

Interactive comment on “Assessing economic impacts of environmental research infrastructures: overview of methodological tools” by Régis Kalaydjian

Antti Pursula (Referee)

antti.pursula@csc.fi

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This paper reviews methods used for assessing economic impact of environmental research infrastructures. The topic is relevant for Geoscience Communication readers as the impact assessment of research investments is more and more in demand for decision-makers, and of interest to the society at large. The paper takes on to describe main tools used to analyze economic impacts together with their application scope and limits, reflecting them against the case study of Argo, an ocean observing system.

The methodology in the paper is sound and has the work has potential to be an interesting contribution. Slightly problematic part is the treatment of downstream impacts,

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which are covered through a KPI analysis, not impact assessment methods. Regardless of this the manuscript gives valuable insights and information on its topic. However, I have several comments, listed below, that should be considered before publication.

1. I am missing more argumentation on some of the statements made in the manuscript (see section based notes below). There should be either references to the source, or more explanation in the text. This is especially the case in the Introduction section. One would expect to cite existing work at the beginning of the paper. For example OECD report (“Reference framework for assessing the scientific and socio-economic impact of research infrastructures”, <https://doi.org/10.1787/3ffee43b-en>) has treated the topic quite extensively.

2. The classification of impacts to three categories seems reasonable. However, as these categories are used throughout the text, it should be explained why these categories were selected, and is this original contribution or adopted from literature. It would be useful to explain in more detail these categories in terms of what actors operate in each of them (e.g. suppliers, data processors, end-users etc). A figure showing relations of different aspects would be very good, and could replace or supplement the current Figures 1-3. This would also clarify especially the formation for downstream impacts. Also, perhaps “indirect impacts” is more descriptive than “feedback impacts” for the third category.

3. The presentation could be made more readable by clearly stating when discussing generally applicable parts (review of used methodologies in Environmental research infrastructures) and particulars of the case study (Argo observing system). Mixing these two is visible at least in section 3.2. Also, summary sections 3.1.4 and 3.2.3 can be improved by writing paragraph on findings applied to Argo case study. Also, I am missing a summary subsection on feedback / indirect impacts (under section 3.3).

4. The language used is sometimes confusing and not precise enough (see detailed notes below). A round of language checking would be beneficial for general readability.

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****Detailed comments by section****

Abstract:

The abstract should be re-written. The first paragraph is unclear (for example, what are the “these activities” referred to. Should include a sentence on why this study is done, what is its value for readers.

The second paragraph on the objective of the paper is clearly explained but the text on case study (3rd paragraph) refers to understanding data flows which is not the central topic of this study.

1. Introduction:

This section needs improvements.

* 1st paragraph: Is this analysis of investments to ENV RIs; or ENV RI development projects? Should be used consistently.

* 2nd paragraph: Different objective for the paper as in the Abstract: “focus on the mechanism through which economic value is generated by ENV RI development projects”. I think the objective written in the abstract is more suitable (“review of main tools ...”).

* 3rd paragraph: The presented classification is reasonable. Is it original contribution or is there a reference? Who are the actors in the Downstream impacts category and how are they different from the feedback (or indirect) impacts actors?

* Row 12 page 2: What is meant with “compensations” here?

* Final paragraph: Is there a reference for this statement: “The development of ENV RIs is mainly motivated by environmental risks and the need for improved observations and efficient forecast.” This statement excludes for example improved preconditions for research & understanding the functioning of the earth system – that one thinks are relevant when investing in a Research infrastructure.

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Adding short discussion on impact assessments on RIs performed earlier (with references) would be useful, for example between 2nd and 3rd paragraph.

2. A case study: Argo

This section would benefit from clarifications and references.

Subsection 2.1.1:

* Give a reference or web site for Argo and for GOOS.

* The first bullet point list would work better as normal text.

Subsection 2.1.2:

* “The latter provides real time in situ datasets to Copernicus Marine Services and to ocean and climate scientists”: Is this to understand only GDAC at Coriolis France provides this and the GDAC in USA does _not_ provide data to scientists?

* Page 4, row 3: “In Europe, the suppliers can be member state- and EC-funded entities”. Can forecast suppliers not be private companies? That would be different than in weather forecasts, and would be worth to explain.

* Please provide reference or website to EMODNet published data products.

Subsection 2.1.3:

* Consider the title of the subsection. Perhaps “Development projects”, or “Planned development of Argo system”

* The bullet point list on Remarks would work better as normal text.

* The first sentences, starting with “The present data market is recent. . .” make several claims concerning the marine data market, and would require a reference or explanations unless these are considered to be general knowledge.

* The text refers to figure 5 to illustrate supply chain, but the figure is about data flows.

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Separate Figure on supply chain would be needed.

Subsection 2.2:

* Small comment that comparing staff costs in Europe should be compared to European part of the operating costs, not to the global operating costs.

Section 3:

This section is the main new contribution of the work and gives plenty of valuable information. However, it would benefit from clarifications, and in subsection 3.2 some changes are proposed.

Subsection 3.1:

In general the part on upstream impacts is well researched and written. Minor remarks:

* First row: "The focus is on the development . . . of ... development projects." The word 'development' is duplicated in this sentence.

Subsection 3.1.1:

Remark, not needing necessarily modifications in the text: Limitation, as I see, with this approach is that the cited study does not try to assess the impact of certain activity to MST companies. It merely scopes the size of the industry in general. This can provide good background information on further analysis.

Subsection 3.1.2:

* Page 7, row 3: "SBS are readily available". Please give a reference or web site.

* My impression is that this approach has the same limitation as the one in 3.1.1., that only background information about the total market size can be gained; and the impact of RIs is not possible to extract. Is this so? Perhaps this could be mentioned in the text.

Subsection 3.1.3:

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* Page 7, row 26: "the latter permit to assess the direct impacts of a marginal demand increase on supply." Please elaborate on this point as it is a key point in this subsection. Does it mean simply that comparing RI investment to the size of the industry gives relevant importance of the RI based demand? Or is more sophisticated analysis proposed?

* In general, this approach to combine ENV RI purchases information & official statistics would be interesting to discuss further. If not in scope for the current paper, maybe for future work.

* Page 8, row 6: "It [Table 3] points out the high degree of competition on EU marine research equipment markets". I don't think such statement can be deduced from the Table 3. According to this table it could as well be that each instrument or purchase item is produced only by 1 single company, and there is no competition at all. Please reformulate.

Subsection 3.2:

The problem with this section is that it discusses key performance indicators of the activities or the RI. It is an important topic but the significance for the economic impacts of the RI is not presented. The OECD report referred to earlier discusses also this challenge.

The downstream impacts in a typical business case would be for the actors that refine RIs data outputs to create value added services. The argument in the paper is that there is no such relevant business at the moment. Would be interesting to list players in the downstream market and discuss this market in economic point of view. Can the growth of that sector be assessed in any way as a function of ENV RI data output? Why is there not such market at the moment? Can Argo case study be used?

I suggest considering to rewrite parts of this subsection, both to motivate the study of KPIs in this context and to include discussion of the potential economic impacts. Please

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consider also shortening of the text. For example 3.2.2 is interesting information but perhaps partially out of scope.

* Page 9, row 4: “. . .assessment of downstream impacts requires valuing the performance of observation data products. . .” . Are there tools for such evaluation ? This would be highly interesting.

* Page 9, row 11: Unclear sentence.

Subsection 3.3:

Overall this subsection is very valuable and interesting. Please consider adding a Summary subsection 3.3.3 (as in 3.1.4 and 3.2.3), with information on even qualitative CBA for the Argo infrastructure.

* 1st paragraph: “Feedback impacts (Figure 3) involve the entire chain of activities upstream and downstream of ENV RIs as a response to environmental risks and uncertainty”. I find this definition limiting the scope in which ENV RI activities can create impacts. Most likely there are sectors outside environmental risk management that creates value based on ENV RI data. For example, travel industry, research services, optimization of operations and logistics, manufacturing of marine vessels, fishing, etc. In fact one of the cases discussed later (Gulf of Maine case) is not mainly on response to risks and uncertainty. I propose reformulating the mentioned sentence.

* 2nd paragraph: “. . .from improved forecast”. Again, I feel that there is unnecessary limitation of scope. What about monitoring of the current state or even historical time series? Those can also be valuable to customers. This may be a minor thing but precise language is preferred.

* Page 12, row 28: Please explain acronym SAR

4 Conclusions

Good section would be still improved if it is possible to give some recommendations to

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RIs, for example Argo, on what methods to use (or not use) at the moment for impact assessment.

Figures and Tables:

Figures 1 and 2 are difficult to grasp. The boxes contain different types of entities together. e.g. in Figure 2, Data processing is a function or process; Processed data supply is a market mechanism; and the rest are services. More informative would be figure in which different actors in the value chain are shown (equipment suppliers, RI, data processors, end users, industries benefiting from indirect impacts. . .). Captions of Figures 1-3 should be changed. They don't describe impacts per se.

Interactive comment on Geosci. Commun. Discuss., <https://doi.org/10.5194/gc-2019-14>, 2019.

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