Interactive comment on “Pan-Eurasian Experiment (PEEX): Towards holistic understanding of the feedbacks and interactions in the land–atmosphere–ocean–society continuum in the Northern Eurasian region” by Hanna K. Lappalainen et al.

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1. Introduction, line 100: replace “will” with “is” AUTHORS’ RESPONSE: corrected according to referee comment

2. Introduction, line 103-104: consider removing the sentence AUTHORS’ RESPONSE: the sentence has been removed.

3. Create “Table of contents” AUTHORS’ RESPONSE: We have added the “Table of contents” after the “Abstract” section

4. Chapter 2, lines 132-135; consider removing, no concrete information AUTHORS’ RESPONSE: we would like to keep this sentence.

5. Chapter 2, line 250. What does the figure 2 do with the information in this paragraph, explain’ AUTHORS’ RESPONSE: We have added the following sentence to clarify the link between text and Fig.2: “Liners trends in the annual maximum Normalized Difference Vegetation Index (NDVI) over 15 years in the Northern areas of the Yamalo-Nenets, Okrug region in Russia provides supporting evidence of the increasing biological activity and greening and potential to enhanced BVOC emissions (Fig.2). Furthermore, we have added the following to the figure 2. caption” Figure 2: Linear trends in the annual maximum Normalized Difference Vegetation Index (NDVI) obtained from analysis of the MODIS 0.25 km data product for 2000-2014 over the North-Western Siberia region in Russia. The trends are given in the NDVI changes per 15 years. The yellow colors show the decreasing NDVI, which corresponds to decreasing biological production; the blue colors show the increasing NDVI. More detailed analysis of the trends is given in Esau et al. (2016).

6. Chapter 2, lines 251-252. What does “turnover of soil carbon stocks” mean? Please explain AUTHORS’ RESPONSE: We have removed to following text “and in the turnover of soil carbon stocks”.

7. Chapter 2, lines 275-284. Arctic “Browning” vs. “greening. Which process is today dominating area-wise? On line 1168 you are stating that the greening dominates, but this is not clear here. Please clarify AUTHORS’ RESPONSE: We have added the reference Phoenix, G.K., and J.W. Bjerke, J.W.:Arctic browning: extreme events and trends reversing arctic greening, Global Change Biology, 22, 2960–2962, 2016. And modified the lines 275-252 as following:

“However, browning as a proxy of decreased productivity has been observed during recent decades in many boreal regions (Lloyd and Bunn 2007), including vast territories
of Central Siberia together with a general downward trend in basal area increment after
the mid-20th century (Berner et al., 2013) and the overall decline in greenness from
2011 to 2014 in Arctic regions (Phoenix and Bjerke 2016). Current predictions on the
extent and magnitude of these processes vary significantly (Tchebakova et al., 2009;
Hickler et al., 2012; Shvidenko et al., 2013). It has been estimated that the northward
shift of bioclimatic zones in Siberia will be as large as 600 km by the end of this cen-
tury (Tchebakova et al., 2009). By taking into account that the natural migration rate of
boreal tree species cannot exceed 200-500 m per year, such a forecast implies major
vegetation changes in huge areas. In addition, we need to have a deeper understand-
ing on the future role of the browning process and re-analyze the model predictions
of arctic greening; to what extent are they wrong, and why (Phoenix and Bjerke 2016)."

Figure 3. Very low resolution of map. Please improve AUTHORS’ RESPONSE: we
provide an improved version of the map B. Chapter 2, lines 508-510. The stable
atmospheric stratification, is that high pressure subsidence inversions, or other types?
Please mention which type of large-scale stratification it is. AUTHORS’ RESPONSE:
Stable stratification is typical phenomena in the night time during summer. In Siberia,
stable stratification takes place in the winter time and is independent on pressure. The
text is modified accordingly.

There is no strong correlation between the atmospheric air stratification and type of
air masses. These are different measures to characterize the atmosphere. Tempera-
ture inversions are formed in high pressure air masses in clear sky conditions, which
enables the cooling of ground surface, commonly during nighttime and early morning.
Stable atmospheric stratification can form also in other type of air masses, e.g. low
pressure air masses with low winds or calm during nighttime. Atmospheric stability is
characterized by Pasquill stability classes according to various meteorological param-
eters.

https://www.ready.noaa.gov/READYpgclass.php http://onlinelibrary.wiley.com/doi/10.1002/9780470935361.app1/pdf
https://en.wikipedia.org/wiki/Outline_of_air_pollution_dispersion

9. Chapter 2.2.3.2, How can the general electric circuit be used as diagnostic tool
for climate studies. Please explain and give references. AUTHORS’ RESPONSE: We
have added a reference Mareev E.: Global electric circuit research: achieve-
ments and prospects, Uspekhi Fizicheskikh Nauk and P N Lebedev Physics Insti-
tute of the Russian Academy of Sciences. Physics-Uspekhi, 53, 504- 511, DOI:
10.3367/UFN.0180.201005h.052 and edited the text as following: Further exploration
of the GEC to be part of the climate sytem studies, its effect on the balance between
Earth ionosphere and global circuit, requires accurate modeling of the GEC stationary
state and its dynamics (Mareev 2010).

10. Chapter 2, lines Line 774-775 “the higher temperature response of aquatic ecosys-
tems compared to terrestrial…” How do you know that the temperature response is
higher for aquatic ecosystem? AUTHORS’ RESPONSE: Yvon-Durocher et al., 2012
have used large dataset respiratory measurements demonstrating and showed "show
that the sensitivity of ecosystem respiration to seasonal changes in temperature is re-
markably similar for diverse environments encompassing lakes, rivers, estuaries, the
open ocean and forested and non-forested terrestrial ecosystems, with an average ac-
tivation energy similar to that of the respiratory complex3. By contrast, annual ecosys-
tem respiration shows a substantially greater temperature dependence across aquatic
versus terrestrial ecosystems that span broad geographic gradients in temperature.”.
We have added “observed”: The observed higher temperature response of aquatic ecosystems

11. Chapter 2.4.3 “The impact of climate parameters, such as temperature (including
sea seasonal, weekly), strong winds, snowfall, snowstorms and precipitation should
be investigated. Both the frequency and the duration of weather extremes…incidence
of diseases”. Not convincing that the climate change major negative effect on human
health in northern Eurasia. If your conclusion is that climate change is not affecting
human health in a major negative way in northern Russia. Please write this out. AU-
THORS’ RESPONSE: We modified the text as following: the living conditions mostly in
Eastern part of the Northern Eurasian societies,

12. Chapter 3.2. The acronyms NPP and HSR should be defined the first time these are mentioned. AUTHORS’ RESPONSE: we have defined the acronyms: terrestrial net primary production (NPP) and heterotrophic soil respiration (HSR)

13. Lines 1191-1194. Serious misspellings’ AUTHORS’ RESPONSE: We have corrected the text as following: At the same time the fluvial export by the largest rivers considered to be an order of magnitude less than coastal erosion in the East Siberian Arctic Shelf (Semiletov et al, 2011). The Lena’s particulate organic carbon export is two orders of magnitude less than the annual input of eroded terrestrial carbon onto the shelf of the Laptev and East Siberian seas.

14. Chapter 3.4 Lines 1276-1283 is a repetition of the previous paragraph AUTHORS’ RESPONSE: To avoid a repetition we have removed the sentence: “Southwestern Siberian soils have lately been reported to contain high concentrations of plant-available phosphorus (Achant et al., 2013), which may enhance carbon sequestration of the ecosystems, if nitrogen is not too limited.”

15. Chapter 4 Lines 1378-1393. What is it you are really trying to communicate in this paragraph. It is general, that it becomes very hard to understand. Please concretize AUTHORS’ RESPONSE: We have shorten and edited the text as follows:

“PEEX is interested in developing methodologies for integrating natural science and social science knowledge as part of the operational Earth sustainable system questions (Schellnhuber et al. 2004). The first-priority tasks in this case is to establish an integrated geographical information background (Ribeiro et al., 2009; Hunt and Sanchez-Rodriquez, 2009; Shvidenko et al. 2010; Skryzhewska et al., 2015). A common information background would be the first step serving the development of a common language of integrated studies. For example, we need spatially and temporally explicit descriptions of terrestrial ecosystems, landscapes, atmosphere and hydrosphere. A common information background would be a unified base for the PEEX modelling plat-
form and for the development of integrated modelling clusters, which could combine ecological, economic and social dimensions. It could provide a historical background for the future trajectories of land cover, state and resilience of ecosystems, stability of landscapes, and dynamics of environmental indicators of environment. The already exiting Integrated Land Information System could be utilized here for combining all historical knowledge about the region and all scientific results obtained by past, current and future studies across the region (e.g. Schepaschenko et al., 2011; Shvidenko and Schepaschenko, 2014).”

16. Introduction: please write at the end of the introduction chapter what is the outline of your report. In other words, describe shortly what is the goal of different chapters in order for the reader to get a full picture of how the report is organized and how the different parts connect. AUTHORS’ RESPONSE: To clarify the structure of the paper we have added the “Table of Content” before the “Introduction”. The structure and goals of the different chapters is introduced in the three last paragraphs of the Section “2. System perspective approach”. We think that now having the “Table of Content”, as proposed by the both referees, clearly provides the full picture of the report, it’s goals are, connections between different parts. The introduction of the report fits better to the end of chapter-2 than in the end of “Introduction”. Having it in Chapter 2. we are addressing the “system based” orientation of the approach.

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/acp-2016-186/acp-2016-186-AC1-supplement.pdf

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-186, 2016.