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*Supplement of*

## **Modeling the diurnal variability of agricultural ammonia in Bakersfield, California, during the CalNex campaign**

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Table S1. Summary statistics of the CMAQ<sub>RVMR</sub> to TES<sub>RVMR</sub> NH<sub>3</sub> comparisons for 2 CalNex overpasses (05/12, 05/14) with mean bias (MB) and mean normalized bias (MNB).

Model Run	Slope	r <sup>2</sup>	MB (ppbv)	MNB (%)
CMAQ <sub>base</sub>	0.35	0.42	-2.94	-12.55

Table S2. Contribution of sources to NH<sub>3</sub> emissions inventory in the San Joaquin Valley as reported in the CARB emissions inventory.

County	Pesticide/ Fertilizer Fraction	Farming Operation Fraction	Other Area Sources
Kings County	0.47	0.55	0.00
Fresno County	0.40	0.57	0.03
Kern County	0.72	0.25	0.03
Merced County	0.23	0.76	0.01
Stanislaus County	0.32	0.65	0.03
Madera County	0.33	0.64	0.03
San Luis Obispo County	0.25	0.51	0.24
Tulare County	0.11	0.86	0.02

Table S3. Summary statistics of the modeled (CMAQ<sub>base</sub>) to measured NH<sub>x</sub>, NH<sub>3</sub> and NH<sub>4</sub> concentration comparisons following the SJV flight on 7 May 2010.

Date	Time (PDT)	NH <sub>x</sub>				NH <sub>3(g)</sub>		NH <sub>4(p)</sub>	
		Slope	r <sup>2</sup>	MB (ppbv)	MNB (%)	MB (ppbv)	MNB (%)	MB (ppbv)	MNB (%)
20100507	10:00- 17:00	0.15+/-0.01	0.29	-19.23	-22.52	-17.71	-21.11	-0.26	-13.08

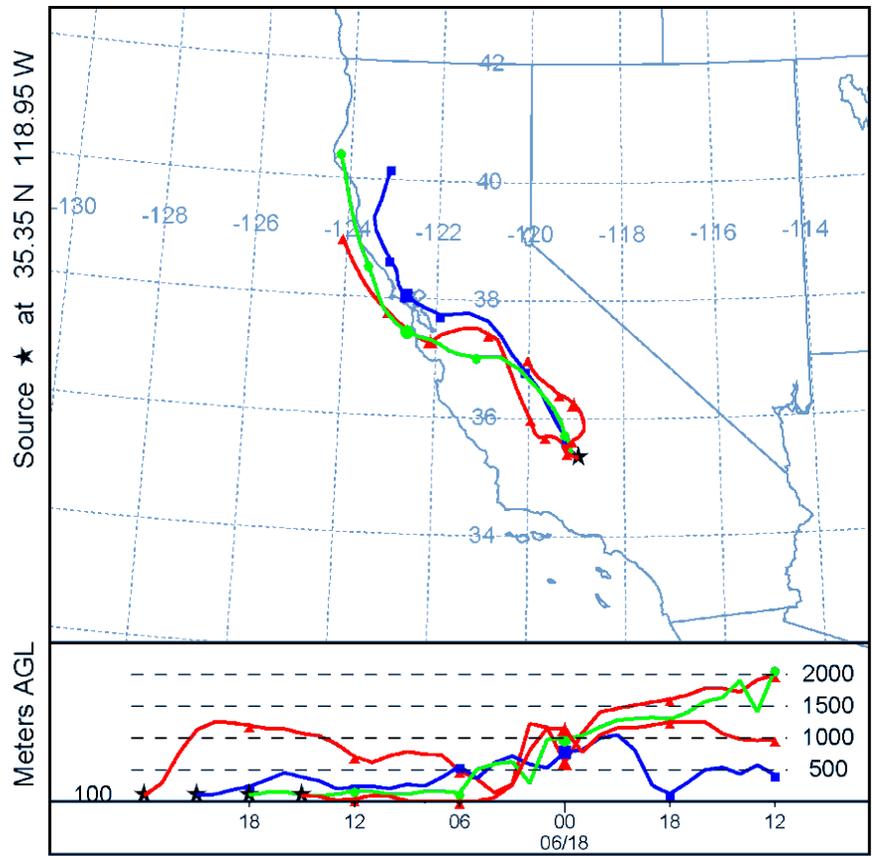


Figure S1. HYSPLIT back trajectories initiated from Bakersfield, CA generated using WRF 4 km input data. The back trajectories are initiated on June 18<sup>th</sup> at 17:00 PDT (red easternmost in the top panel) and run backwards every 3 hours until June 17<sup>th</sup> at 20:00 PDT. Only the first 4 outputs are shown.

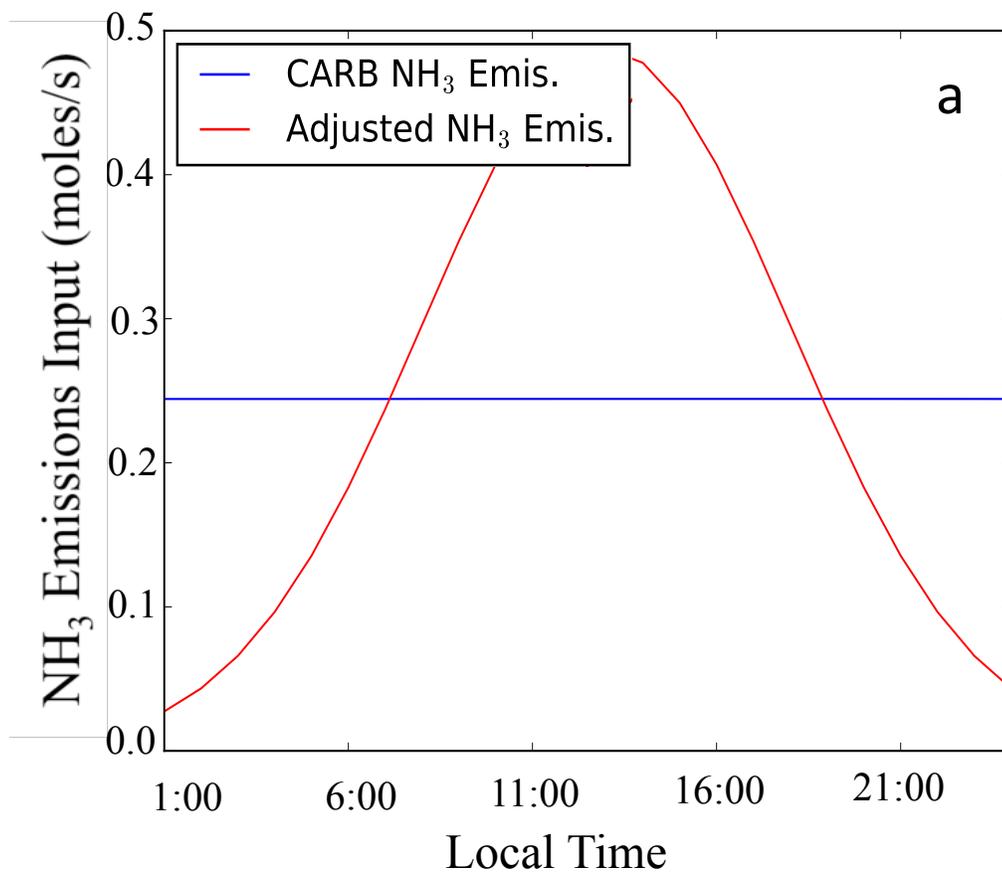


Figure S2. The CARB NH<sub>3</sub> emissions (solid blue) and adjusted scenario emissions (solid red) based on ground measurements at the Bakersfield site.

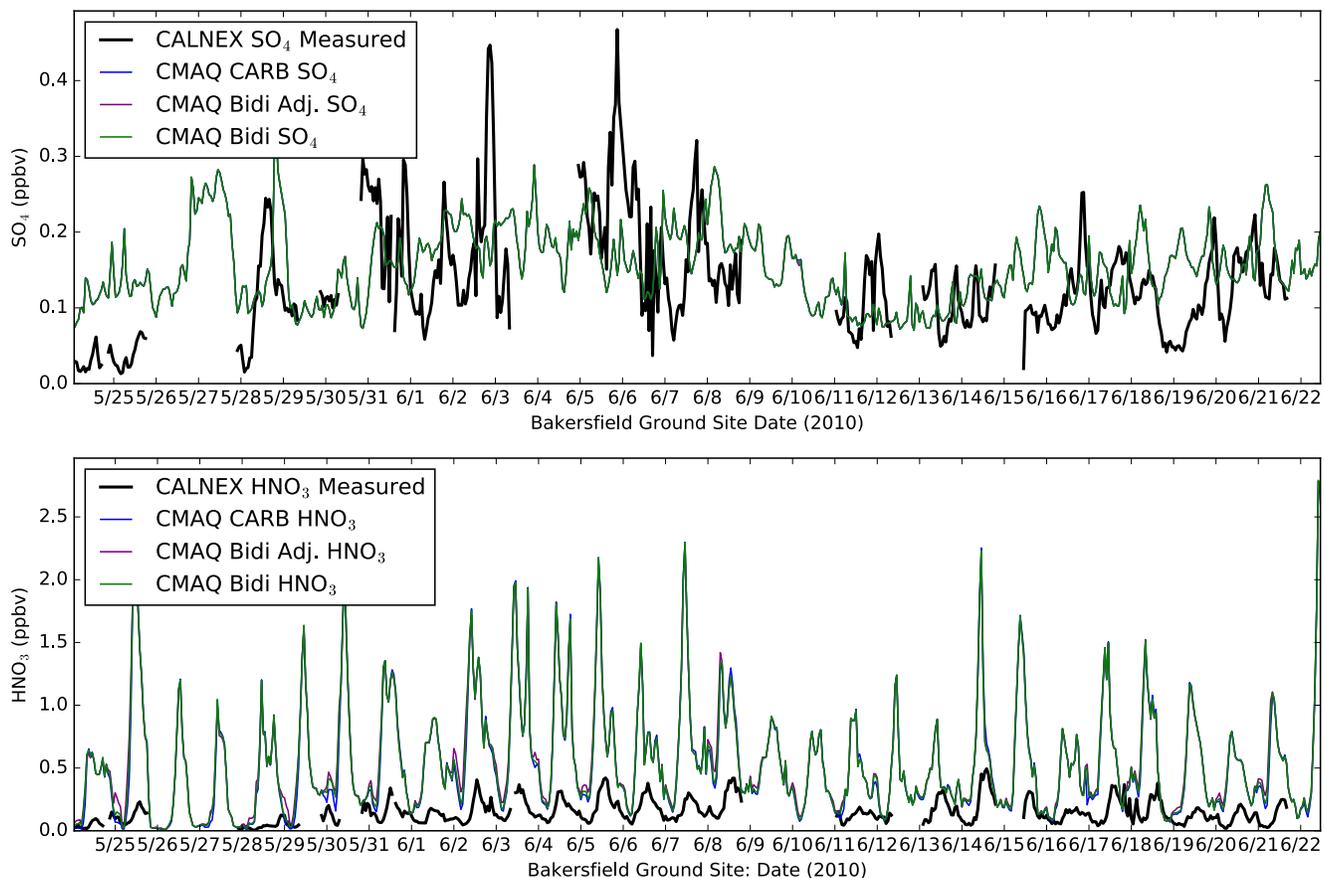


Figure S3. The CalNex ground measurements at the Bakersfield site (solid black) compared to the CMAQ<sub>base</sub> (solid blue), CMAQ<sub>AB</sub> (purple) and CMAQ<sub>B</sub> (green) simulations for a month of model runs. The top panel (a) shows SO<sub>4(p)</sub>, b) shows HNO<sub>3(g)</sub>

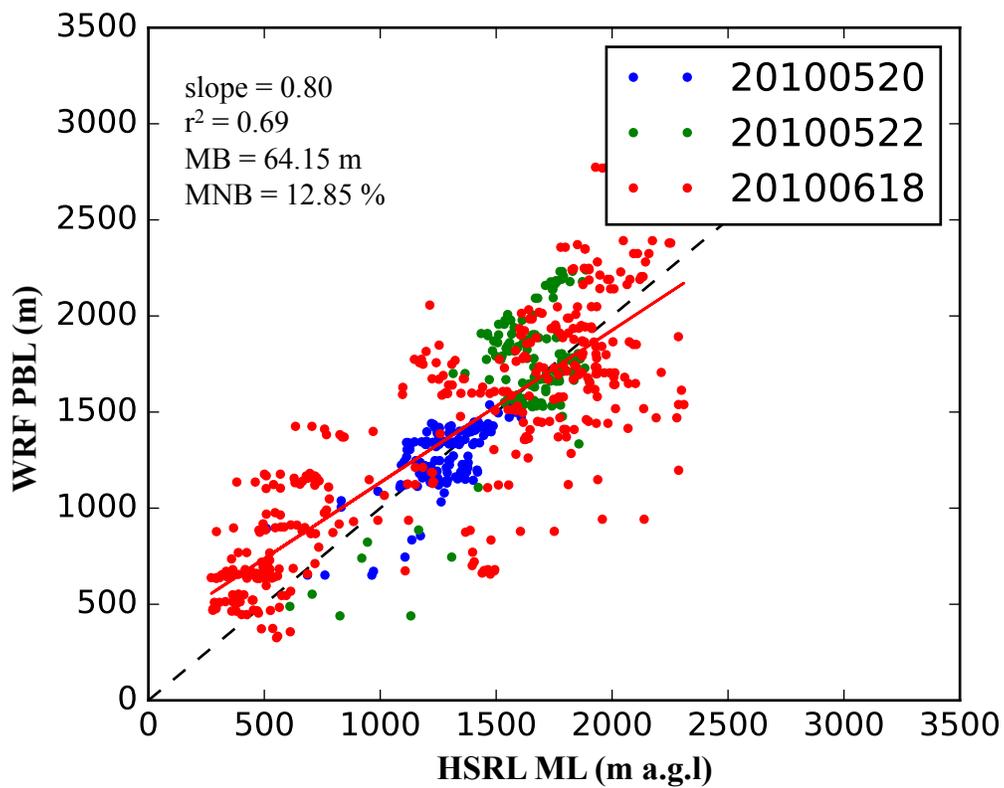


Figure S4. WRF predicted planetary boundary layer heights and HSRL calculated mixed layer heights for 3 flights in the San Joaquin Valley (2 during CalNex and one during a CARES campaign).

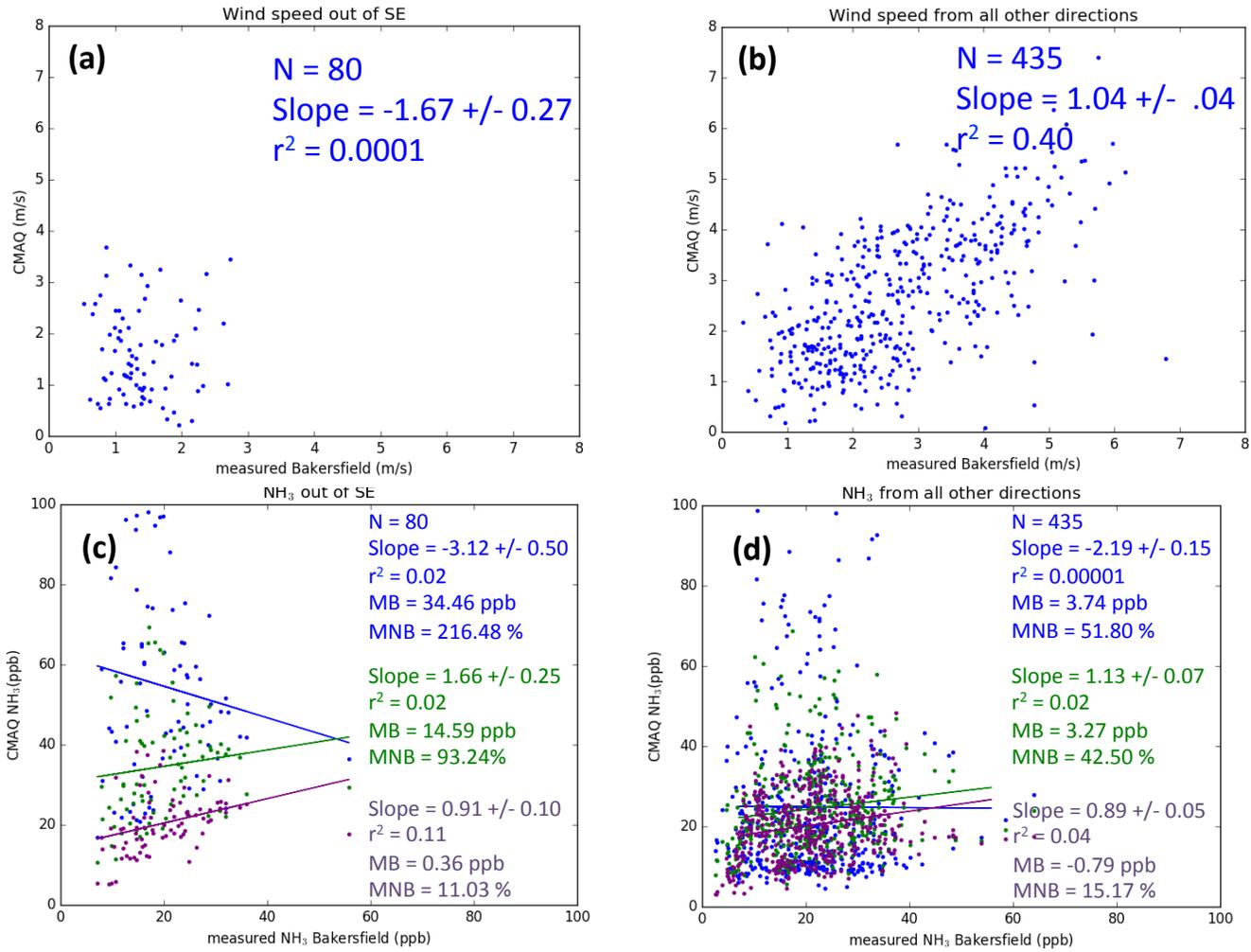


Figure S5. Comparing measured and modeled wind speed (a) when coming from the southeast direction and (b) all other directions relative to the Bakersfield, CA site. Comparing measured and modeled NH<sub>3</sub> concentrations (c) when coming from the southeast direction and (d) all other directions. Colors describe the CMAQ<sub>base</sub> (solid blue), CMAQ<sub>AB</sub> (purple) and CMAQ<sub>B</sub> (green) modeled scenarios.