

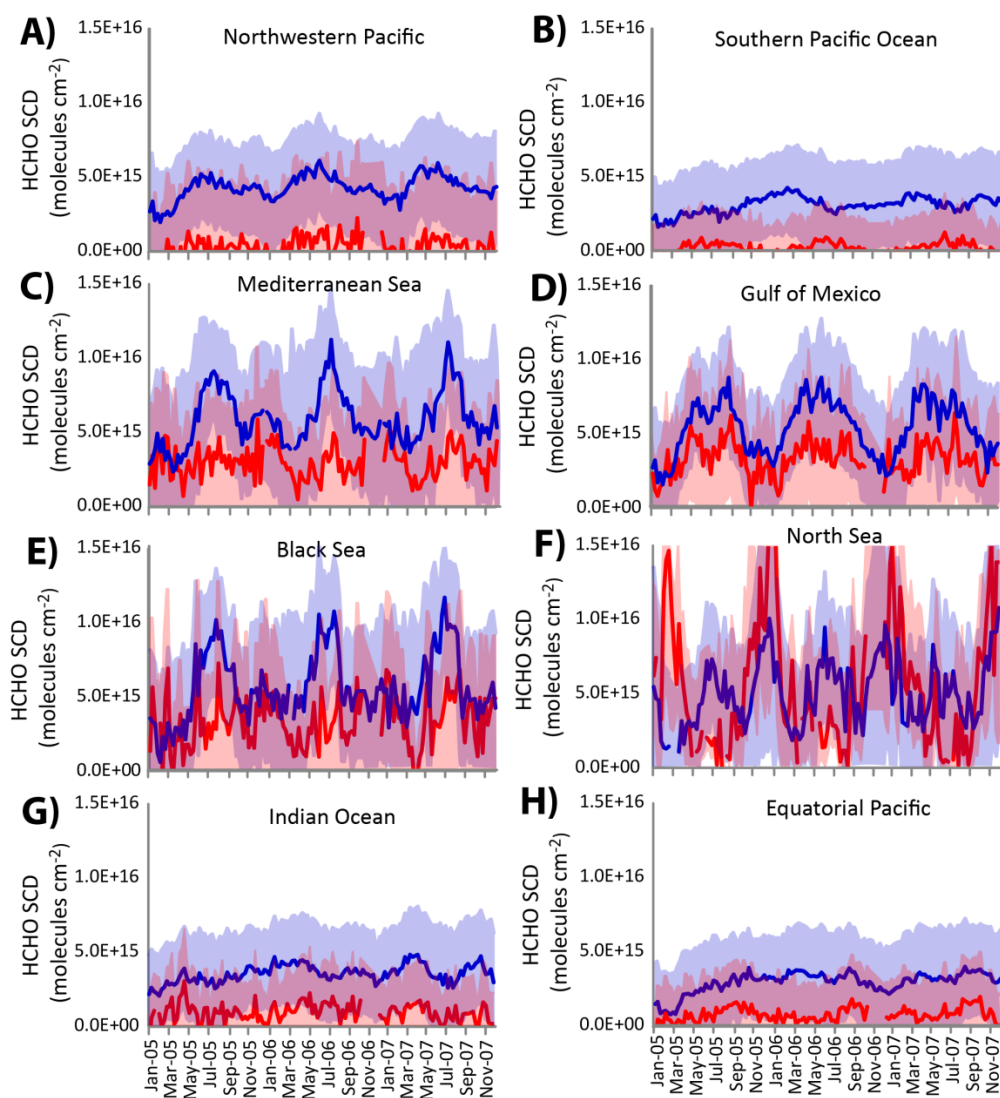
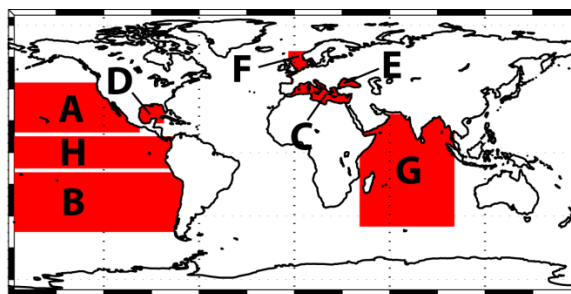
## Supplementary Online Material

**Table 1:** One-day yields of formaldehyde per C reacted from the oxidation of parent VOCs emitted in CHIMERE chemical transport model, assuming summer conditions over Europe (obtained from Dufour et al., 2009).

	VOC Lifetime <sup>a</sup>	1 ppbv NO <sub>x</sub> <sup>b</sup>	0.1 ppbv NO <sub>x</sub> <sup>b</sup>		VOC Lifetime <sup>a</sup>	1 ppbv NO <sub>x</sub> <sup>b</sup>	0.1 ppbv NO <sub>x</sub> <sup>b</sup>
C <sub>2</sub> H <sub>4</sub>	6 h	0.98-0.83	0.88-0.79	O-xylene	4 h	0.26-0.18	0.14-0.09
C <sub>3</sub> H <sub>6</sub>	2 h	0.66-0.61	0.49-0.29	MEK	1 day	0.22-0.16	0.07-0.06
CH <sub>3</sub> CHO	3 h	0.48-0.49	0.3-0.28	α-pinene	47 min	0.21-0.11	0.08-0.07
Isoprene	32 min	0.48-0.42	0.3-0.25	n-C <sub>4</sub> H <sub>10</sub>	22 h	0.16-0.14	0.05-0.02
CH <sub>3</sub> OH	2.5 days	0.41-0.38	0.27-0.26	C <sub>2</sub> H <sub>6</sub>	9 days	0.05	0.01-0.03

<sup>a</sup>. VOC lifetime under summer midmorning conditions: [OH]=5×10<sup>6</sup> molecule cm<sup>-3</sup>, [O<sub>3</sub>]=10<sup>12</sup> molecule cm<sup>-3</sup>, temperature at 298K.

<sup>b</sup>. HCHO formation obtained from the oxidation of VOCs emitted in CHIMERE chemical transport model with several different chemical mechanisms: the MELCHIOR mechanism, the SAPRC99 scheme, the Master Chemical Mechanism (MCM), and the Self-Generated Master Mechanism (SGMM) (Dufour et al., 2009).



**Figure 1S.** Time series of 8-day averaged HCHO SCD from SCIAMACHY (red) and OMI (blue) for January 2005 to December 2007. Shaded area represents one standard error about mean observation. The areas selected are highlighted in red in the top two panels: (A) northwestern Pacific Ocean, (B) southern Pacific Ocean, (C) Mediterranean Sea, (D) Gulf of Mexico, (E) Black Sea, (F) North Sea, (G) Indian Ocean, and (H) equatorial Pacific Ocean. Note that the OMI VCD time series in (C) uses the corrected values.