figure S8. Global COVID-19 testing rates by continent.** Graphs show testing rates per continent against recorded cases per million for countries with available data over the course of the pandemic. The extent of testing (average daily number of tests) is shown relative to the size of outbreaks (average daily number of reported cases) per million people per country. Data is obtained from Our World in Data (OWID). Colour scale denotes test positive rates. Points are shown for countries reporting the relevant data and with an average daily number of tests greater than zero for the relevant period. Axes are log scaled.





**Figure S9: Justification for use of evolutionary rates.** Graphs show the range of 90% maximum posterior region of inferred node dates (in number of days) and the confidence of reconstructed node states as proxies for robustness of inference either as an averaged measure for all nodes or by node number, from deepest nodes for the adjusted evolutionary rate v.s. the standard evolutionary rate. Results are shown for one phylogenetic reconstruction of Delta and Omicron BA.1 datasets.

**Table S1:** Published VOC tMRCA used in this study.

VOC	Method	Median	Upper	Lower	Source
Alpha	BEAST	2020-08-28	2020-09-09	2020-08-15	Hill et al., 2022 ( <a href="https://doi.org/10.1093/ve/veac080">https://doi.org/10.1093/ve/veac080</a> )
Beta	BEAST	2020-08-05	2020-08-30	2020-07-15	Tegally et al., 2021 ( <a href="https://doi.org/10.1038/s41586-021-03402-9">https://doi.org/10.1038/s41586-021-03402-9</a> )
Gamma	BEAST	2020-11-15	2020-11-24	2020-10-06	Faria et al., 2021 ( <a href="https://doi.org/10.1126/science.abh2644">https://doi.org/10.1126/science.abh2644</a> )
Delta	BEAST	2020-10-19	2020-11-29	2020-09-06	McCrone et al., 2022 ( <a href="https://doi.org/10.1038/s41586-022-05200-3">https://doi.org/10.1038/s41586-022-05200-3</a> )
Omicron BA.1	BEAST	2021-10-09	2021-10-20	2021-09-30	Viana et al., 2022 ( <a href="https://doi.org/10.1038/s41586-022-04411-y">https://doi.org/10.1038/s41586-022-04411-y</a> )
Omicron BA.2	BEAST	2021-11-05	2021-11-29	2021-10-09	Tegally et al., 2022 ( <a href="https://doi.org/10.1038/s41591-022-01911-2">https://doi.org/10.1038/s41591-022-01911-2</a> )
Omicron BA.4/BA.5	BEAST	2021-12-15	2022-02-06	2021-11-25	Tegally et al., 2022 ( <a href="https://doi.org/10.1038/s41591-022-01911-2">https://doi.org/10.1038/s41591-022-01911-2</a> )