Table S1: Statistical summary of MISR daily measurements over each of the 14 regions in this work, where mean is the average, STD is the standard deviation, and skewness is the skewness.

	Mean	STD	Skewness
Central Africa	1.38km	0.53km	1.76km
Midwest Africa	0.92km	0.30km	0.79km
Southern Africa	1.67km	0.40km	0.46km
Central Siberia	1.50km	0.56km	0.60km
Siberia and Northern China	1.09km	0.44km	0.75km
Eastern Siberia	1.11km	0.31km	-0.18km
Western Siberia	1.06km	0.58km	0.99km
Northern Southeast Asia	1.38km	0.81km	1.32km
Northern Australia	0.91km	0.45km	1.91km
Alaska	1.62km	0.71km	0.93km
Central Canada	1.80km	0.98km	1.23km
South America	0.87km	0.38km	1.36km
Argentina	0.63km	0.40km	2.48km
Eastern Europe	1.24km	0.78km	1.52km

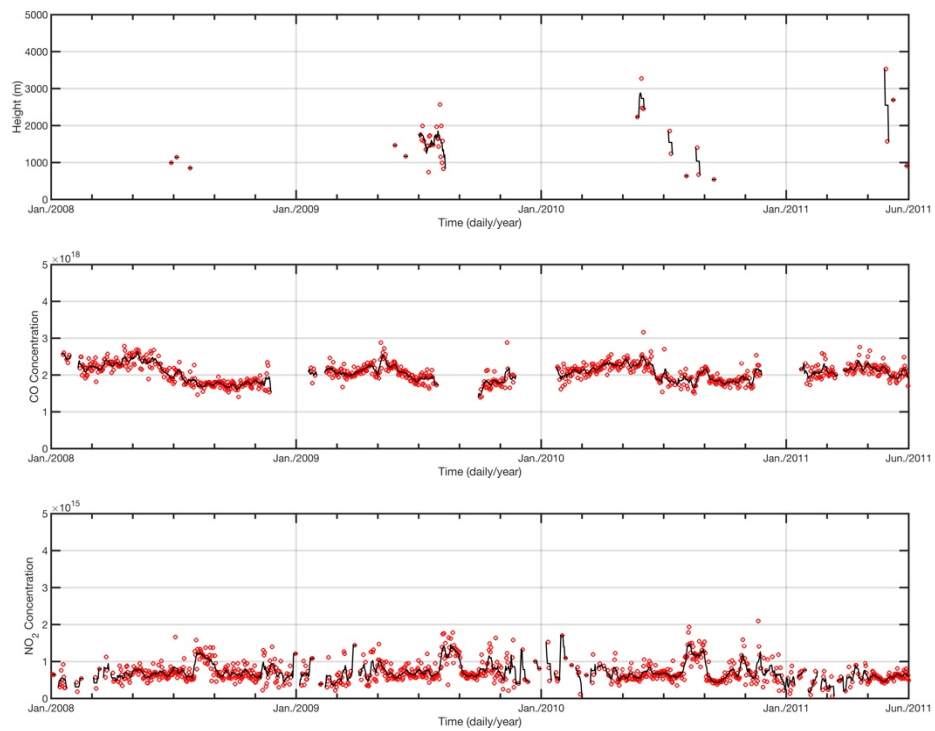
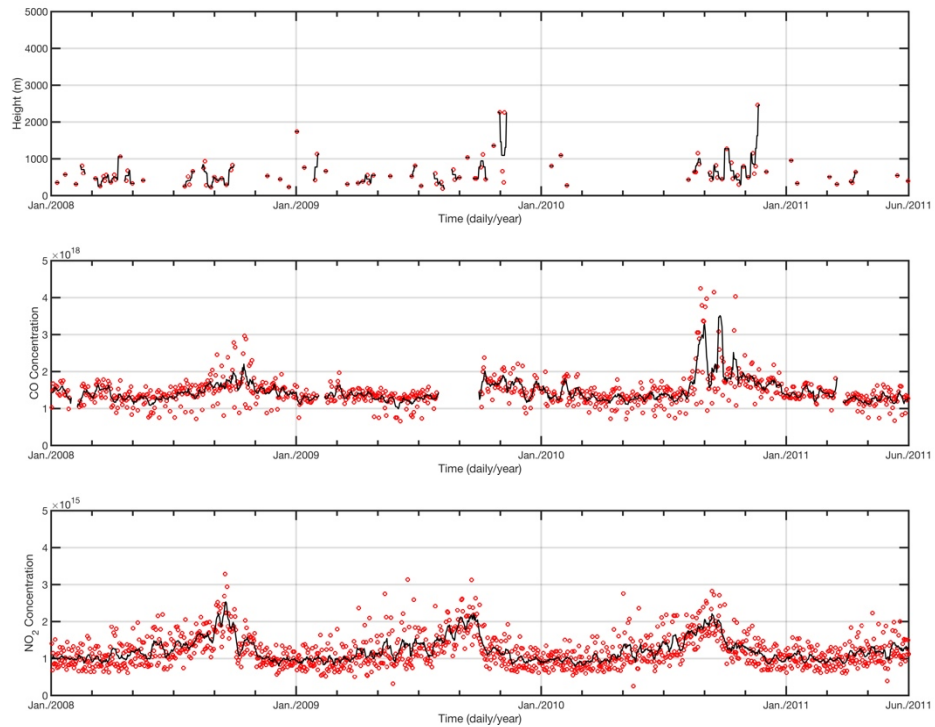
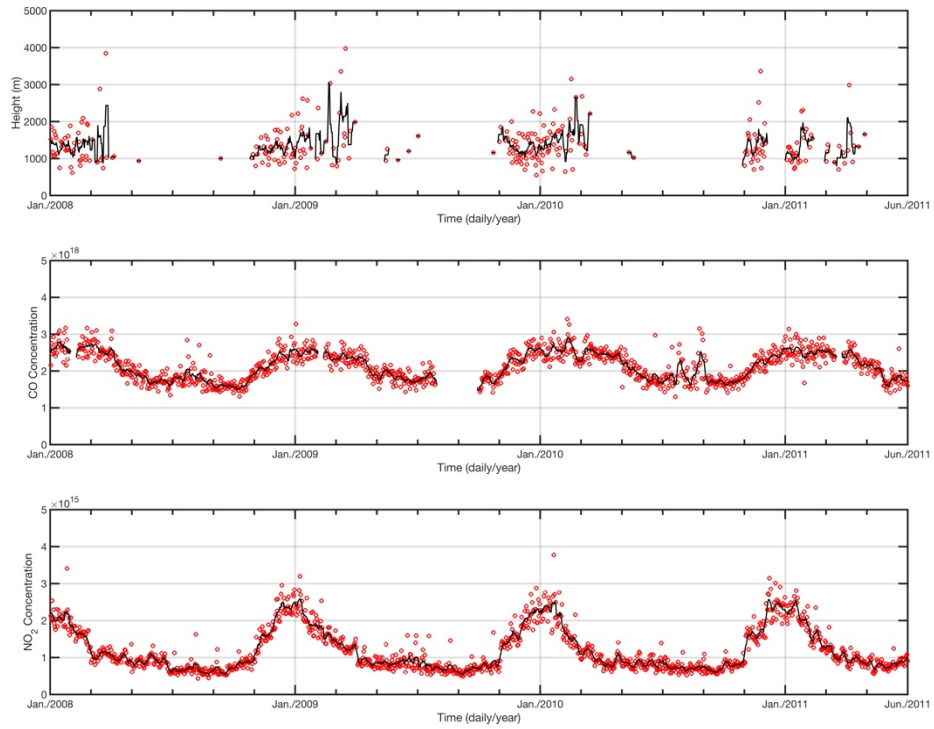
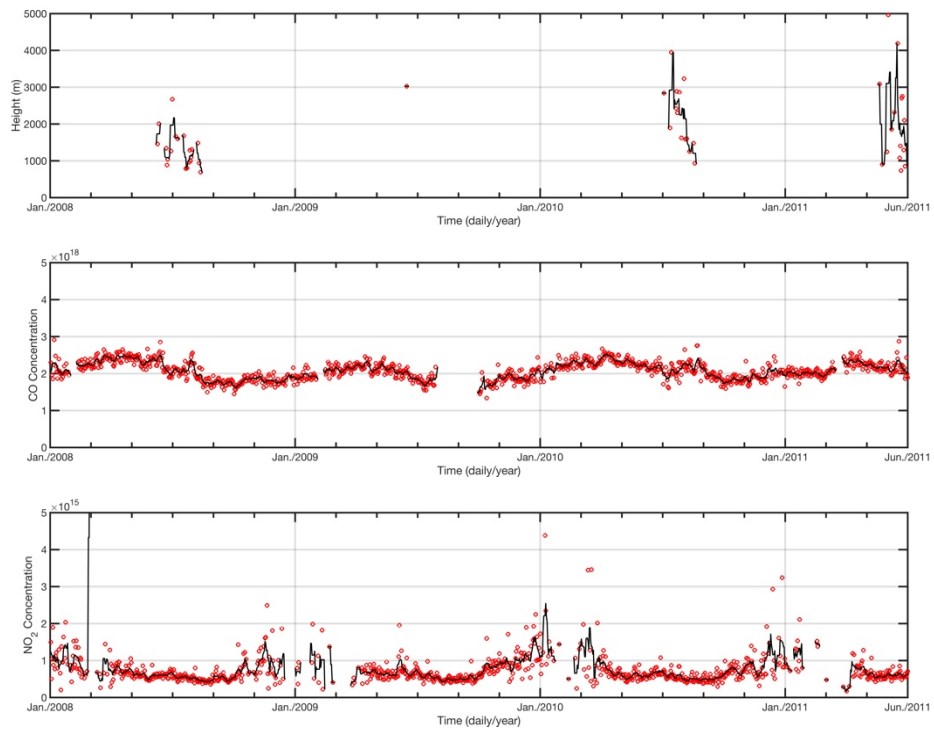
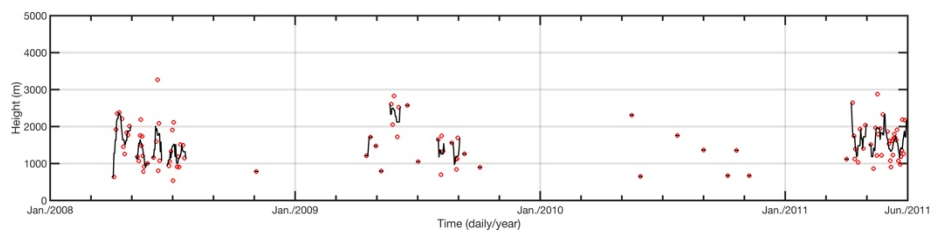
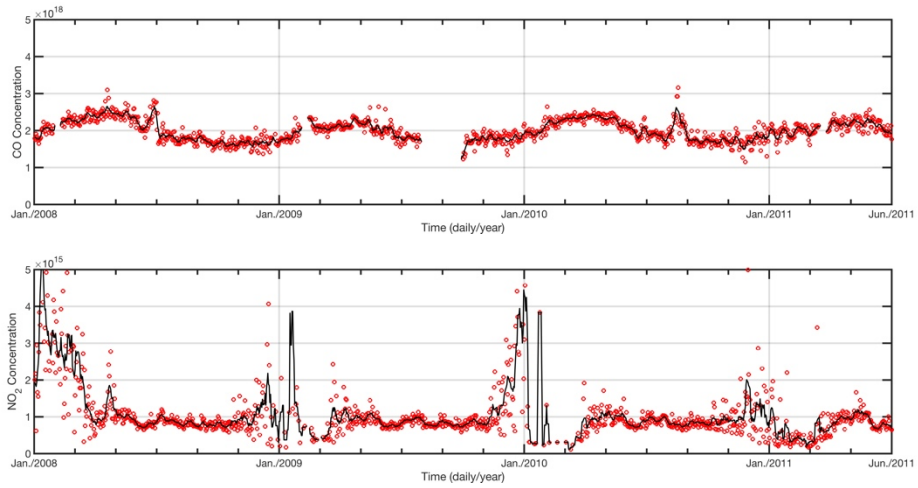
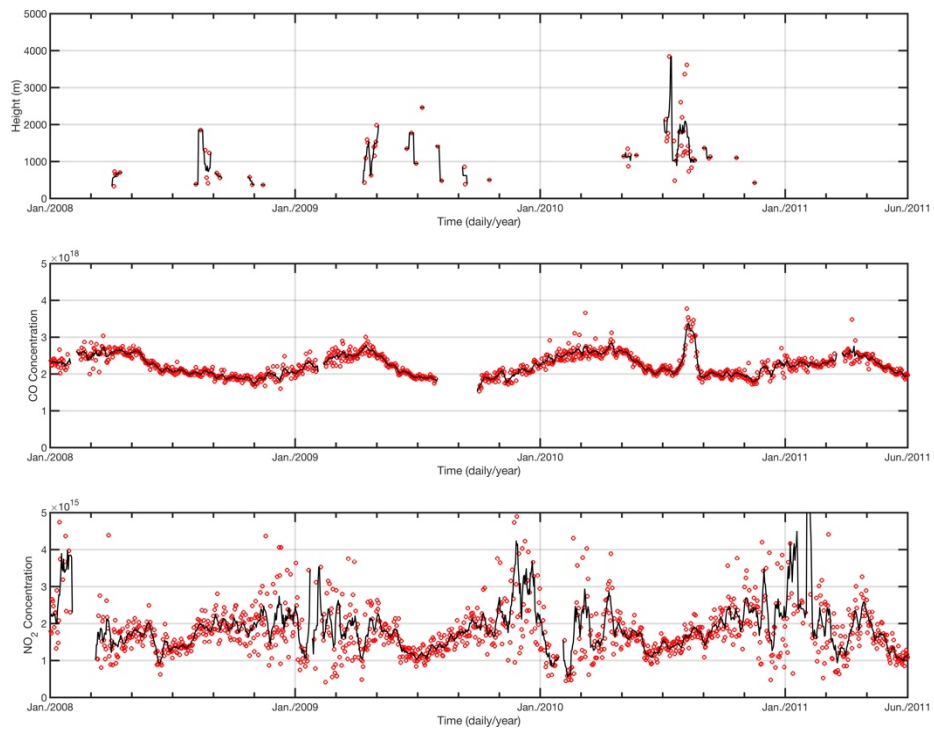
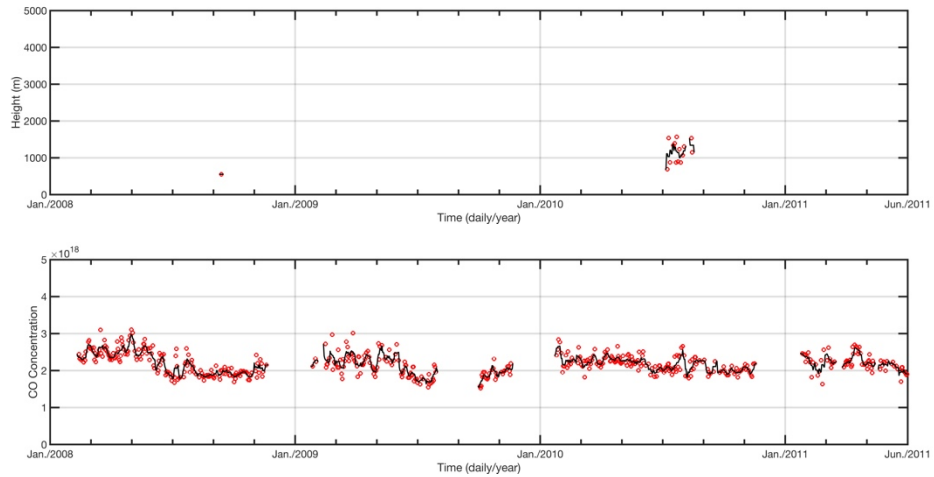
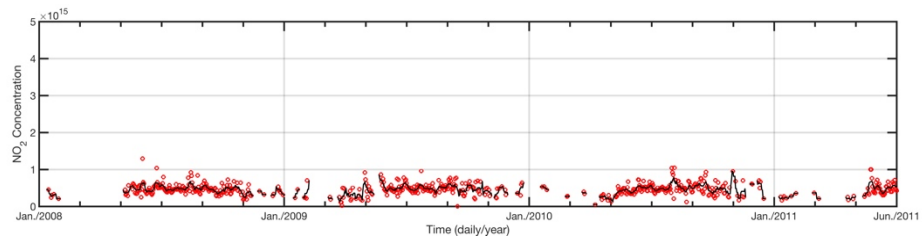
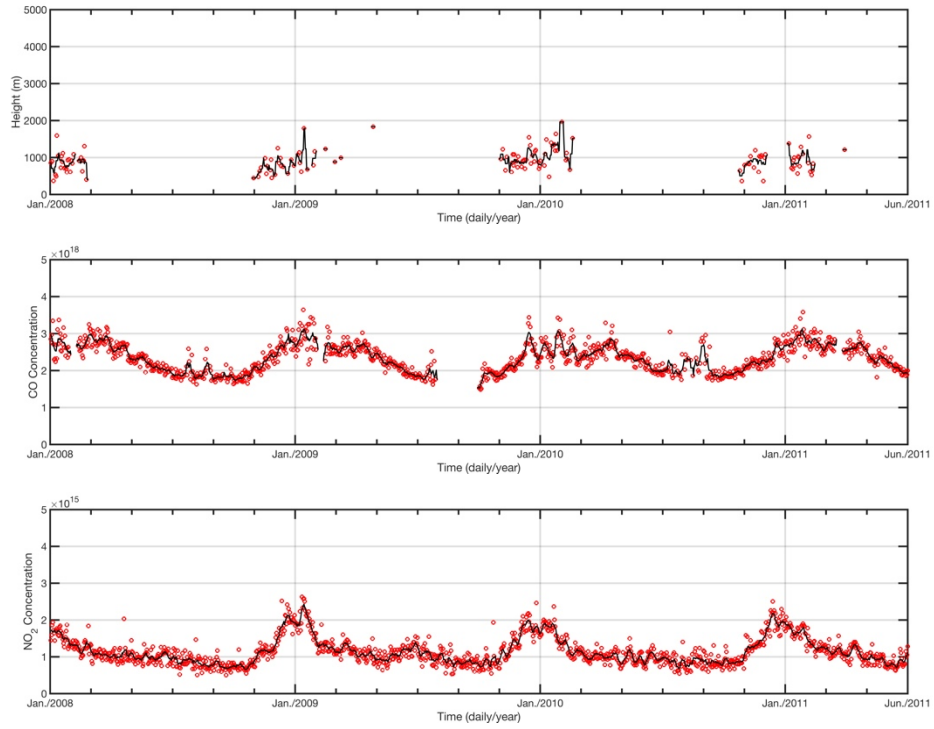
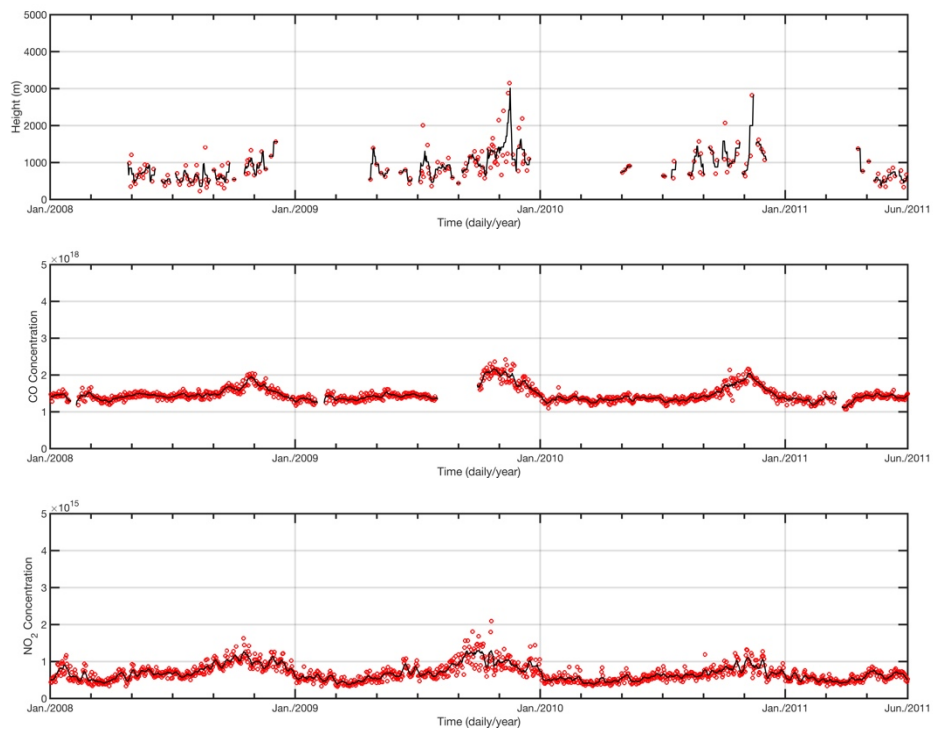
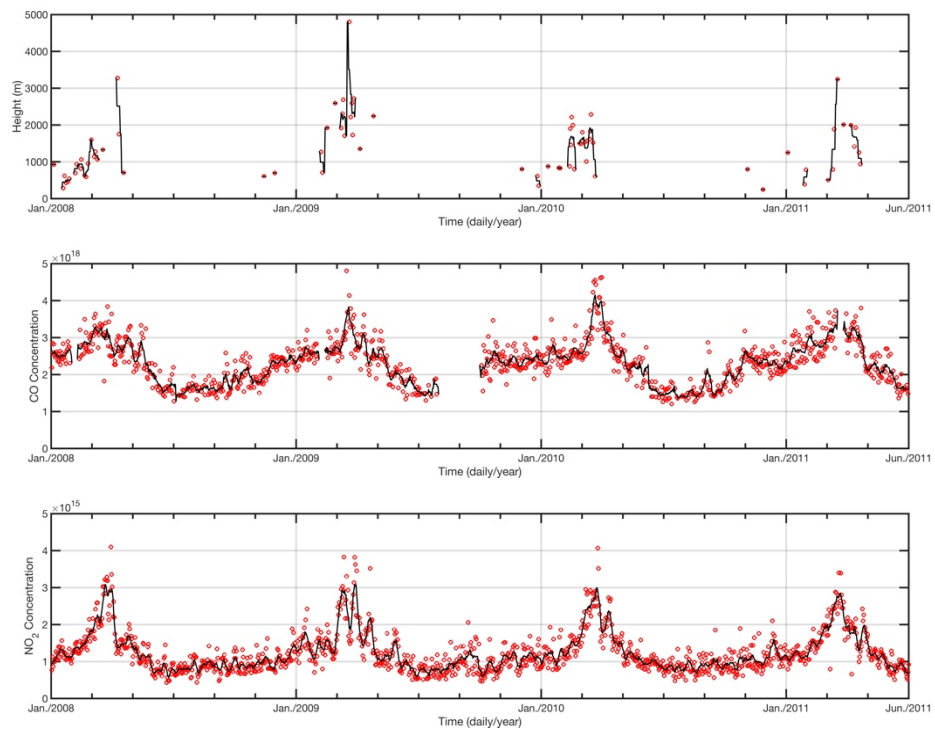
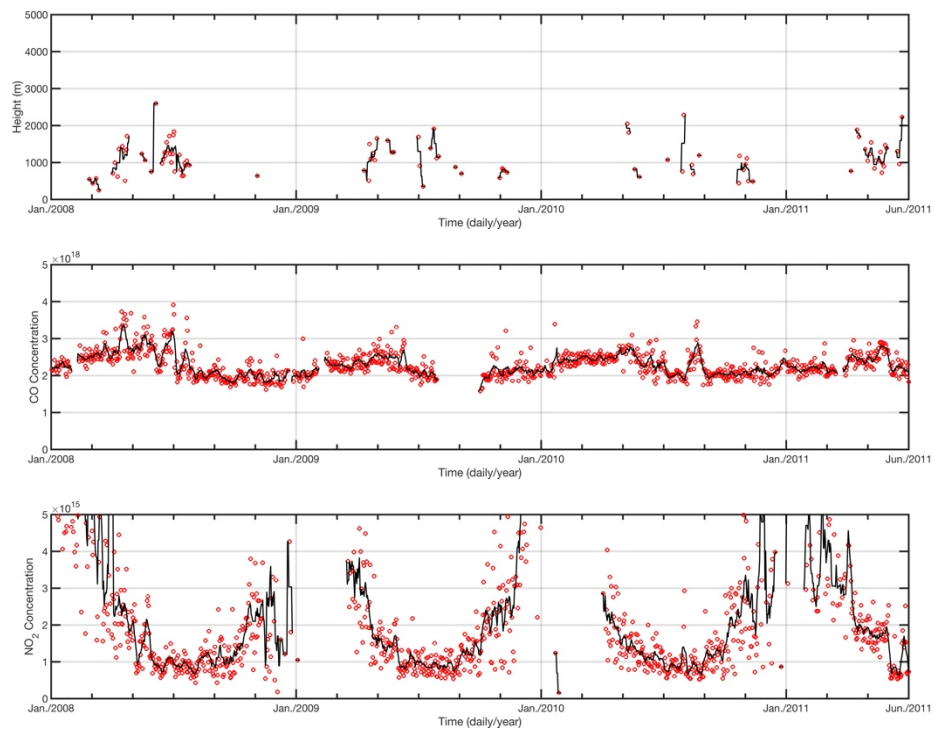
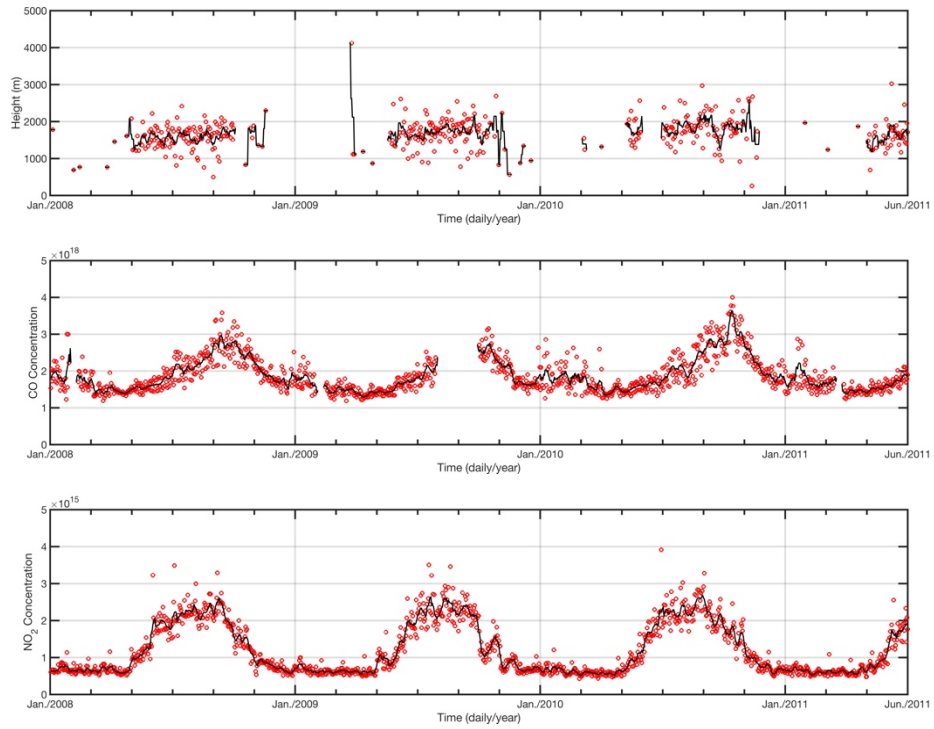
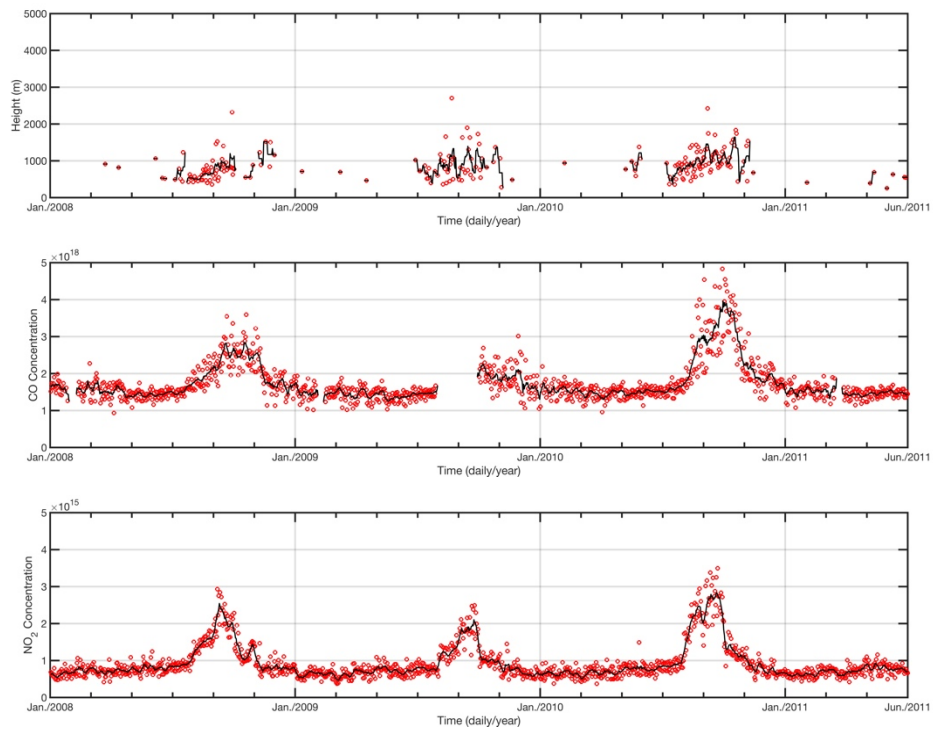
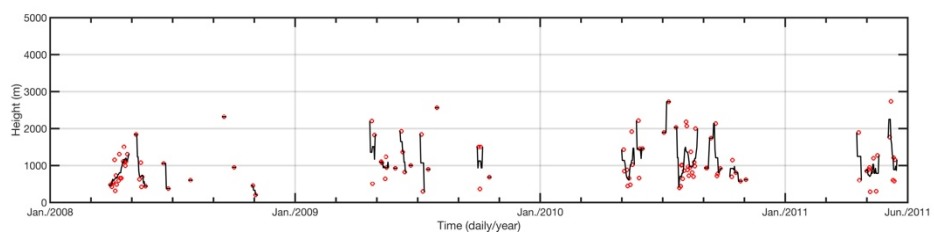
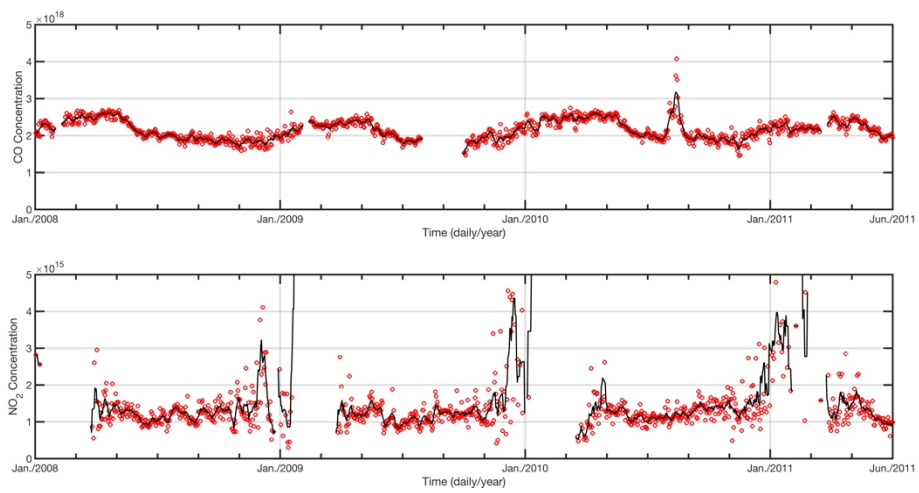
Figure S1: time series of different satellite products over all regions (top panel is MISR measurements, median is MOPITT CO measurements, bottom is OMI NO₂ measurements and black line is move mean value using seven days)

(1) Alaska

(2) Argentina

(3) Central Africa

(4) Central Canada

(5) Central Siberia

(6) East Europe

(7)East Siberia

(8)Midwest Africa

(9) Northern Australia

(10) Northern Southeast Asia

(11) Siberia and North China

(12)South Africa

(13)South America

(14)West Siberia

Figure S2: PDFs of the overall MISR height data in each region, and the corresponding PDFs over the plume rise model and regression model heights, where they are available. The total number of height measurements available is given in each legend.

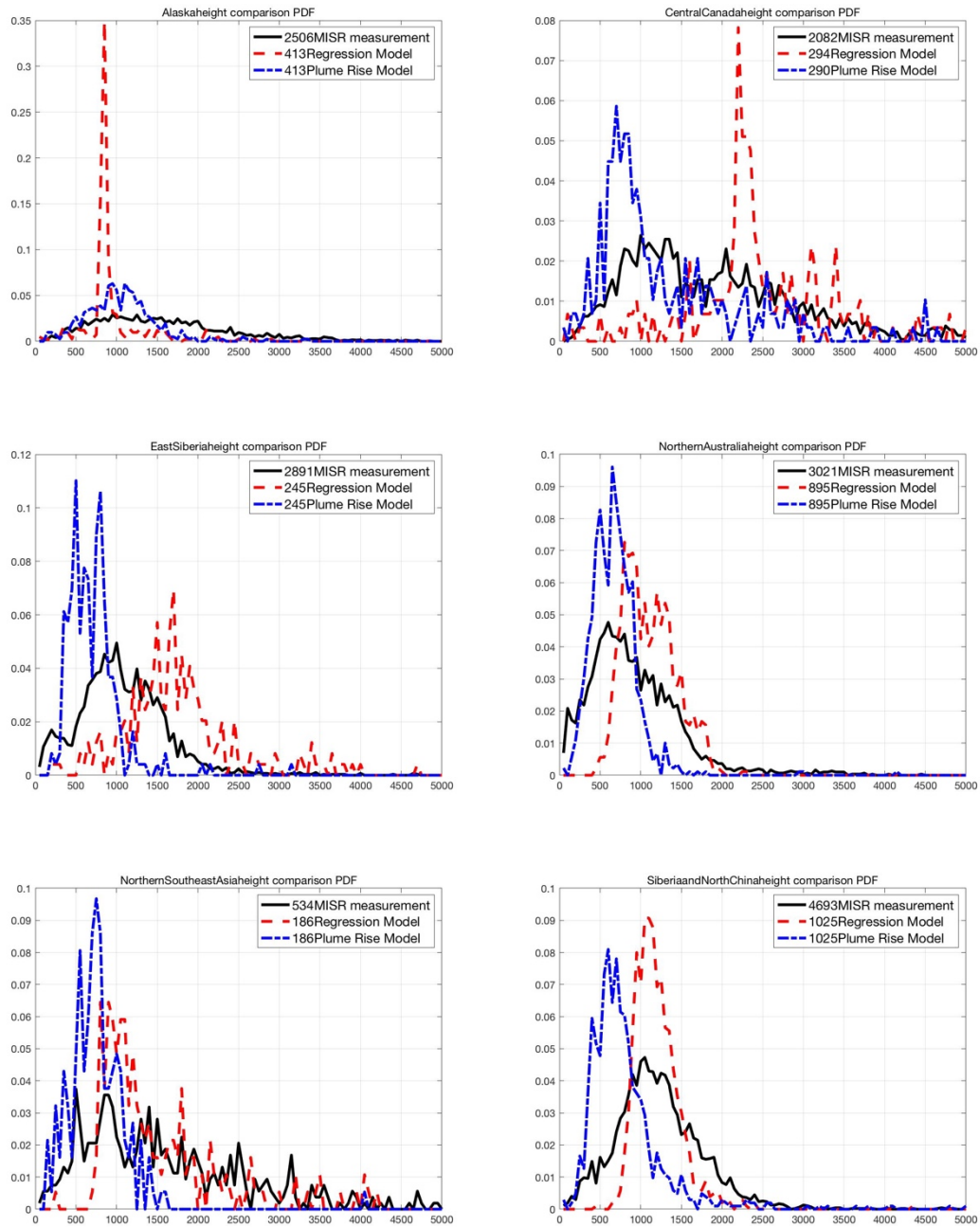
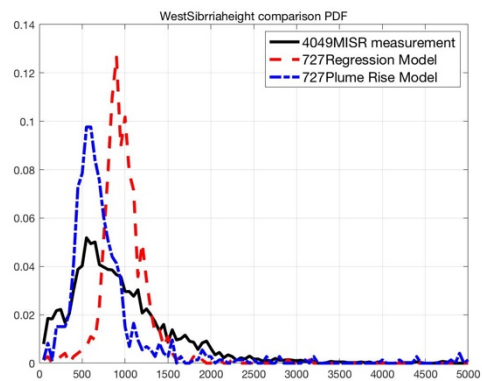
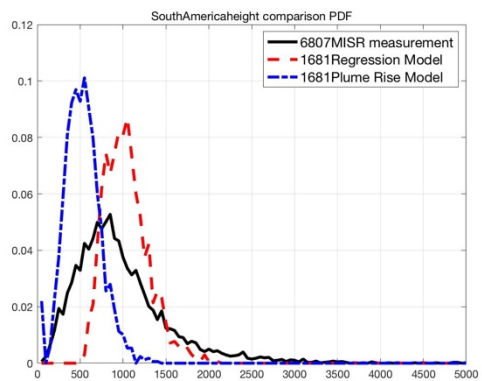



Figure S3: Daily MISR measured heights in blue circles, with a 1 standard deviation range in blue lines. Plume rise model calculated heights in red boxes, and regression model calculated heights in black boxes, where available.

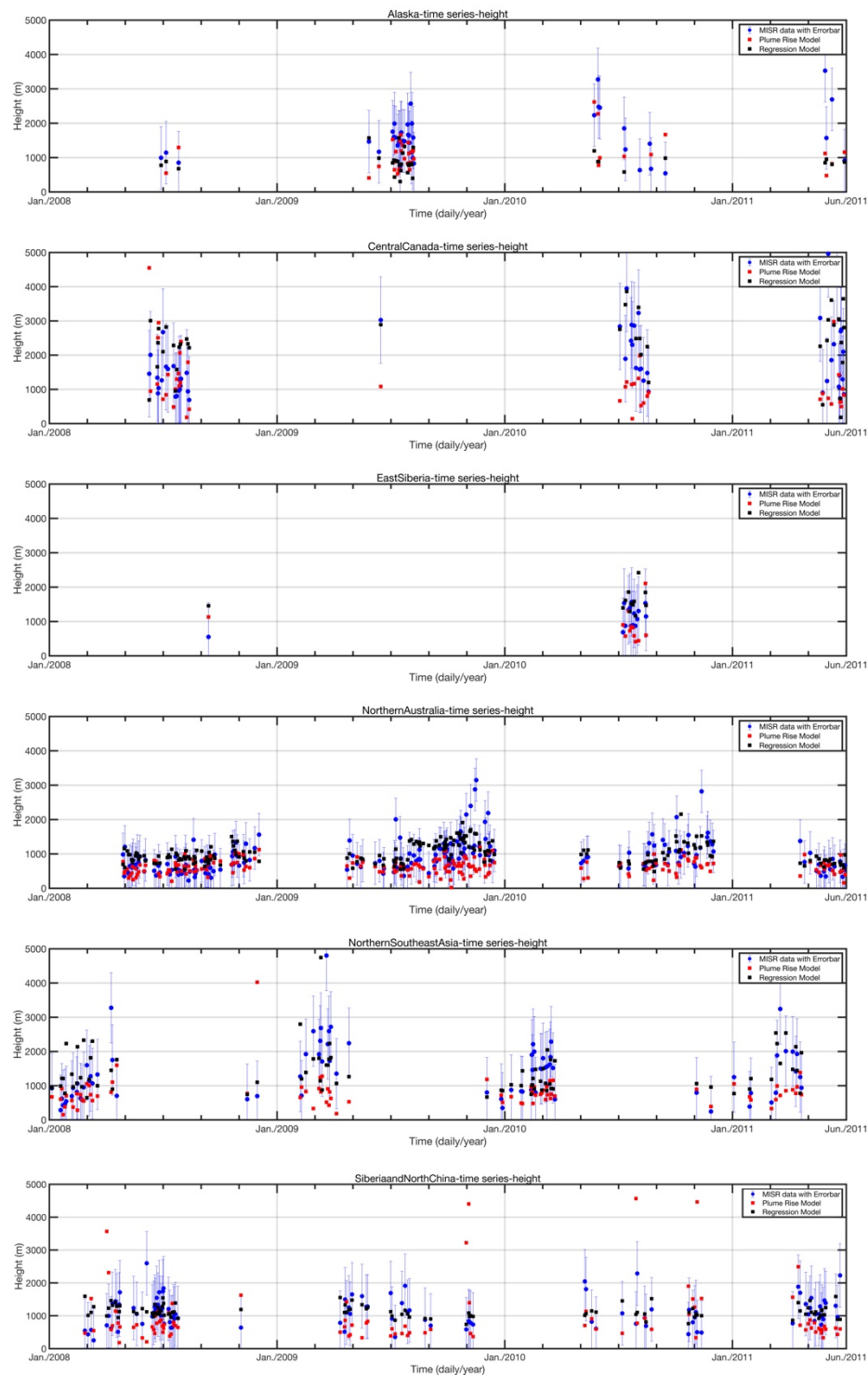
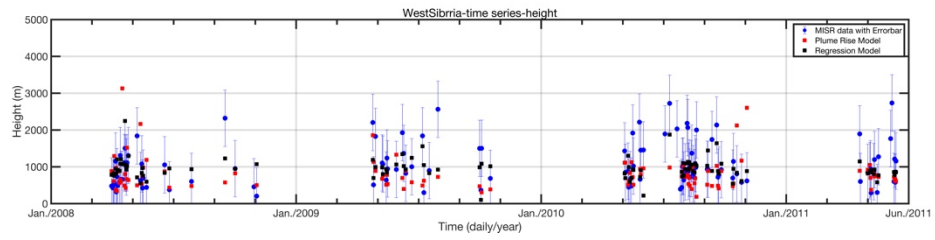
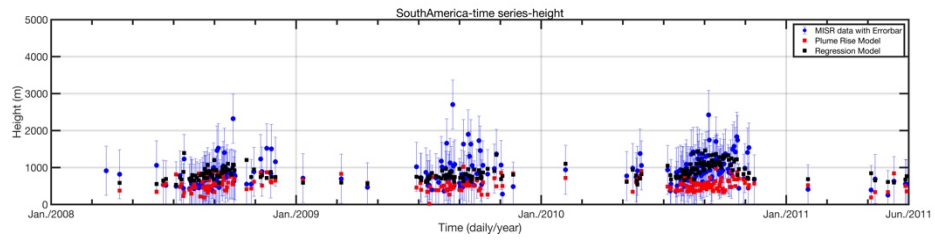



Figure S4: Probability density functions (PDFs) of all measured MISR heights. The boundary between inside and outside is defined as 1 standard deviation from the mean. The total number of measurements within each range is given in the legend.