

**Referee Noe: We would like to thank the reviewer for the constructive comments. Our responses to each comment is given below in bold text.**

#### General

The manuscript presents the structure, motivation and objectives of the Pan-Eurasian-Experiment (PEEX) project. The ambitious vision is clearly set in section 2 where the projects structure is listed as four focus areas. Consequently, the manuscript follows later on in section three the same construction. Overall, the manuscript presents and introduces well the PEEX projects and aims. In some few places (see below) I made some suggestions to reorder sentences for clarity.

#### Detailed comments

Page 22569, line 20: The term "urban environment" is used as one of the "Grand Challenges". From my viewpoint, "urban environment" is a wrong term here. It is not the "urban environment" as such but the change of it. This change might be driven by processes like migration from rural to urban areas, extension of urban area on cost of rural area etc.

**We agree on this error. We replaced "Urban environment" with "migration of peoples and other changes in human population"**

Page 22571ff, line28ff: The sentence starting with: "The durability of infrastructure..." is not very clear. I would turn its logic around and center it around the "thawing permafrost", which is responsible for the future changes in durability of infrastructure and the loss (or dramatic change) of environmental structures needed for the survival of indigenous people.

**In line with the suggestion by the referee, we modified this sentence into the following form: "Future thawing of permafrost threatens the durability of infrastructures (power networks, buildings, ice roads, oil drilling) and may have large influences on the living conditions and culture of indigenous people living in the north."**

Page 22577, line 6ff: The sentence starting "Although these feedback..." in the part after the comma I would change the sentence accordingly: "...Finland, there is need to establish a flagship station network...". It makes the statement clearer, that this network need to be set up to meet the PEEX needs. Further in the same sentence, the it would be more clear if the "other tools" are noted.

**We fully agree. Corrected.**

Page 22582, line 1: Here you speak about the "PEEX Preliminary Phase". Is there some time interval of this preliminary phase given? Is it still ahead or already passed? That is not clear at that point.

**We added the time interval (2012-2017) into the text.**

Page 22582, line 8: Here you mention the PEEX-RI. Is it planned to move with

PEEX into the direction of an ESFRI (ERIC) type infrastructure? If so, there should be some note in the introduction on that goal.

**We clarified this sentence. It now reads: “PEEX will adopt the common European data formats and procedures for the PEEEX research infrastructure development, including open data policy.”**

Page 22582, line 22: I would replace”... enables to us find out ...” with ”... enables us to address ...”.

**Modified as suggested.**

Page 22582, line 25: What do you mean in this sentence? Do you mean ”in nature” or ”in real” in this context? Of what the ”deep multidisciplinary understanding” is needed? For what the ”practical solutions” should be found?

**We modified the sentence into the following form: “These interlinks are in most cases very nonlinear, and therefore we need deep multidisciplinary understanding for finding practical solutions to the grand challenges discussed earlier.”**

Page 22583, line 1: I would write ”PEEX is an active...” here.

**Corrected.**

Page 22583, line 14ff: This sentence does not read well (fragmented) and is not very clear. I understand, that PEEEX contributes to the formation of a new, integrated Earth system research community in the projects target area. The way to do this is to have an open access policy to the PEEEX research and modeling infrastructure and to invite international partners and organizations to do the same.

**We agree. We modified this sentence into the following form: “PEEX will contribute to the building of a new, integrated Earth system research community in the Pan-Eurasian region. In practice this means an open access to the research and modeling infrastructure, as well as invitation of international partners and organizations to share their development and use.”**

Page 22585, line 1ff: Parts of the paragraph starting from here would better fit to the introduction part as here some overall goals are presented that have not been noted before. Some abbreviations, like PEEEX-RI, would also be already introduced then. However, as the whole manuscript introduces the project and the major part of section four concludes it is not very easy to find a compromise where to present these topics, but it is worth to think a bit to restructure to set overall project goals more clear.

**As also the reviewer points out, this is not a typical research paper that has its own scientific goals that are then addressed in the paper. Rather, the given project goals are planned to be addressed in the future. Therefore, we feel that the overall project goals fit better to section 4 with project future outlook than in the introduction part of this paper.**



**Referee 2: We would like to thank the reviewer for the constructive comments. Our responses to each comment are given below in bold text.**

The manuscript Introduction: The Pan-Eurasian Experiment (PEEX) – multidisciplinary, multi-scale and multi-component research and capacity building initiative is as stated an Introduction to a scientific research initiative of large scale and impact. As such it can be seen differently in terms of the current evaluation namely not assessed at this stage with respect to the results but the potential and the design of the initiative. Having this in mind the manuscript provides well thought documentation of the means in terms of human and infrastructure capacity it encompasses in order to solve the knowledge gaps and challenges it is designed to tackle. Some specific corrections and suggestions are given below for the revision of the manuscript.

Section 2 P 22753, Line 22 instead of “process understanding” better use understanding of processes.

**Corrected.**

P22754 line 10 instead of health use —human health or public health.

**Corrected.**

P22577 line 10 Measurements of the changes. . . . . This is too general Provide a paragraph explaining what some of these main measurements are (i.e hygroscopicity, cloud formation potential etc) and the techniques to achieve it.

**We partly agree. We added a list of measurements that we consider very important, but did not go in the detail of listing the required experimental techniques, since there are several hundreds of those.**

P22578 line 21 “. . .long term continuation of advanced measurements of aerosols, clouds, GHGS, trace gases” Again provide a description of what these advanced measurements are envisaged to be and what is here considered advanced. Maybe state of the art is adequate, provide some references of the type of measurement techniques implied

**We added a short list of examples of the advanced measurement techniques.**

P22580 lines from 10-20 A suite of models is mentioned with a general description. It would be helpful for the reader to have one representative reference of each type of model or modeling system

**The problem here is that we do not want to restrict the set of models to be used in this project to one or two individual models of each type. Giving an example of each model type would easily give such (wrong) impression to the reader. Having several examples of each model type would, in turn, make the reference list exhaustive and imbalanced compared with other parts of this manuscript. As a result, we feel that it is best to list the types of models planned to be used without references to different model types. In order to provide some reasoning to our approach, we added the following sentence after**

**the first sentence of this paragraph (in line 9 on page 22580): “We have preliminary tested this kind of a multi-scale approach in a framework of an integrated European research project (Kulmala et al., 2011a).”**

P22582 line 25 “ these interlinks are mainly very nonlinear” Instead of mainly probably is best to use often or in most cases.

**We agree. Corrected.**

P22583 line 23 Section 4 Title For this title since it is the concluding section is best to use: Summary and outlook of PEEEX in the future society

**We modified the title as suggested by the referee.**