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## ***Interactive comment on “Input and output of dissolved organic and inorganic nitrogen in subtropical forests of South China under high air pollution” by Y. T. Fang et al.***

**Anonymous Referee #3**

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### General Comments

This paper looks at the deposition and subsequent loss of various nitrogen species into 3 differing subtropical forest types in southern China; two young aggrading forests (conifer or mixed broadleaf/conifer) and an old growth broadleaf forest. Measurements were made of nitrogen deposition in bulk and wet-only precipitation and in through fall in each of the forests. Surface run off was measured in the pine and old growth forests and the soil solution was sampled in all 3 forest types at a depth of 20cm. This study showed: 1) Very high levels of nitrogen deposition into these forested systems, with an input of between 32 and 34kg/ha/yr in the form of Dissolved Inorganic Nitrogen

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(DIN) and almost 18kg/ha/yr in the form of Dissolved Organic Nitrogen (DON), which are the highest values on record. 2) The majority of the N deposition is in the form of wet deposition and the major species in DIN is ammonium. 3) A differing seasonal pattern between the input of DIN and DON was reported, indicating differing sources. 4) Canopy uptake of DIN occurred in the young conifer dominated forests, but not in the old growth broadleaf forest. 5) The major forms of N losses from the forests are through surface run off and leaching into the soil solution. 6) Nitrogen losses were both in the form of DIN and DON, however the N retention patterns differed between the forest types: Where the aggrading forests retained some of the N input (40-60% of DIN and 50% DON), which balanced with the increases of biomass N stocks in these forests; and the old growth forests did not retain any N and furthermore showed a net loss of 8-16kg/ha/yr, resulting in a total N loss of approximately 60kg/ha/yr.

This is a very interesting paper which has well thought out and executed measurements. The results are valuable since they show the alarming magnitude of N deposition, and specifically the important contribution of DON to the total N deposition. I believe that this is a valuable study that examines an ecosystem that has not been sufficiently studied and an interesting region that is currently experiencing intense changes in the pollution regime and anthropogenic impact, as such I believe that it is a suitable paper for publication in Biogeosciences.

#### Specific comments

The quality and style of the English used, particularly in the Abstract and Introduction, needs attention. This detracts from an otherwise good paper. There are too many specific comments to list them all here.

Page 4136 Lines 15-20: It is mentioned that there is a net loss of 8-16 kg/ha/yr in the old growth forests; it might be worth while mentioning where this extra N comes from.

Page 4151 Lines 17-26: Mentions the mining of pre-existing organic N. Do you have any estimates on what N fixation could be in these forests? Could current N fixation

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balance against the current net loss?

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**BGD**

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