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Interactive comment on "The submarine groundwater discharge as a carbon source to the Baltic Sea" *by* B. Szymczycha et al.

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General comments The manuscript discusses the mechanism of submarine groundwater discharges (SGD) as source of carbon (dissolved inorganic carbon-DIC and dissolved organic carbon-DOC) to the marine environment. Point and diffused SGDs constitute an important, yet little studied, pathway of nutrients, contaminants, and other substances to the marine environment; as such, the subject of the paper is relevant to the scopes of Biogeosciences. The study area is the Puck Bay (Gdansk Gulf) in the Baltic Sea, where several recent studies have studied SGD seepage rates, nutrient and heavy metals (mercury) concentrations. The authors attempt to relate carbon inputs of the Puck Bay to the Baltic Sea, making some assumptions which are questionable. The structure of the document is generally good but often 'Results' are mixed with 'Dis-

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cussion' (see Specific comments below). Although the language needs polishing, the views of the authors are easy to follow and clearly stated. The methodology should be improved and more details are required in some parts (see Specific comments below). The quality of data is overall good, but I have major reservations whether results presented are sufficient to support the interpretations and conclusions. At first, the location of sampling stations is not given in text or figures, and also the number of sampling stations is unknown. Therefore it becomes impossible to evaluate the sampling strategy's quality and efficiency, and moreover if the results obtained represent the entire study area. Having so many uncertainties from the very beginning, it is striking that the authors have chosen to extrapolate DIC and DOC flux estimates to the entire Baltic Sea, and furthermore to the world ocean. The study area covers a minor part of the southern Baltic, and there is no solid evidence that the Puck Bay may be representative of the entire Baltic Sea in terms of SGDs chemical composition. In summary, carbon fluxes via SGD in the Puck Bay contain an interesting story at the local scale, but a substantial amount of additional sampling, analyses, interpretations and re-writing is required to support publication in the future. I believe fragmenting the data set between a number of short papers (e.g. Szymczycha et al., 2012-nutrients, Szymczycha et al., 2013-mercury) is not useful, as it favors repetition and weakens the value of the data sets. On the basis of the problematic issues stated above, I conclude that this manuscript is not recommended for publication in Biogeosciences.

Specific comments P2071, L2 State which recent findings question earlier estimations regarding carbon dioxide sequestration; L13 Emelyanov; L15 Kuliński P2072, L20 I'm not sure what 'richest' means P2073, L25 The sampling points are not shown in Fig. 1 or elsewhere; L26 Pore water salinity profiles: it is unclear how the measurements were made P2074, L2-3 Briefly describe seepage meters and groundwater lances principles of operations; L25 'Craterous' should probably read Cretaceous P2075, L27 Which is the original method (reference) that was modified by Kaltin et al. (2005)? P2076, L4 Scaling up to the entire Baltic Sea is misleading. The Bay of Puck is a small area relatively to the entire Baltic Sea, and this is clearly reflected in the SGD discharges (Table

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2). There is no supportive evidence that SGDs around the Baltic Sea exhibit similar carbon concentrations to the Bay of Puck; L15-20 This part belongs to Discussion section; L22 Again, the location of GL I is not shown in Fig. 1 P2077, L8 provenience? Maybe provenance; L25-27 I would like to see a detailed description of the end-members approach P2088, L8-11 Should be moved to Discussion P2079, L5-16 This is also part of Discussion P2079-2080 section 4.1: This section explains that high DIC loads via SGD in the southern Baltic are related to the carbonate structures. But this is basic knowledge and is not justified to be the first part of the Discussion section. I would rather move the geology of the Baltic to the Introduction. P2083, L25 Shirshov P2090, Fig. 1 What is the meaning of the rectangle on the map? P2091, Fig. 2 The small size makes it impossible to read. Please consider other ways to present the data or split in more than one Figures.

Interactive comment on Biogeosciences Discuss., 10, 2069, 2013.