1st submission

Editor Start Date: 4/5/2018

Editor Stop Date: 7/11/2018

Reviewer #1 (6/20/2018–7/6/2018)

Reviewer #2 (4/5/2018–5/9/2018)

Editor Comments to the Author:

Reviewer #1 :Tanaka Taichu Y.

General:

This manuscript gives the description of the near-real-time forecast system for assisting the observational campaigns such as the Arctic cruise of the Research Vessel (R/V) Mirai. The forecast system includes well-established regional meteorology-chemistry model WRF/Chem, and the meteorology is assimilated by NCEP GFS data. The system produces 48-forecast for assisting the observational plans. The description of the numerical system is reasonable.

The data files that I got for this review, however, are not "forecast" data. The forecast data should be free-run results from the specific initial time, but the output files seem just the simulated data with assimilated meteorological fields. So, we cannot evaluate the forecast skills, which is important for evaluating the forecast system is usable or not. I think this is somewhat confusing because the title of the manuscript states "forecasting data". Without the forecast data, the data users cannot investigate the forecast skills, that is critical to the usability of the forecast for observational campaign. I recommend that the authors to include the 48-hour forecast data for each day.

Specific points:

Title, abstract, etc.: This manuscript includes "Near real-time" (title), "quasi-real-time" (abstract, 1st paragraph of "Methods"), and "near-real-time". Is there any difference among the usage of the terms?

Section 1, 1st paragraph: "Black carbon (BC), which is known to be a component of PM2.5, can change the Earth's albedo by changing the color of ice and snow via deposition onto the surface, and the impact of BC on the climate

change appears to be larger at high-latitude regions in comparison with the other parts of the world": There should be some references to support this statement.

Section 1, 1st. paragraph, line 6: "... mid-latitude regions such as Asia": I think the word "Asia" is too wide because Asia includes tropical regions.

Section 1, 2nd paragraph: "Chemical transport models have been used to estimate the burden and origin of BC and other pollutants in the Arctic region.": The previous studies should be cited.

Section 1, 2nd paragraph, line 3-: "the horizontal resolution of these models is generally not sufficient to reproduce frontal activity": How fine the horizontal resolution of the model should be?

Section 1, 2nd paragraph: "a better representation of convection, clouds, and aerosol–cloud interaction processes is required for the precise estimation of wet deposition processes2.": That should be "better representations ... are" because there are several processes.

Section 1, 3rd paragraph, line 3: "some special treatment": should be "some special treatments"

Section 1, 3rd paragraph, line 4: "maturely": should be "mutually"? Or what does this mean to "maturely coupled"?

Section 2, line 4: Is 40-km grid interval enough to reproduce the frontal activity? Also, in section 1 the authors stated that "horizontal resolution of these (= global) models is generally not sufficient", but some current operational global chemistry weather forecast models (such as Copernicus/ECMWF, GEOS/NASA) have comparable or even finer resolutions compared with this study. I think the horizontal 40 km grid interval and vertical 32 layers are not an advantage from the global forecast in the current situation.

Section 2, line 8: "Since the Arakawa C-grid is used in the model (ref 3)": The "ref 3" should be a superscript, and I think it should be at just after "the Arakawa C-grid" (not after "the model").

Section 3, 1st paragraph, line 3-4: There should be a reference for the NCEP GFS dataset.

Section 3, 1st paragraph, line 4-: I cannot follow the treatment of the initial and lateral boundary of the chemical compositions from MOZART-4. (1) Is the global output of MOZART-4 climatic (or some averaged) output or is MOZART-4 simulated for each day? (2) Why the lateral boundary condition of chemical compositions set to have fixed vertical profiles and how do you prescribe the fixed profiles?

Section 3, 3rd paragraph, line 3: "slightly modification": should be "slight modification"

Section 4: "The original output files are available upon request": The available variables (meteorological fields and chemical compositions) in the original output should be listed, because Table 2 only includes horizontal wind components and two chemical components.

Section 5, 1st paragraph: It is desirable to present the ship track of the MR1606 cruise, for example, in the Figure 1. Section 5, 2nd paragraph: It is also desirable that the evaluations of the BC and ozone are conducted in the Arctic region or on the ship cruise because the target of this study is the Arctic region and the support of the observations.

Section 5, 2nd paragraph, line 5: " The accuracy of COSMOS has been assessed to be about 10%": A reference should be cited for the basis of this assessment.

Reviewer #2 : Anonymous

This manuscript seems to be written fitting to the guidelines though this is the first time for me to review this type of manuscript. However some minor points below should be revised for accepted. Additionally native check seems to be highly required.

Title
・As mentioned in abstracts, will data in both 2016 and 2017 provide? If that, the title had better be changed.

2. Model Domain
・Authors used surface concentrations comparing to observations in following sections. Information for the surface height or/and the height of first layer will be helpful.

3. Methods
・Describing data sources (website etc.) for input data will be useful in a manner that will make reproduction possible by a third party.
・Which version of FINN data did authors use? It has recently been brought to developer's attention that some of the FINNv1.6 files include incorrect emission estimates. They have removed FINNv1.6.
・Temporal resolutions of original emission inventories are needed information.

5. Technical Validation
・Information for particle size distributions in this model is needed.

Tables

・Column breaks of Tables are not clear.

Authors Response:

To Reviewer #1

Reply to reviewer 1 of our manuscript entitled as "Near real-time simulation data of atmospheric components and meteorology in the Arctic region using the WRF-Chem model from August to September 2016"

The authors appreciate your careful review and appropriate comments and suggestions on our manuscript. We have tried to revise our manuscript following to your comments. Following is the detailed reply to your comment.

1. General: Following to your comment, additional native check is applied to the revised manuscript.

2. Title: Following to your comment, authors have decided to focusing on the data for 2016.

3. 3 .Section 2: Following to your comment, a sentence "the height of the lowest level is about 20 m above the surface" is added to the revised manuscript (page 3, line 10 of section 2).

4. Section 3: Address of web-page is added to the model and emissions (page 3-4, section 3)

5. Section 3: FINN version 1.6 was able to be available from December 2017 to April 20, 2018 (cf. http://bai.acom.ucar.edu/Data/fire/), and the problem of version 1.6 is not affected on our results.

6. Section 3: Temporal resolution for some part of emission is not mentioned in the original version of manuscript, and add some information in the revised manuscript. Anthropogenic emission is annual-mean version of EDGAR4.2 for 2010. Biomass burning (FINN version 1.5) is daily, and the release height is estimated every 60 minutes. Biogenic (MEGAN2) is every model time step (typically 3 minutes, but it can be changed to keep CFL condition).

7. As GOCART model is applied for this study, only one size distribution is considered.

8. Tables are modified for the improvement of separation for each column in the revised manuscript (page 11, Tables 1 and 2).

To Reviewer #2

Reply to reviewer 2 of our manuscript entitled as "Near real-time simulation data of atmospheric components and meteorology in the Arctic region using the WRF-Chem model from August to September 2016 and 2017"

The authors appreciate your careful review and appropriate comments and suggestions on our manuscript. We have tried to revise our manuscript following to your comments. Following is the detailed reply to your comment.

General:

The author agrees that there is no "forecast" data in the manuscript. The aim of this manuscript is to describe the dataset which is operationally calculated using WRF/Chem and NCEP GFS. As mentioned in the manuscript, the "forecasted" data was overwritten by the output executed using the operational reanalysis meteorological data and it seems to be difficult to evaluated the forecast skill in this manuscript. I have removed "forecast" from the title, and added a reference of Takigawa et al. (2007) which estimated the forecast skill of WRF/Chem for Kanto region of Japan.

Specific:

1. The author apologize for the lack of unity for the word. "near real-time" is used for these word in the revised manuscript.

2. Following to your comment, Quinn et al. (2011) is referred in the revised manuscript (page 2, line 4 of 1st paragraph of section 1 in the revised manuscript).

3. "Asia" is replace with "China and Japan" in the revised manuscript (page2, line 6 of 1st paragraph of section 1).

4. The reference of "Ikeda et al." is moved to the first sentence of this paragraph in the revised manuscript (line 2 of 2nd paragraph of section 1).

5. Transport of passive tracers and water vapor seems to be improved using 50km or higher for the horizontal resolution. I have added references (Yamashita et al. and Kawatani et al.) in the revised manuscript (line 4 of 2nd paragraph of section1).

6. "a better" is replace with "more realistic" (page 2, line 5 of 2nd paragraph of section 1.

7. The author apologize for the insufficient check for the grammar. Manuscript is rewritten following to your comment.

8. Manuscript is rewritten following to your comment.

9. Related to #5, horizontal resolution of 50 km or higher is needed for the reproduction of transport related with frontal activity. The author also agree the comment that ECMWF and NASA have already developed global chemical weather forecast with higher resolution, but still our calculation might be useful as it is an online model and it can be customized for our own observational campaign.

10. The sentence is written following to your comment in the revised manuscript.

11. MOZART-4 data is available on the webpage of NCAR(https://www.acom.ucar.edu/wrf-chem/mozart.shtml) with a delay of several months. I have used MOZART-4 for the initial condition of spinup, but it cannot be used for the

near real-time calculations.

12. Manuscript is rewritten following to your comment.

13. List for all items in the scheduled calculation is added in the sample files mentioned in Table 1 as "full_list.txt" (page 11, Table1).

14. Figure 1 is modified to include the ship track of the MR1606 cruise in the revised manuscript (page 7, Figure1).

15. BC observed on the ship cruise is still under quality control process. Comparison of BC concentration will be done in the following papers.

16. The author slightly modified the sentence to "The accuracy of COSMOS has been assessed to be about 10% in East Asia27 and the Arctic region28" following to your comment. Here, reference 27 is Kondo et al. (2011) and reference 28 is Sinha et al. (2017) (page 6, lines 5-6 of 2nd paragraph of section 5).

2nd submission

Editor Start Date: 7/19/2018

Editor Stop Date: 8/1/2018

Editor Comments to the Author:

You have done precisely to the comments of the reviewer.

The current data is in the server of JAMSTEC, please deposit it in the recommended data repository for granting DOI.

Editorial Office's note

Calculate checksum date: 8/9/2018

Algorithm: SHA256

Hash: 222AFD498D6A7FF6346596A48D0D2FC2B6A1BF76F5A70BAE89B34537FD8B67D1

Path:takigawa_PDJ¥binary_files.tar

Algorithm:SHA256

Hash:2383E5D6BC3EF5BC58B7C712A3C6D313C0A76B8BD9AF113E8B595EF56095663A

Path:extractCDF.tar

Algorithm:SHA256

Hash:6F68DC79E7E0B2F48AD5FC00D77B56B65BEDDF1BE785F96E89EED0691D531A6B

Path:full_list.txt

Algorithm:SHA256

Hash:0913D326851EC6620F124072FC0DAB7F706579EF99F38EBB90FD6F6F8FF0D079

Path:sample.ctl

Original Data

Takigawa, M., Yamaguchi, M., Taketani, F., Kanaya, Y. and Kondo, Y. Arctic Data archive System(ADS), 1.00, NIPR, 2018, https://doi.org/10.17592/001.2018082101.

Postscript by editorial office,

Hash calculations above were updated as below:

Calculate checksum date: 10/27/2020

Algorithm: SHA256

Hash link: http://id.nii.ac.jp/1434/00000003