Ocean Sci. Discuss., 8, C701–C703, 2011
www.ocean-sci-discuss.net/8/C701/2011/

Ocean Science Discussions

Interactive comment on "New constraints on the Eastern Mediterranean delta;¹⁸O:delta;D relationship" *by* K. A. Cox et al.

K. A. Cox et al.

kac@noc.soton.ac.uk

Received and published: 9 October 2011

In answer to the reviewers comments:

1) The objective of this study was to investigate the apparent discrepancy between the model data and the observations of G96 in the Mediterranean; the abstract will be amended to reflect this.

The new data indicate that the evaporative conditions in the Mediterranean basin reflect that of the open ocean, the highly evaporative nature of the region pushing the mixing line to the top right of the world ocean mixing relationship. This will be clarified in the manuscript.

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Interactive Discussion

Discussion Paper

There are some humidity data reported in Gat et al 2003, however, we do not have humidity/temperature profiles in this region and such data are beyond the scope of this paper.

We are using the oxygen and hydrogen isotope relationship as a tracer for the evaporation/precipitation conditions of a region; this will be added to text.

2) This has already been stated in the manuscript – the East Greenland data in combination with the Mediterranean data encompass almost the whole salinity range of the global ocean. Therefore using these data we show that the world surface ocean mixing relationship is consistent over this salinity range and we can validate our measurements of the Mediterranean data, and put the relationship observed in the Mediterranean in a wider context using data collected and analyzed using the same methods rather than relying on historical data for context which were not collected and analyzed using the exact same methods. Additionally the Greenland dD data have filled a large salinity gap in the GISS database.

3) D-excess data from the Baltic (Frohlich et al 1988) is included in the Schmidt et al 2007 study and although these data are more scattered they still adhere to the world surface ocean relationship despite the enclosed nature of the basin. Discussion about the Baltic will be included in the manuscript.

In the manuscript, we discuss evaporation and precipitation in the global ocean and not terrestrial regions and inland lakes. The comparison of model data with observations for more terrestrial settings would be an interesting study however this manuscript is concentrated on oceanic settings which we have indicated isotopically that the Mediterranean is part of.

4) Unfortunately, we do not have these data.

5) IAEA data for this region confirm that the European rivers are isotopically lighter than the Asian ones. This will added be to the discussion. Additionally there are more

OSD

8, C701–C703, 2011

recent oxygen data from Gat et al (2003) that is also shifted relative to the G96 and Pierre et al data and we have stated this in the manuscript.

Schmidt et al have not done any coupled transient runs for the late 20th century with the isotope model. Nudged runs with observed SST are only appropriate for an atmosphere-only model and while those have been done with recent models, they cannot say what the expected trends in ocean d18O might be expected to be. There are some coupled Holocene runs (i.e. from 9500 kyr BP, 6kyr, 3kyr etc.) reported in LeGrande et al (2010), and there are some figures (e.g. fig 4) related to changes in d18Osw, they are generally small - mostly <0.1 permil for the 6kyr case.

6) The appendix will be moved into the main text.

Thank you for your comments.

Interactive comment on Ocean Sci. Discuss., 8, 39, 2011.