Reply to Reviewer #1's Report

General Comments

1. Evaluation of model coupling

The description of cases is much improved and sufficient. The additional analysis of aerosol measurements supports the use of these urban measurements to evaluate the impact of changes to the ammonia fertilizer emissions and bidirectional treatment of ammonia.

Response: Thank you.

2. Comparison with other emissions estimates

The authors could still improve the comparison with other estimates of fertilizer emissions by acknowledging that the flux to air of deposited ammonia in the bidirectional method changes how emissions are counted. If the authors have not considered reemission of ammonia in the 3.0 Tg total, it would be important to note how the calculation has been done.

Response: Thank you for your comments. In the bidirectional method, the deposited ammonia can indeed affect the NH_3 emission by impacting the soil gamma (Γ_g). A clarification has been added to section 2.3 in the revised manuscript (Page 9, Line 16-19), which is as follows:
"The soil gamma (Γ_g) is defined as soil $[NH_4^+]/[H^+]$, and the soil NH_4^+ budget in CMAQ is parameterized following the method in EPIC. The soil NH_4^+ would increase due to N deposition, and decrease due to NH_3 evasion and soil nitrification. "

3. Uncertainty analysis

The authors have strengthened the uncertainty analysis section by describing many sources of uncertainty in the modeling process. Nevertheless, no quantitative work is done to support +/- 50% uncertainty (p.17, l.2). This number needs to be excised from the paper to avoid being misleading for future work.

Response: Thank you for your comments. That number has been excised from the revised manuscript.

Specific Comments

A. Abstract

Lines	*Comment*
8	"coupling" to "which couples"
9	"Multi-Scale" to "Multi-scale"
11	"emission" to "emissions"
13	"rate" to "rates"
14	"method for different crop" to "methods for different crops"
15	"inputed" to "input"

B. Text

Page | Lines	***Comment***
throughout	*"researches" to "research"*

throughout “It’s” to “It is”

Response: Thank you for your comments. The above editorial mistakes have been amended.

The text needs to be thoroughly edited by a native English speaker

Response: Thank you. The revised text has been thoroughly edited by a native English speaker.