

N.Metzl, 18/11/07

Dear Bob,

below is a short report I have prepared to explain the differences of DIC and TA observed between KERFIX, INDIGO and several OISO cruises at location 50°40'S-68°25'E. The corrections are substantial and I used these corrections to better interpret and discuss the seasonality of air-sea CO₂ fluxes in the southern Indian ocean (Metzl et al., 2006). Here is my short story and I hope this could be usefull for the GLODAPII/CARINA.

I have compared the profiles from OISO data with KERFIX data, as well as INDIGO 1 cruise (station 16 was sampled at the same place, in March 1985, Poisson *et al.*, 1988). Results of these comparisons are shown below in Figure A1 and A2. Figure A1 for all the water column. Figure A2 shows the results for deep samples only. To calculate the mean differences of concentrations between the different cruises, only measurements of deep samples are used (salinity > 34.55). The differences are calculated from the DIC/Salinity and TA/Salinity regressions also presented in Figure A2. Based on the OISO data (1998-2000) I propose to correct INDIGO 1 data for DIC by -10.7 µmol/kg and TA by -14.2 µmol/kg. This result could be compared with the analysis performed by Sabine *et al.* (1999) based on the average difference of deep samples (>2500m) calculated between INDIGO 1 (1985), US-WOCE (1995) and French-WOCE/CIVA1 (1993) cruises conducted at 30°E. At the KERFIX site, the ocean depth is 1650 m, and therefore station 16 of INDIGO 1 cruise was not included in the comparison made by Sabine *et al.* (1999). Interestingly, for DIC I obtained exactly the same results than Sabine *et al.* (1999) who proposed a correction of -10.7 µmol/kg for INDIGO DIC data. For TA, Sabine *et al.* (1999) proposed a correction of -6.5 µmol/kg, which is less than my calculation maybe because Sabine *et al.* reported average differences for the south-west indian basin, whereas the present comparison is attached to only one location.

These independent comparisons (WOCE versus INDIGO, OISO versus INDIGO) suggest that DIC and TA data for all these cruises are coherent, after correcting INDIGO. We can now move to the comparison between OISO and KERFIX. For KERFIX data, reported and used in several publications (Louanchi et al., 1999, 2001), but not used by Sabine et al (1999), I evaluate much larger differences compared to INDIGO and OISO data (Figure A.2). Based on the deep samples, I propose to apply a correction of -35 µmol/kg for DIC and - 49 µmol/kg for TA on the original Kerfix data.

References:

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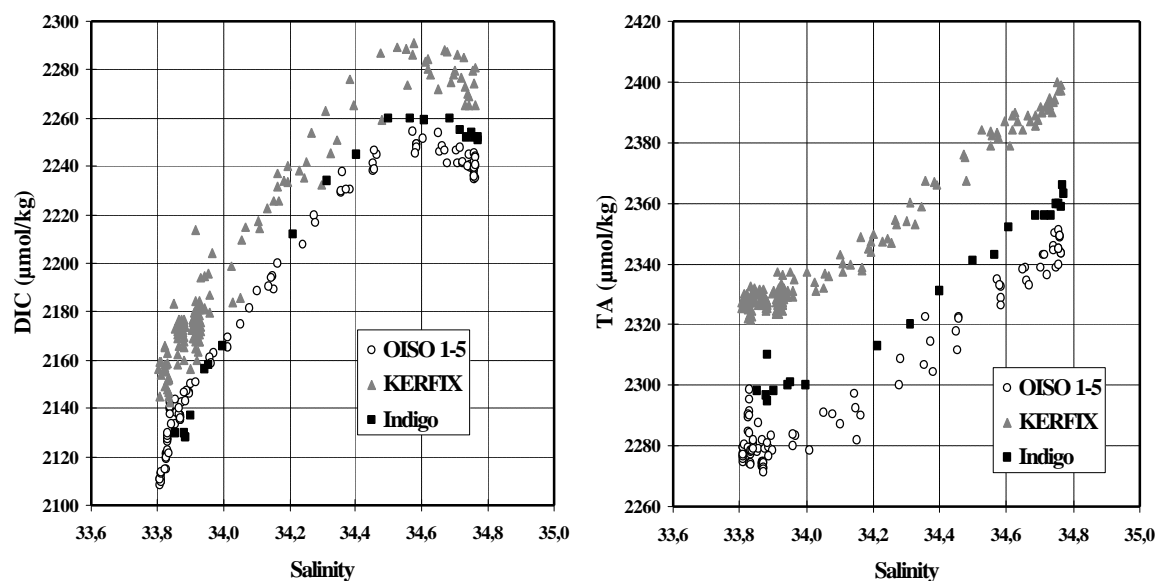


Figure A.1: DIC versus salinity and TA versus salinity for all measurements obtained during cruises INDIGO (March 1985), KERFIX (1993) and OISO (five cruises in 1998-2000) at location $50^{\circ}40'S$ - $68^{\circ}25'E$. For OISO and KERFIX all seasons are plotted.

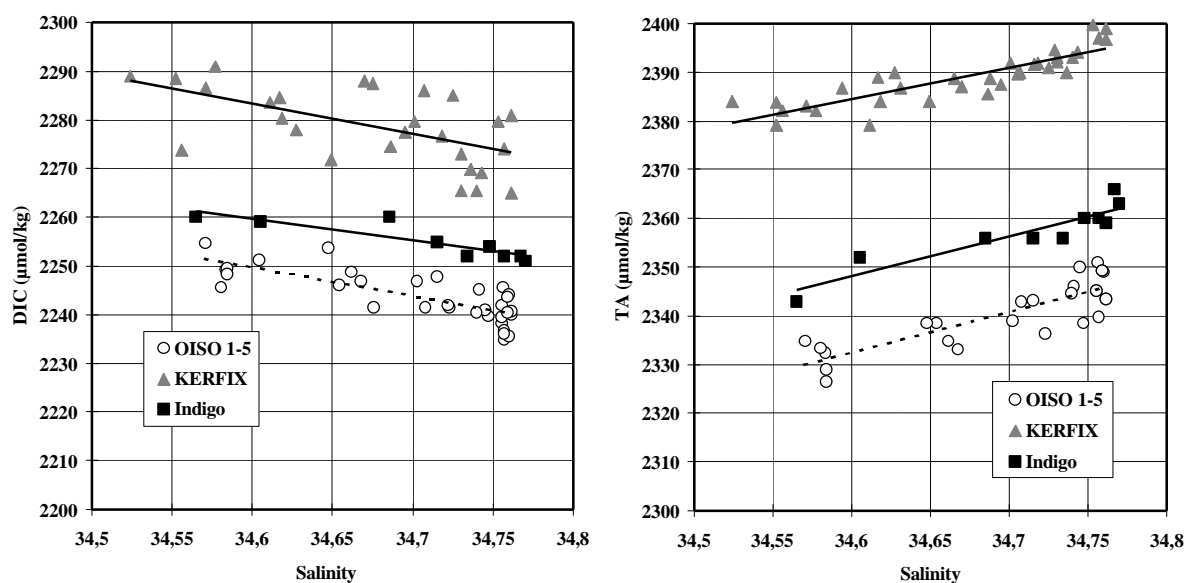


Figure A.2: DIC versus salinity and TA versus salinity for deep sample (salinity $> 34,55$, $Z > 700\text{m}$) obtained during cruises INDIGO (March 1985), KERFIX (1993) and OISO (5 cruises in 1998-2000) at location $50^{\circ}40'S$ - $68^{\circ}25'E$. Linear regressions for each cruise are indicated.