

Interactive comment on “Isotopic composition of water-soluble nitrate in bulk atmospheric deposition at Dongsha Island: sources and implications of external N supply to the northern South China Sea” by J.-Y. T. Yang et al.

Anonymous Referee #1

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General comets

Yang et al. monitored the concentrations of anions (nitrate and sulfate etc.) and cations (ammonium and calcium etc.), and analyzed the $\delta^{15}\text{N}$ and $\delta^{18}\text{O}$ -nitrate in the wet and dry depositions at the South China Sea (SCS) for four seasons, in order to investigate the sources of atmosphere N_r input and quantify its influence on marine N cycle of SCS. Although authors tried to show us potentially interesting aspects (such as the impact of Typhoon on change in isotopic ratio of nitrate in wet and dry deposition) and to find out the source of wet and dry N deposition on ocean water using dual iso-

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topic ^{15}N -ratio, it is hard for me to recommend the publication of the manuscript in “Biogeosciences”. The major problems are the insufficient supporting data to prove their hypotheses and the inconsistent results (such as exceptional case results (July 2010) showing opposite to their hypothesis). For example, they concluded “the major atmospheric N_r deposition was sourced from mainland China driven by the prevailing monsoon winds and occasionally by tropical cyclones”. However, they showed us only one case of typhoon impact on nitrate and ammonium concentration and signal of delta ^{15}N -nitrate, which is not enough data to support their opinion and also is difficult to be statistically accepted. In addition, they did not explain why ~ 0 per mil values in delta ^{15}N -nitrate (which is indicative to lightning impact) was observed after typhoon phase 2 without observation of increase in nitrate concentrations. Secondly, they insisted that wet N deposition (such as precipitation) led to the increase in nitrate and ammonium concentrations, showing three cases. However, four cases did not follow their hypotheses (three precipitation event during July 2010, but no increase in inorganic N concentrations/ dramatically increase in nitrate concentrations during December 6th to 10th without precipitation impact). Thus, I suggest them to monitor for one more year to collect consistent data to support their hypotheses.

Specific comments

p. 9670 L1 to 5 You said that Typhoon phase 1 (no precipitation) caused to high level of nitrate during September 16th to 20th and the precipitation during Typhoon phase 2 caused to increase in the ammonium and nitrate concentrations. However, nitrate concentration was dramatically increased during December 6th to 12th without the Typhoon impact. So, what causes to this increase of nitrate concentrations during December 6th 12th?

Also, you mentioned that precipitation (rain days) affected the nitrate and ammonium concentrations. However, in July 2010, there was no precipitation impact on the concentrations of nitrate and ammonium. Thus, it is still ambiguous how and why precipitation (rainy days or wet deposition) changed nitrate and ammonium concentrations

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because too many exceptional case (July 2012 and December 6th to 10th).

p. 9672 L8-14 You mentioned that "Different trends are likely attributed to the sources of atm nitrate and their respective nitrogen imprints varying temporally from site to site". I think you need to explain which different source could make different temporal trends for ^{15}N -nitrate between your study and other study because your research has mainly focused on the sources of atm nitrate.

p. 9674 L18 I think that you need to supply the figures showing the relationship between nitrate and sulfate concentrations in bulk atmospheric depositions as supplementary materials because this correlation could support one of your hypotheses (Nitrate is derived from coral combustion).

p.9675 L10 You mentioned that "Typhoon events caused to the increase in the level of nitrate concentrations and the isotopic ratio of ^{15}N -nitrate was closed to N isotope signals derived from lightning". However, during September 21st to 23rd (after typhoon), isotopic ration of ^{15}N -nitrate was close to 0 per mil (which was identical to the ^{15}N -nitrate produced by lighting), but there was no impact of typhoon and also no increase in nitrate concentrations. You need to explain why.

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