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**Geoscientific
Model Development
Discussions**

Interactive comment on ""Gtool5": a Fortran90 library of input/output interfaces for self-descriptive multi-dimensional numerical data" *by* M. Ishiwatari et al.

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Replies to the comments by referee #1

Thank you for your a valuable opinion about our manuscript. Followings are the replies to your comments.

Replies to the general comments

- Although the paper mentions use of the Climate and Forecast (CF) metadata conventions, it is not clear whether the files written by gtool5 subroutines are strictly CF compliant. Knowing the degree of CF-compliance would be useful information to determine whether the files would be interoperable with other tools for model analysis and visualization.

  [reply]

  Not all the date produced with the gtool5 library satisfies the gtool4 netCDF conventions or CF conventions. We have to take care of variable names and attributes in programs in order to follow the conventions. Nevertheless, since optional arguments of "HistoryCreate" subroutine of gtool5 library is designed to deal easily with the names of coordinate variables, the global attribute "conventions", and settings of "time" dimension, it is more convenient to produce data in conformity with the conventions using the gtool5 API compared with the raw netCDF API. Actually, our GCM "dcpam5" can produce output date satisfying CF convention (ver.1.0) only by changing two optional arguments of the output subroutine. The result of the online checker for CF conventions is attached at the bottom of this response letter.

  Considering them with the first comment by referee #2, we described that

  > The two conventions have little difference so that most data can circulate only with changing "Conventions"

  in "3.1 Gtool5 data format" of the text.

- It might also be useful to know whether users of the gtool5 library could take advantage of compression for model output, as provided by netCDF-4.

  [reply]

The present version of the gtool5 library can read compressed files by linking with netCDF-4 library, whereas it cannot output compressed data. However, it is expected to realize compression of model output by using "nf90_def_var_deflate" and "nf90_def_var_chunking" instead of old interfaces of netCDF-3 without changing the programs in present models.

Above statement was added to "Conclusions" as an example of the next comment.

- It might also be good to point out that one of the benefits of a layer such as gtool5 is the possibility of adding to its capabilities in the future, such as compression capabilities, without changing existing interfaces used in current models, so that relinking with a new version of the library would automatically provide the new functionality.

  [reply]

  Thank you for your valuable comment. This point is exactly one of the important benefits of gtool5 library. We added the following description in "Conclusions" according to your comment.

  > "Moreover, use of gtool5 give us the possibility of adding to its capabilities in the future without changing existing interfaces used in current models. Relinking with a new version of the library would automatically provide the new functionality."

Replies to the technical corrections

- Page 3693, lines 23-26 Unclear: "However, netCDF provides a fundamental numerical data environment, which means that the granularity of the netCDF data

structure is so coarse that many operational steps are needed for data manipulation, and hence a diversity of software arises." Suggested replacement: "However, netCDF operations are relatively low-level, so that many small steps are needed for data manipulation. This leads to a diversity of ways to implement input and output in models."

[reply]

It is corrected following to the suggestion.

- Page 3694, line 25 Unclear "should be verified independently in a certain manner." Suggested replacement: "should be verified independently in some way." or just "should be verified independently."

  [reply]

  Considering with the comment by referee #2, we replaced it with "should be checked independently".

- Page 3694, line 26-27 Word choice: "acquirement of observational data" Suggested replacement: "acquiring observational data"

  [reply]

  It is corrected following to the suggestion.

- 3695, line 6 Word choice (use of "presume"): "conceptual models used to presume the rough behavior of GCMs" Possible replacements, depending on intent: "conceptual models used to understand, approximate, capture, perfect, clarify (?) the rough behavior of GCMs"

  [reply]

  We used "capture" instead of "presume".

- 3696, lines 8-9 Word choice: "become diverse in the program code" Suggested replacement: "differ"

  [reply]

  It is corrected following to the suggestion.

- 3696, line 24 "UNIDATA of National Center of Atmospheric Research (NCAR)." should be "Unidata, part of the University Corporation for Atmospheric Research (UCAR)."

  [reply]

  It is corrected following to the suggestion.

- 3698, line 9 Word choice: "outputted" (2 occurrences) Suggested replacement: "output"

  [reply]

  It is corrected following to the suggestion.

- 3702, line 3 Typo: "represent on approach" Suggested replacement: "represent one approach" or "represent an approach"

  [reply]

  It is corrected following to the suggestion.

- 3704, line 1 Word choice: "outputted" Suggested replacement: "output"

  [reply]

  It is corrected following to the suggestion.

We hope that the revised manuscript will be suitable for publication in GMD.

Sample output of CF-checker

```
CF-Convention compliance checker for NetCDF format

Checking against CF version 1.0...
Check another file | NetCDF format | CF Convention.

File name:      U.nc
Output of CF-Checker follows...

CHECKING NetCDF FILE: /tmp/6256.nc
=====================
Using CF Checker Version 2.0.2
Using Standard Name Table Version 18 (2011-07-22T10:58:54Z)


------------------
Checking variable: lon_weight
------------------

------------------
Checking variable: sszi
------------------

------------------
Checking variable: ssz
------------------

------------------
```

```
Checking variable: lon
------------------

------------------
Checking variable: time
------------------

------------------
Checking variable: sigm
------------------

------------------
Checking variable: sig_weight
------------------

------------------
Checking variable: sig
------------------

------------------
Checking variable: wn
------------------

------------------
Checking variable: lat
------------------

------------------
Checking variable: U
```



```
------------------

------------------
Checking variable: lat_weight
------------------

ERRORS detected: 0
WARNINGS given: 0
INFORMATION messages: 0
```

Interactive comment on Geosci. Model Dev. Discuss., 4, 3691, 2011.