

**Comments and Responses on SOCCR/SAP 2.2 Draft 1 (May 2006)
CHAPTER 15**

COMMENT FROM PEER REVIEWERS						AUTHOR'S RESPONSE						
Comment Number	Reviewer ID	Chapter	Page	Line	Comment Text	Acknowledged, but no further response or revisions are required	Revisions have been incorporated as suggested in the comment	Agree, but see "Notes on Response"	Agree, but elaboration is precluded by length limitations	Disagree; see "Notes on Response"	Beyond scope of report/chapter	Notes on Response
15-001	24	15	General		This chapter presents an impressive synthesis of ocean pCO ₂ observations around the coast of the US, and quantifies the observed fluxes on an annual basis. In addition to the new pCO ₂ observations, the chapter nicely synthesizes existing information on US coastal ocean fluxes. This is scientifically very interesting, and it also very useful to develop a comprehensive picture of the US carbon budget.	X						
15-002	24	15	General		Throughout the chapter, the information is not always clear which processes are active from the natural carbon cycle, and which processes have been influenced by either human activities or increasing atmospheric CO ₂ . For example, p.15-2 lines 20-21 says that the biological pump removes atmospheric CO ₂ . This suggests that the biological pump removed *anthropogenic* CO ₂ , which I think is not the case here. Similarly page 15-5 lines 2-4 is ambiguous. I suggest that the introduction is revised to explain that many natural processes drives fluxes in and out of the ocean, that in addition the ocean responds to increasing atmospheric CO ₂ and to changes in the input of nutrients from land. The same problem re-appears in the section "trends and drivers", where it is not entirely clear is processes are natural or response to anthropogenic changes.		X					
15-003	24	15	General		The information on processes is sparse and incomplete. In particular it would be useful to know for each processes which direction are the CO ₂ fluxes expected to go if the process is enhanced in the future. Pars of this information could be integrated in the "global coastal ocean carbon fluxes" and part in the "trends and drivers" sections.			X				This is the state of the science
15-004	24	15	General		I would have liked to have some information on the Arctic ocean, especially because of the projected decrease in ice cover.			X				This is the state of the science
15-005	24	15	15-1	15	What time period is this for?		X					
15-006	24	15	15-1	16-31	Please clarify as much as possible which information relates to the natural carbon cycle and which information is due to anthropogenic influence.		X					
15-007	24	15	15-5		I would have liked to have more information if the new data presented agree with the climatology of Takahashi et al (2002) in the regions where there is an overlap.			X				As we note there is agreement where there is overlap
15-008	24	15	15-8	7-10	Please revise. The flow of the information is difficult to follow.		X					
15-009	24	15	15-8	18-19	It is not clear to me why the seasons summer+fall and winter+spring is used here. I would have thought that spring+summer and winter+fall would make more sense both physically and biologically.					X		Summer and Fall are the warm months
15-010	24	15	15-8	24	If only summer months are available, I do not think these observations should be represented in the figure.		X					
15-011	24	15	15-10	16	The net effect of El Nino is well known and not uncertain at all (see many publications by Feely and also your own Figure 15-5).					X		Not true and depends on time scale. Changes made in text in an attempt to clarify
15-012	24	15	15-10	16-19	This statement is not supported by material in this chapter. I suggest to strengthen the section on processes to support this statement.		X					

**Comments and Responses on SOCCR/SAP 2.2 Draft 1 (May 2006)
CHAPTER 15**

COMMENT FROM PEER REVIEWERS						AUTHOR'S RESPONSE						
Comment Number	Reviewer ID	Chapter	Page	Line	Comment Text	Acknowledged, but no further response or revisions are required	Revisions have been incorporated as suggested in the comment	Agree, but see "Notes on Response"	Agree, but elaboration is precluded by length limitations	Disagree; see "Notes on Response"	Beyond scope of report/chapter	Notes on Response
15-013	24	15	15-10		Regarding ocean Fe fertilization. I am not aware of any scientific studies that support the efficiency of Fe fertilization. All studies show that this is highly inefficient because as soon as Fe fertilization is stopped, the CO ₂ goes back to the atmosphere. This chapter need to say clearly that Fe fertilization is not a prospect for reducing atmospheric CO ₂ , and not be ambivalent like it is here.					X		Only results that do not support efficiency are models and recent modeling results suggest high efficiency.
15-014	24	15	15-21	Fig 15-3	Need some information on summer/winter distribution of the data (perhaps use different color).						X	Will look into for next revision
15-015	24	15	15-21	Fig 15-3	In the bottom panel, need to use same scale and units as 15-1. The color scale does not allow the reader to see if the regions are sources and sinks and makes the reading of the text very difficult.						X	Next revision
15-016	24	15	15-22	Fig 15-4	Please provide units in axis label.					X		Provided at the bottom of both panels
15-017	24	15	15-23	Fig 15-5	Please provide a smooth (filtered) curve in the bottom panel if possible.						X	Will look into for next revision
15-018	25	15	General		Overall, I believe that this is a clearly written, succinct and high quality summary of our state-of-knowledge of carbon cycling in coastal, lake and estuarine systems. My main significant concern is the potential under statement of potential uncertainties. This and a few minor grammatical and editorial suggestions organized by line number follow.	X						
15-019	25	15	15-1	15	Delete "global". Since you are making a distinction between global and coastal oceans (the title of this chapter), declaring that the global ocean takes up 1.3 - 2.3 Gt/y of anthropogenic CO ₂ presupposes that little uptake can be attributed to the coastal ocean. Also, "anthropogenic" needs to be added to this statement.		X					
15-020	25	15	15-1	18	Not clear if sediments are included in estimating storage.	X						Yes and changed to anthropogenic carbon
15-021	25	15	15-1	20-23	It seems to me that there is more uncertainty in this assessment than indicated here - see later comment.					X		We think the assessment of a net zero air-sea flux is true, uncertainty about the rest of the carbon fluxes is high.
15-022	25	15	15-1	29	Again, I think that there is more uncertainty as to whether North America's coastal ocean is a source of CO ₂ .					X		See above. It is not a source given the uncertainty.

**Comments and Responses on SOCCR/SAP 2.2 Draft 1 (May 2006)
CHAPTER 15**

COMMENT FROM PEER REVIEWERS					AUTHOR'S RESPONSE							
Comment Number	Reviewer ID	Chapter	Page	Line	Comment Text	Acknowledged, but no further response or revisions are required	Revisions have been incorporated as suggested in the comment	Agree, but see "Notes on Response"	Agree, but elaboration is precluded by length limitations	Disagree; see "Notes on Response"	Beyond scope of report/chapter	Notes on Response
15-023	25	15	15-2	15-16	It is correct of the authors to point out that most previous studies have been limited to assessing air-sea exchange. However, the authors should also point out that adjacent to continents, significant inputs can be derived laterally from terrestrially pools. These would include freshwater inputs, groundwater inputs and coastal waters exchanged with coastal zone systems (e.g. salt marshes). One of the authors (WJC) has shown that on the Georgia shelf, exchange with the marshes supplies sufficient carbon to uncouple coastal air-sea exchange from coastal - open ocean exchange. That is, shelf waters on the Georgia shelf are both a source of CO ₂ to the atmosphere AND the open ocean. Thus, in this setting, the use of air-sea exchange to assess net anthropogenic invasion is not valid and in fact is of the wrong sign. If the authors wish to dismiss these recent findings, they should provide a reason. If not, this exchange should be included which will significantly increase the uncertainty of the net exchange for North American coastal systems.					X		We have included them indirectly by looking at the effects of freshwater on air-sea exchange but we also agree that the freshwater issues have not been treated fully and have changed the title of the Chapter.
15-024	25	15	15-3	1	Replace "global" with "deep" since (as the authors point out in the next line) the coastal ocean is not included.					X		Not all coastal waters are shallow. We prefer open ocean
15-025	25	15	15-3	6	There is also a more recent wind speed - gas exchange relationship reported by McGillis. This should be mentioned and the uncertainty in invasion reported.		X					
15-026	25	15	15-8	14	The authors briefly mention high PCO ₂ associated with terrestrial inputs. However, the important offshore flux here is reflected in the total CO ₂ (not PCO ₂) in the shelf waters all at salinities above 30.						X	Yes but apparently do not affect air-sea exchange
15-027	25	15	15-9	6	Again the authors focus on air-sea exchange exclusively without noting potential uncertainties associated with the boundary.						X	See coment 26
15-028	25	15	15-9	25	The authors note that the air-sea flux is approximately 1% of the deep ocean (note the authors should replace "global" with "deep"), but again do not note potential lateral fluxes. Also, earlier the authors cite Ducklow and McCallister (2004). I do not believe the results of the D&M analysis but if the authors are going to cite them in one location, they should be consistent. Since D&M come up with a value that is inconsistent with the 1% coastal flux presented here, they should at least acknowledge the uncertainty.						X	See coment 26
15-029	25	15	15-10	15	Again in this section, the authors completely equate ocean uptake of anthropogenic CO ₂ with air-sea exchange which has been shown to not be true at ocean margins. What is true is that the importance of non-air-sea CO ₂ inputs is uncertain, but preliminary extrapolations indicate that it can not be objectively ignored with the present data set.						X	See coment 26

**Comments and Responses on SOCCR/SAP 2.2 Draft 1 (May 2006)
CHAPTER 15**

COMMENT FROM PEER REVIEWERS						AUTHOR'S RESPONSE						
Comment Number	Reviewer ID	Chapter	Page	Line	Comment Text	Acknowledged, but no further response or revisions are required	Revisions have been incorporated as suggested in the comment	Agree, but see "Notes on Response"	Agree, but elaboration is precluded by length limitations	Disagree; see "Notes on Response"	Beyond scope of report/chapter	Notes on Response
15-030	25	15	15-11	1	The importance of WJC's observations on the Georgia coast seems to be ignored in the much of the ending discussion and in suggested R&D needs. The most important point is that the margin inputs of CO2 to the ocean are not necessarily reflected completely in the PCO2 but one needs to also measure the total CO2 and residence times of the coastal waters.						X	See coment 26
15-031	32	15	General		I have a major question on the review: The title is "Coastal Oceans, Lakes and Rivers." The discussion of the oceans is very good, as would be expected by that author group. But they say nothing about Lakes and Rivers, other than a brief allusions to input to coastal zone. The Wetlands does a nice job of .just wetlands, mostly northern.						X	See coment 26
15-032	32	15	General		The statement in Houghton "Rivers, lakes, dams, and other inland waters are mentioned in Chapter 15 as being a source of carbon, but they are claimed elsewhere to be a sink (Chapter 3). The sign of the net carbon flux attributable to erosion, transport, deposition, accumulation and decomposition is uncertain (e.g., Stallard, 1998; Lal, 23 2001; Smith /et al./, 2005)." pretty much sums up the treatment - pretty marginal.						X	See coment 26
15-033	32	15	General		At a minimum, I would suggest that the title of Ch 15 be changed to "Coastal Oceans," and delete the Rivers and Lakes bit. As I remember, this was a gap pretty much identified at the kickoff meeting, a few years ago.						X	See coment 26