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Interactive comment on “Recent transient tracer distributions in the Fram Strait: estimation of anthropogenic carbon content and transport” by T. Stöven et al.

Anonymous Referee #1

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General Comments

This paper presents measurements of transient tracers, DIC, and TA across Fram Strait in 2012, and uses these measurements together with current velocity measurements to estimate the net flux of DIC and anthropogenic carbon through Fram Strait. The methods used are not novel, but the dataset and estimate of flux through Fram Strait are new and of interest to the community. The manuscript describes an important problem (estimating carbon fluxes) and is generally well written, however I think some extra analysis is necessary before publication. In particular, the impact of the assumption on an Inverse Gaussian (IG) TTD on the results needs to be examined.

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Specific Comments

1. The major issue I have is that the authors assume an IG TTD, and attributes differences between model and data to sub or super saturation of the tracers (or SF6 remaining from deliberate tracer release. However, another reason (that I think is more likely) is that the TTD is not well described by a single IG TTD. The authors need to explore this possibility. In the Stoven et al. (2015) they did some calculations using two-IG TTDs, and I think similar calculations need to be done here. Is it possible to reproduce the SF6 and CFC12 using a two-IG TTD, and if so how different is the calculated Cant?
2. The discussion in first few sentences of section 2.3 uses "transit time distribution", "Green's function" and "age spectra" somewhat interchangeably, which is confusing. I think they mean the same thing for all 3 terms and should just use one. If they mean different things by each term then they need to describe this better.
3. There is no discussion of application of SF6 as age tracer. Although CFC12 can't be used in "young" waters, SF6 can.
4. On page 2203 evidence is presented that suggests that the "excess SF6" is not due to deliberate tracer release, but on pg 2208 (line 29) this is given as one of the reasons. I am confused, do the authors think this is a likely cause? If not then should not be in the conclusions.
5. Should the Stoven et al (2014) references on pg 2203 be the 2015 paper?
6. "is supposed to be" indicates that the authors don't think this is the reason. If they authors think the applicability is limited because of these factors then remove "supposed to be".

Interactive comment on Ocean Sci. Discuss., 12, 2189, 2015.

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