

Interactive comment on “Sea–air CO₂ fluxes in the Indian Ocean between 1990 and 2009” by V. V. S. S. Sarma et al.

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General Comments

Modelling and inversion methods are often used to assess the role of the undersampled Indian Ocean in the global carbon cycle, therefore it is important to evaluate and compare these methods, over various spatial and temporal scales.

C5075

Sarma et al have carried out a thorough investigation of different approaches to estimating CO₂ fluxes – observations, ocean models and inversion techniques. The differences between the approaches are then evaluated, and put into the context of the drivers of the carbon cycle in the different sub-regions of the Indian Ocean.

This multi–institutional, multi-disciplinary effort has produced a paper that is easy to follow and is logically organised in spite of the large amount of information and interpretation contained within.

Therefore, I recommend that this paper be published with only minor changes, which I describe below.

Specific Comments

Figure 1 could be improved to make it easier for the reader to identify features described in the text, For example: add the latitude and longitude labels to the map, identify Bay of Bengal, Indonesian Flow Through and other features mentioned in the text. It would also be helpful to have a Table or extension to the Figure 1 legend that has the position and location names of the atmospheric monitoring locations.

Response: Figure 1 has been redrawn illustrating the major circulation, labeling latitude and longitudes, and atmospheric stations. The names of the atmospheric stations are now contained in the caption of the figure- as shown below.

“Figure 1: Sub-regions of the Indian Ocean (30°N–44°S, red and blue combined) used in this paper: North Indian Ocean (blue), South Indian Ocean (red). The water column circulation pattern is also given. East India Coastal Current (EICC), West India Coastal Current (WICC), Somali Current (SC), South Equatorial Counter Current (SECC), East African Coastal Current (EACC), North East Madagascar Current (NEMC), South East Madagascar Current (SEMC), South Equatorial Current (SEC), South Java Current (JC) and Leeuwin Current (LC). The currents shown in dashed line represents during boreal winter and these currents flow opposite direction during boreal summer.

C5076

Overlain also is the network of atmospheric observations of CO₂ - Cape Rama, India (CRI), Mount Kenya (MKN), Bukit Koto Tabang (BKT), Seychelles (SEY), Tromelin Island (TRM), Cape Point (CPT), Amsterdam Island (AMS), Cape Grim Observatory (CGO), Crozet Island (CRZ). The colour of the dot indicates how many inversions used data from that location (black: all or almost all inversions, dark grey: around half the inversions, light grey: one or two inversions). We note that the temporal period over which the atmospheric data was collected is not the same for all the stations”.

There are many abbreviations which often make the text difficult to read without referring back to the definition. I suggest that some of these abbreviations be written in full each time eg IAV – interannual variability. The Indian Ocean Dipole / Zonal Mode is sometimes referred to as IOD/ZM and sometimes as IODZM. The abbreviation should be consistent.

Response: We have used only IOD in the entire text for consistency

Technical Corrections:

Page 10762 line 25 : : : Indian Ocean: : :

Response: Corrected in the text to be published in BG.

Pg 10763 line 1 change words to maxima and minima

Response: Corrected in the text to be published in BG.

Pg 10767, move sentence “In our subsequent: : ..climatologies” to the end of the paragraph.

Response: Corrected in the text to be published in BG.

Pg 10781 line 23 change word to suggesting

Response: Corrected in the text to be published in BG.

Pg 10786 line13 – net work is one word

C5077

Response: Corrected in the text to be published in BG.

Pg 10786 line14 – incorrect word, accumulate should perhaps be accurate

Response: Corrected in the text to be published in BG.

Interactive comment on Biogeosciences Discuss., 10, 10759, 2013.

C5078

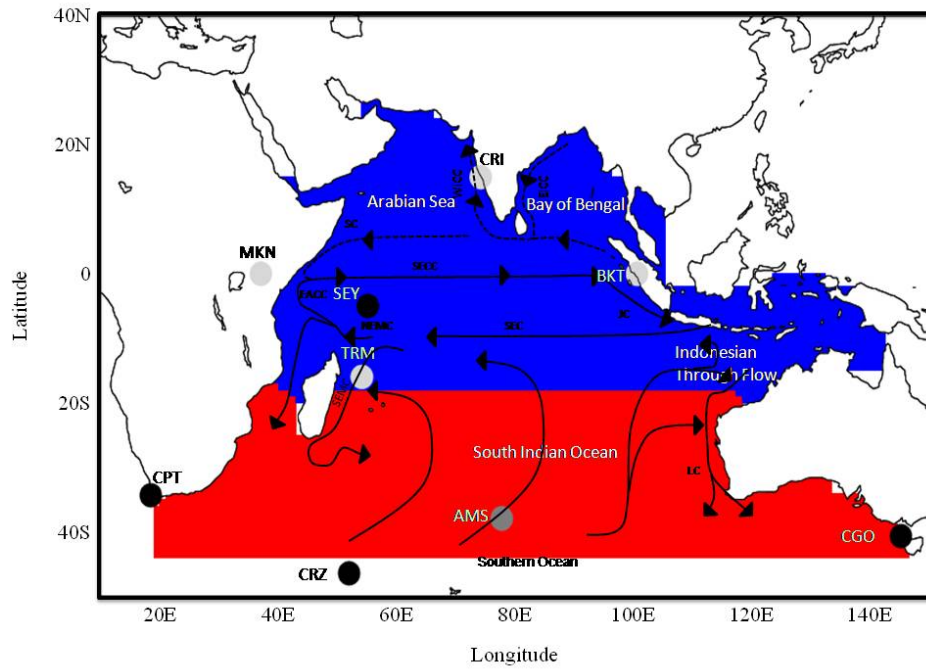


Fig. 1.

C5079