

Dear Reviewer#1

Thanks for your careful reading and helpful comments.

This manuscript examines the nitrate transport by the absolute geostrophic velocity calculated from the repeated hydrographic data and nitrate concentration measurement through the four transects along the Kuroshio downstream. The understanding the budget of specific element in the region is key for the understanding of the biogeochemical cycles of the element and of the material flux through the ecosystem. From the data and analysis method, I can see how much mathematical work has been done to calculate the nitrate transport. However, I don't see any explanation showing why the authors calculated the nitrate flux except for just getting numerical number for nutrient transport. Thus I recommend that the authors should re-write the manuscript with clear purpose and organization of ideas.

Thanks for your comments. We assumed that the readers can understand why we calculated nitrate flux because similar calculations have been carried out for the Gulf Stream for more than 20 years. However, it is true that we must add some sentences for the introduction of this study in the revised manuscript.

As given in our response note to another reviewer, we finish a budget calculation from our nitrate fluxes. This is an answer to your comment “*the understanding the budget of specific element in the region is key for the understanding of the biogeochemical cycles of the element and of the material flux through the ecosystem*”. This is also our first step to understand the nitrate cycle in the Kuroshio region.

Specific comments

There are many abbreviations in the abstract, but it is very hard to follow. Make clear the abbreviations.

The abbreviations in the abstract are the name of sections used in this study.

On page 6738 Line 8 Ryukyu Islands, Ryukyu current was not identified but showed on line 17 Ryukyu current (section OK), but there is no mark on the map about the location of Ryukyu Islands.

We added them in the revised Fig. 1.

On page 6739 Line 18 unit for transport 170.8 kmol s-1 is different from the transport unit in the abstract line 14 kmol m-1

kmol s-1 is correct for nitrate transport. Sorry for this typo

On page 6744 Line 18 Tokara Strait should be marked on Fig. 1

Section TK covers Tokara Strait. We add this explanation in the caption of Fig 1.

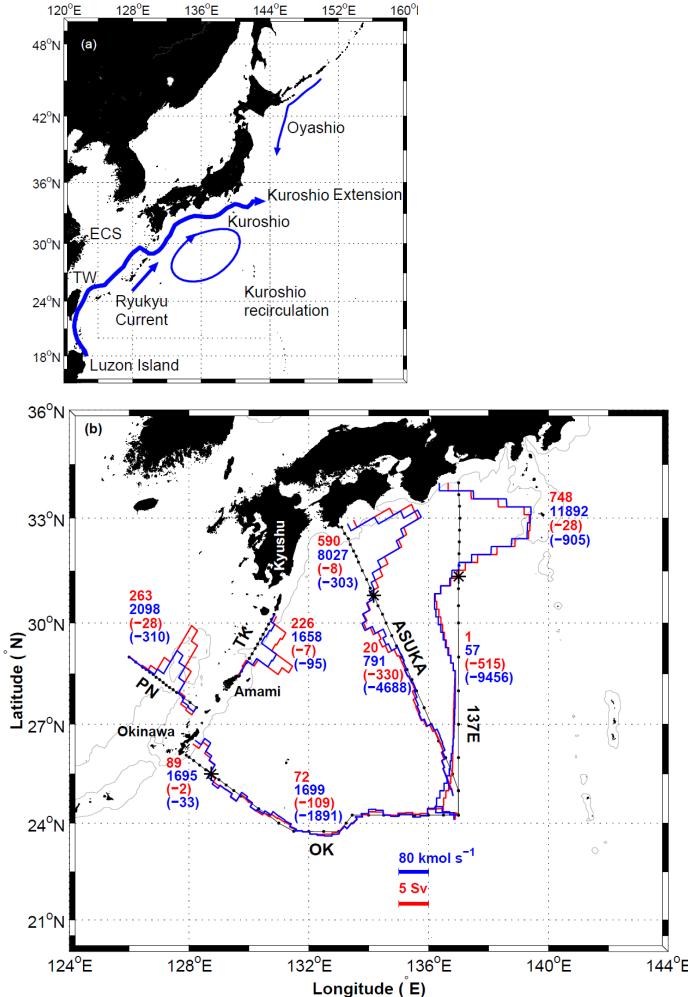


Figure 1. (a) Study area and schematic image of Kuroshio path, Kuroshio recirculation, Ryukyu Current. ‘ECS’ denotes East China Sea; ‘TW’ denotes Taiwan. (b) Position of hydrographic stations (black dots), volume transport (red line, $1 \text{ Sv} = 10^6 \text{ m}^3 \text{s}^{-1}$) and nitrate transport (blue line, kmol s^{-1}) integrated from sea surface to deepest layer within 25 km width. The positive direction for two transports is defined as the same as the Kuroshio or Ryukyu Current. The thin straight lines connecting dots are served as a reference for the transports. See Eqs. (4) - (6) and their description in section 2 for the calculation method of these variables. ‘PN’, ‘TK’, ‘OK’, ‘ASUKA’, and ‘137E’ are the name of sections. Tokara Strait is at section TK. The thin curve line denotes 200 m isobath. The black star separates section OK into two parts: section OK-W at its west and section OK-E at its east; section ASUKA into two parts: section ASUKA-N at its north and section ASUKA-S at its south; section 137E into two parts: section 137E-N at its north and section 137E-S at its south.

There are four numbers for each section, in which two red numbers are for positive and negative volume transports through the section in a unit of 0.1 Sv; two blue numbers are for positive and negative nitrate transports through the section in a unit of 0.1 kmol s⁻¹.