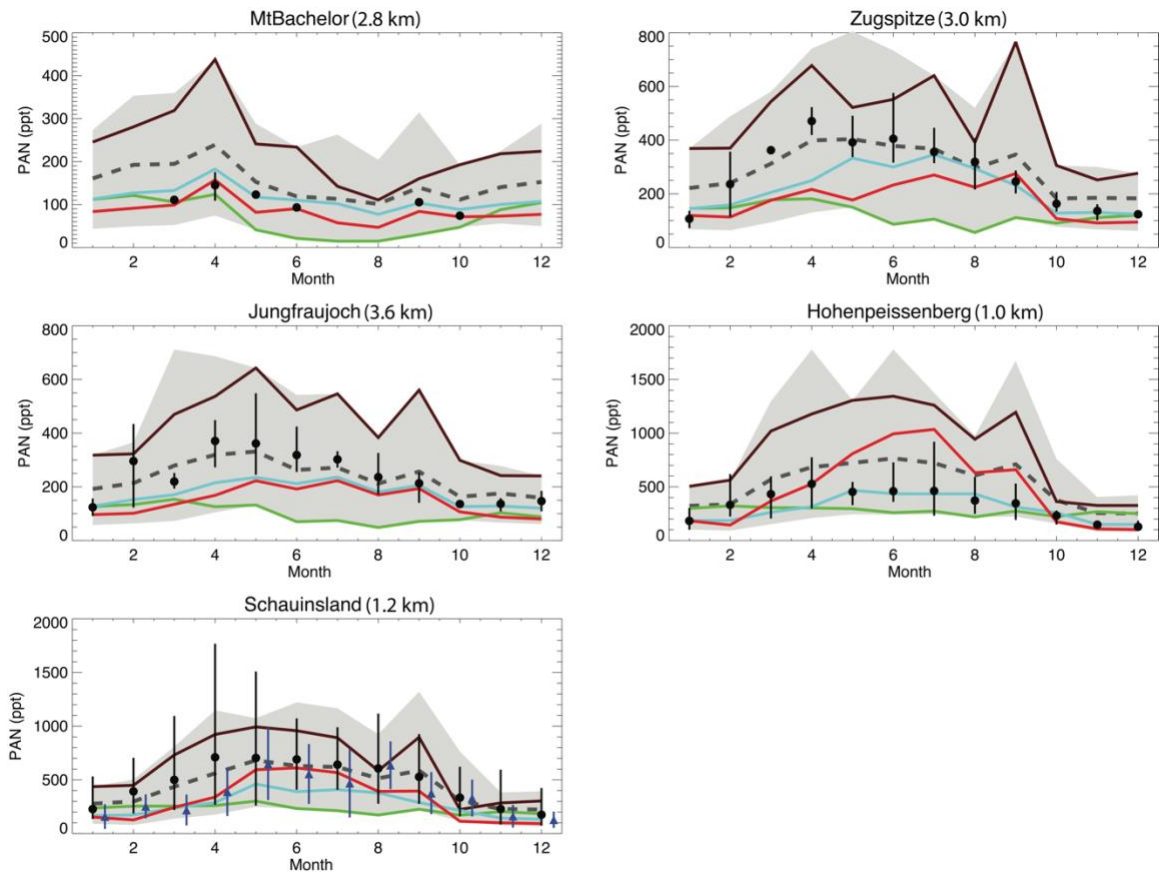Atmospheric
Chemistry
and Physics

Supplement of

Peroxy acetyl nitrate (PAN) measurements at northern midlatitude mountain sites in April: a constraint on continental source–receptor relationships

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Supplemental Figure 1: Monthly mean observed (black symbols for the multiyear mean, with minimum and maximum across the available years shown as black vertical lines; see Table 3) and simulated (the 14-model mean is shown as the grey dashed line; grey shading encompasses maximum and minimum values from any model in each month) PAN at northern mid-latitude mountain sites with multiple years of PAN measurements. For illustrative purposes, we show a "high" model (CAM-Chem, brown), a "low" model (GISS-ModelE, green), and two models that vary from site to site in their comparison to the other models (MOZARTGFDL, red and GMI, cyan). Also shown are year 2001 monthly mean values available at the Schauinsland site (blue triangles offset by a few days for clarity) and the standard deviation of measurements within each month (blue vertical lines).
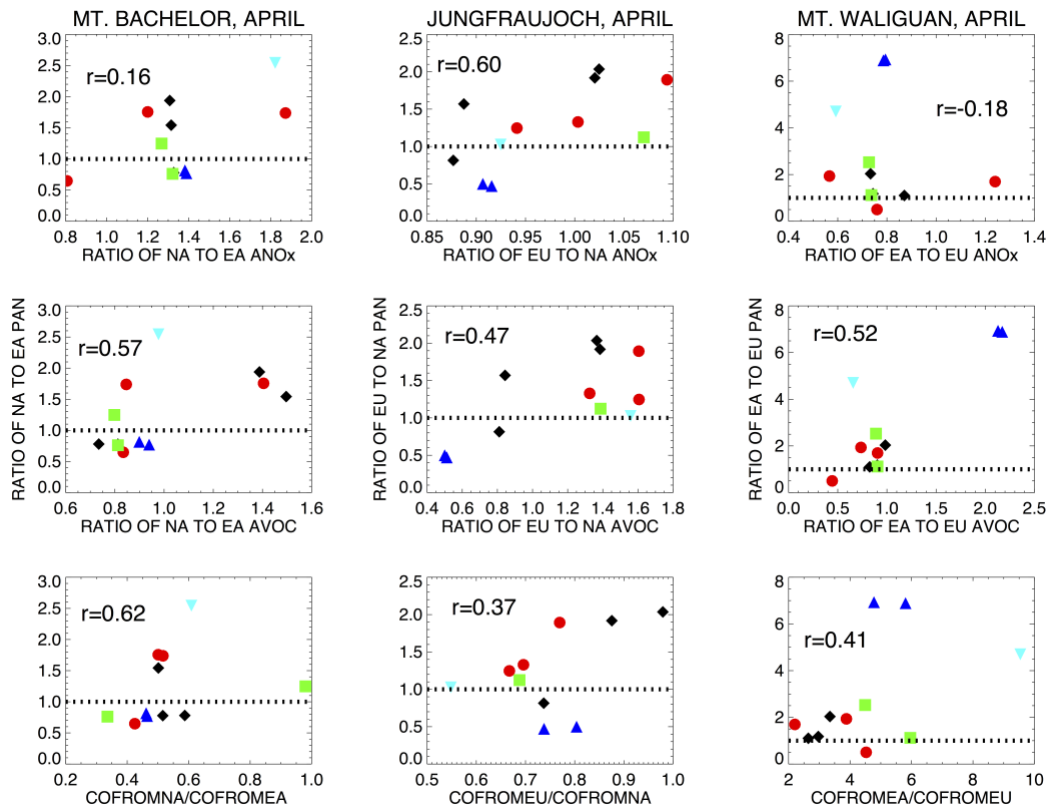
Supplemental Figure 2: The ratio in April of simulated SRRs for PAN sampled at Mount Bachelor (left) Jungfraujoch (middle), and Mount Waliguan (right), produced from emissions within the continental region where the site is located versus an intercontinental region, plotted as a function of the regional-to-intercontinental ratio of anthropogenic NO_x emissions (ANO_x; top row), of anthropogenic volatile organic compound emissions (AVOC; middle row), or of idealized tracers of model transport (COfromXX where XX = region of origin). Each point corresponds to an individual model and is color-coded by the meteorological fields used in the simulation: blue triangles for GEOS winds; red circles for NCEP; black diamonds for ECMWF; cyan upside-down triangles for CMC; green squares for general circulation models forced by observed sea surface temperatures and sea ice. At Jungfraujoch, one model with a ratio of 8.3 for EU to NA PAN is excluded. The Spearman rank correlation coefficient is shown in each panel. The black horizontal dashed line at 1 separates the models suggesting one region versus the other as the larger influence.
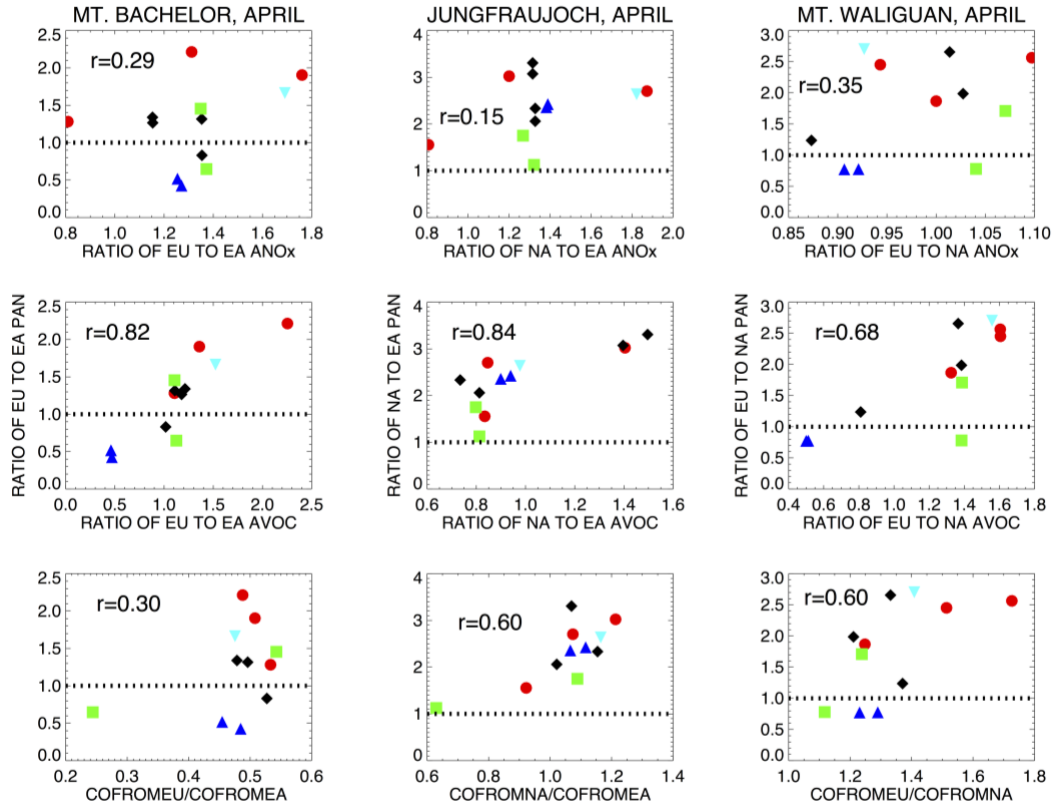
Supplemental Figure 3: As in Supplemental Figure 2, but for the ratios between two intercontinental source regions.
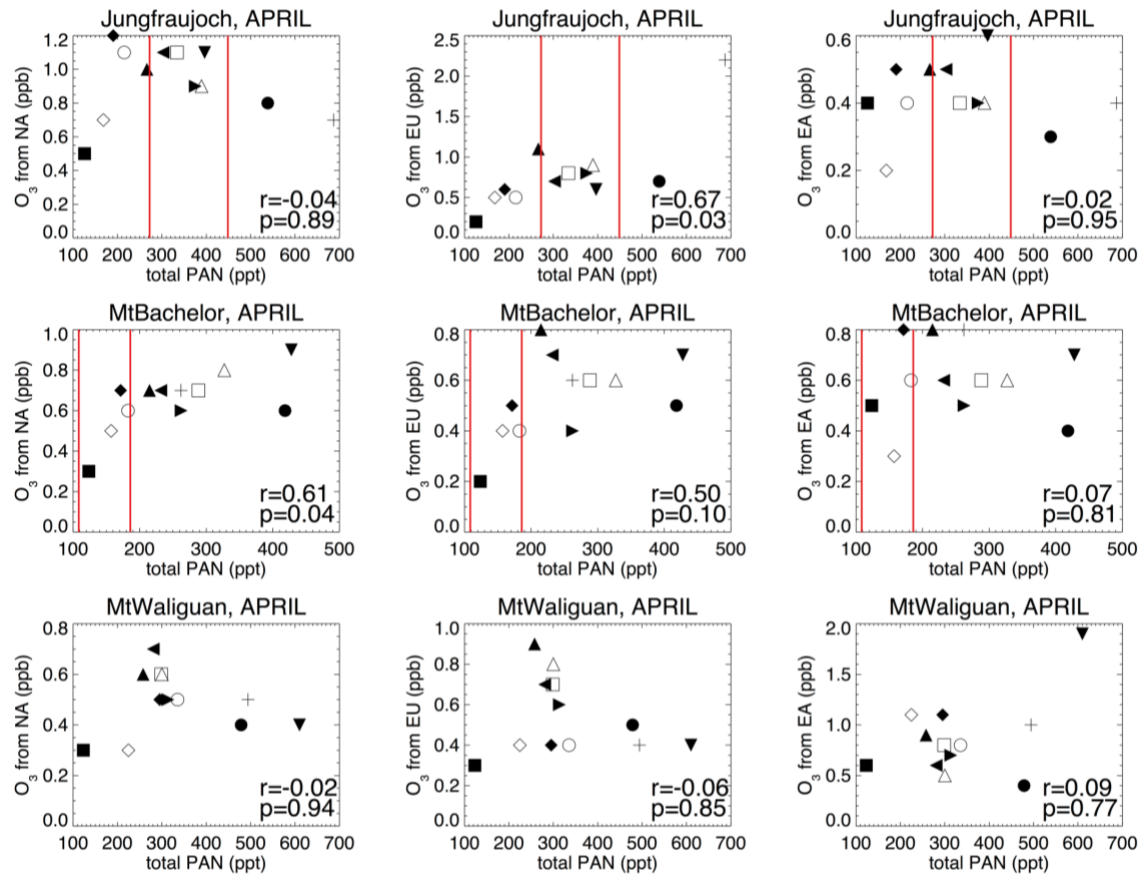
Supplemental Figure 4: As in Figure 4 in the main text but for O₃ SRRs.