Community feedback

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General Comments

The author introduces a new modeling package to create values for incoming top of atmosphere solar radiation based on variable orbital parameters and insolation constants. The purpose of the package is to easily create useable inputs for earth system modeling and educational purposes.

The paper details the construction of the model and compares output to existing PMIPII simulations. It seems like the fundamental calculations done by the model are thoroughly detailed, and the model seems to compare well to the state-of-the-art simulations in PMIP. I think the paper could however benefit from some clarifications and figures could be made more readable (both detailed below). In particular, DINSOL's advantages over other TOA shortwave calculators could be made clearer.

I was able to easily download and run the model on a Linux server. I was unable to test the GUI, however – I run MacOS (which the paper clarifies is not supported by the software), and the Linux server I have access to runs CentOS, which has known issues with installing required dependencies such as PyGTK.

Since the paper emphasizes the educational component of the model, moving forward (beyond the publication in this journal), it may be helpful to bundle the code with a sample lesson plan to detail how it can be used in the classroom.

Specific Comments

L55: This paragraph would benefit from a clearer description of what benefits DINSOL has over existing programs. Though a sentence is given for this point, I was still a bit confused as to these differences – is it usability? Speed? Flexibility?

Author answer:

The most significant DINSOL advantage is the flexibility (offering some options to prepare custom datasets) and usability (ideal for assisting research or being employed in classrooms).

L129: Most GCMs use 365-day years these days – though this might not be the case for other types of models, perhaps a clarification could help

Author answer:

The audience will likely employ the DINSOL on simplified and intermediate-complexity climate models. It's expected that this audience needs a 360-day calendar, such as the Planet Simulator (PlaSim) model (link: https://www.mi.uni-hamburg.de/en/arbeitsgruppen/theoretische-meteorologie/modelle/plasim.html).

For instance, the DINSOL source code was adapted by myself to work with the Global Resolved Energy Balance (GREB) model, a simplified climate model that works with a 365-day calendar (two-time steps per day).

The main idea is to cater to the users with as many options as possible.

L335 – 354: Please clarify what exactly is meant by 'sample' – samples of eccentricity, etc.? or Q?

Author answer:

The samples are referred to the Earth's orbital parameters (EOP), calendar dates, and monthly daily Insolation (Q).

I should be clearer in the paragraph. I will improve it.

L355: Please clarify which time intervals

Author answer:

Thanks for warning me. I'm going to introduce the time slice at the initial lines.

L400: why were the differences between DINSOL and PMIPII only with the 360-day calendar?

Author answer:

A full analysis of the DINSOL and PMIPII monthly insolation data is given in Table 6, where the Root Mean Square Error (RMSE) and U test were adopted, and conforming to Table 6, we know that DINSOL samples do not differ significantly from the PMIPII. Thus, Figure 11 provides just an overview of these data, where the first six graphs represent the monthly insolation from a 365-day calendar, whereas the rest represent a 360-day calendar.

Appendix B: - this is useful performance information, thanks for including it. Could you also include an example for a more 'typical' GCM-level output (say, 1 degree x 1 degree, while keeping the 30-minute timestep)

Author answer:

I will modify the text in order to include a more typical GCM's spatial resolution (e.g., 1°x1°; 0.5°x0.5°; 0.25°x0.25°) and keep the 30-minutes timesteps. A table with this information should be an interesting alternative as well.

Typos / Other fixes

Author answer:

The text typos corrections and other sentence improvements are ongoing.

A few places, including L80, L158, L233, could you please use $\times$ instead of x for the multiplication sign? The latter makes it look at first glance as if a variable is being referred to.

L92: please clarify true anomaly of what (solar longitude I assume?)

L96: Typo: find instead of finding

L100: Recommend placing the sentence starting with "However" after eq 3 for clarity.

L114: Typo: should be "Kepler"

L125: Please specify what the 'beginning' of the year is defined as – a particular value of λ?

L131: perhaps 'supports' instead of 'uses'

L159: maybe clarify that S_0 can be manually set in the model as well

L241: clarify that it's +/- 1 Myr "of the present"

L322: "Even under hypothetical cases…" perhaps

Figures

Figure 7 – please label axes on figure as well

Author answer:

I made the recommended suggestions.

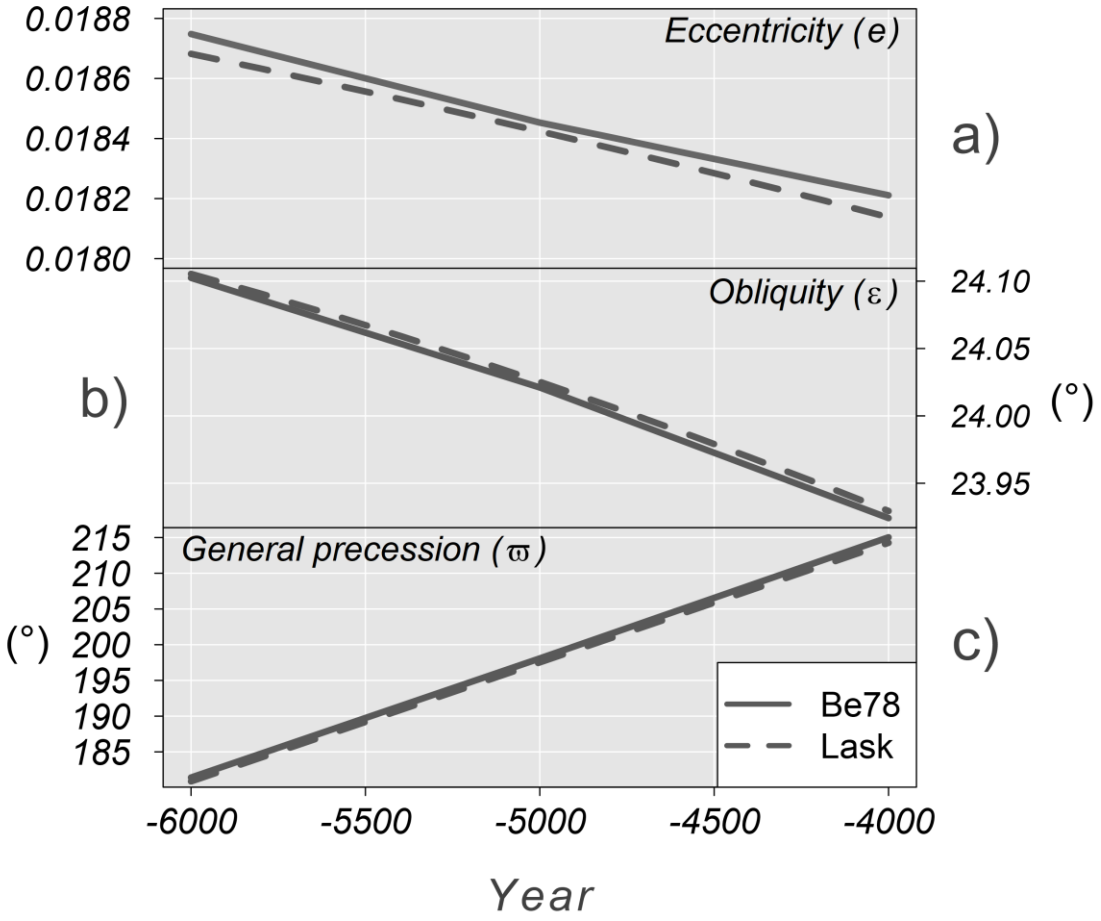


Figure 10 – I recommend putting all of the lines for each subplot onto the same axis and differentiating them perhaps by color. Right now, it's very difficult to see that the Be90 and Lask curves have a different eccentricity amplitude, due to the different y-axes used.

Author answer:

Thanks for warning me about the y-axis issues in Figure 10-a. I already fixed it by putting the same y-axis values. Another observation was to modify the dotted and

dashed line graphs with color graphs. In this case, an old-style line graph was adopted because I considered the readers with color view deficiencies. The GMD Journal recommends that the authors pay attention and be careful about it.

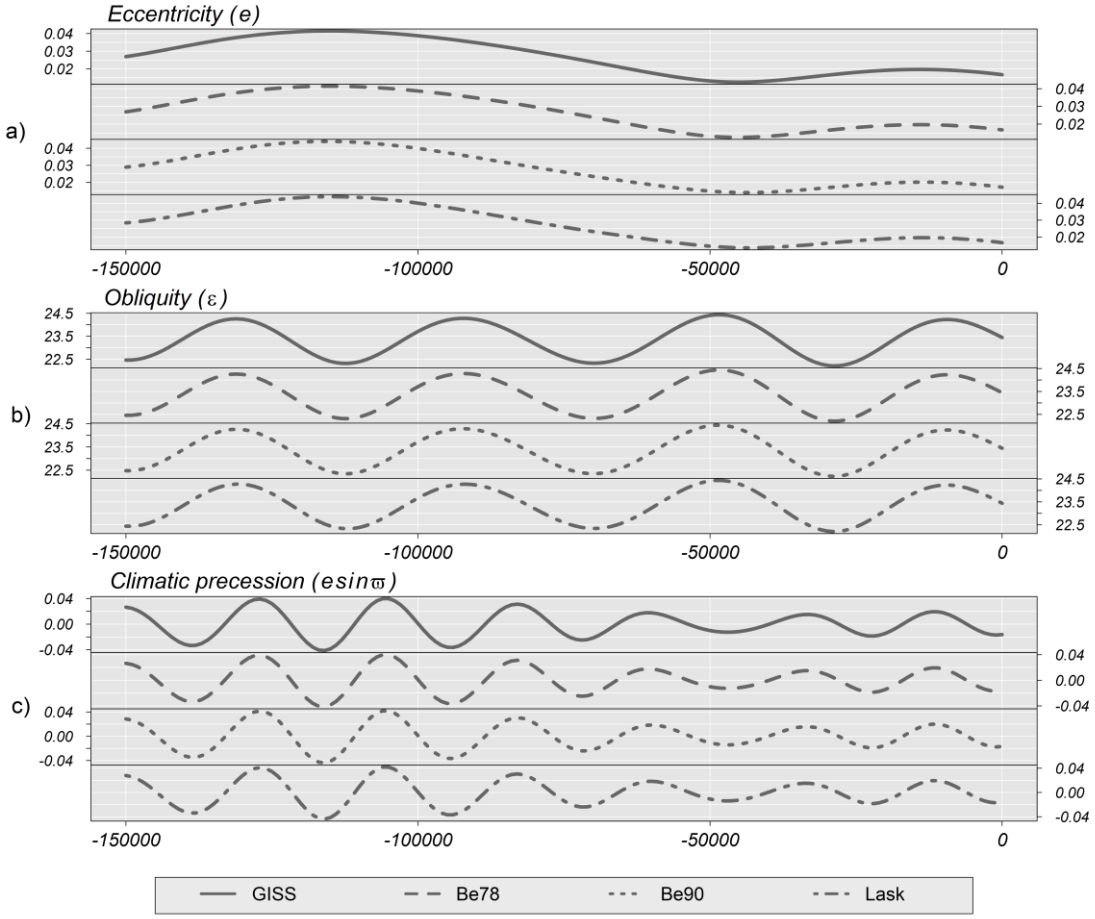


Figure 11 – please use a divergent colormap (red to blue, for example) for difference maps (g, h, i) – they are currently unreadable with the monotonic colormap (from the screenshots of the GUI, it seems like the same colormap is used for difference maps in the program as well – it would definitely be preferable to use a divergent colormap whenever differences are shown). Also it would be great if the broad categories of subplots were labeled on the side – i.e., 365-day for a-f and 360-day for g-l (this can easily be done in a post-processing program – paint, powerpoint, etc.)

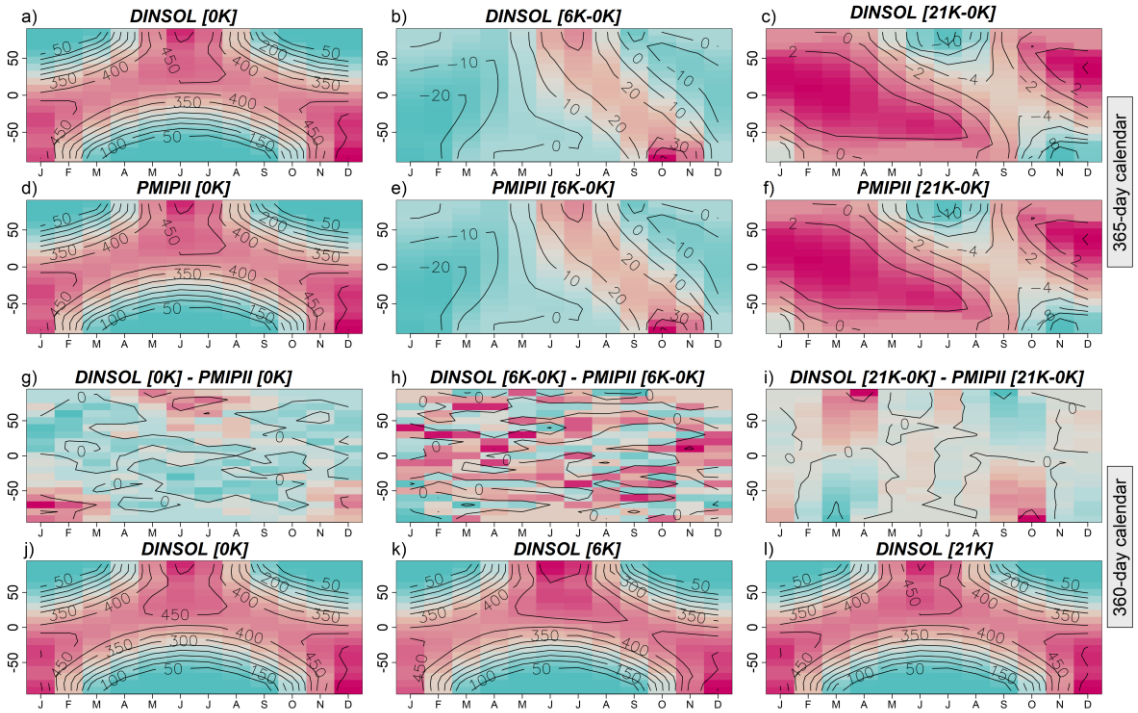
Author answer:

Thanks for sharing your suggestions. With regard to Figure 11, I included two labels on the right side to distinguish the contour fields from 365-day and 360-day calendars. Furthermore, I also adopted a divergent color palette for all of Figure 11,

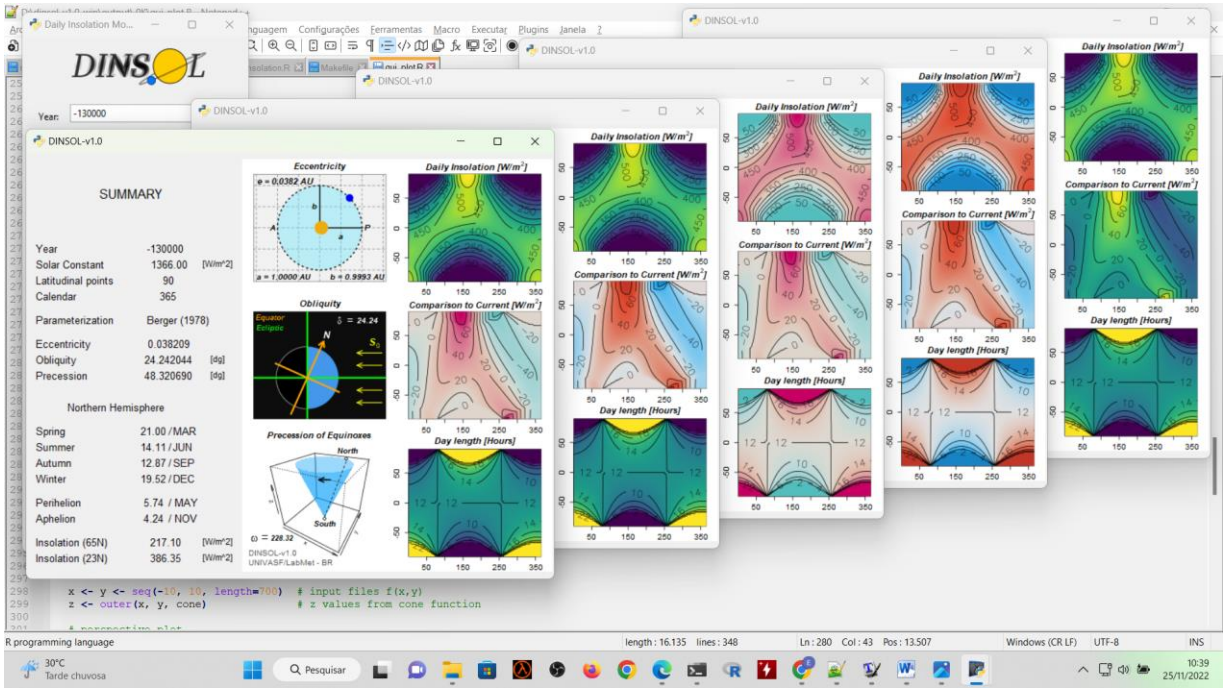
and now it is more readable. Additionally, I made some tests, including other palettes in the Graphical User Interface (GUI) mode. A screenshot of this is presented here as well.

For now, I will wait for other suggestions until I decide what the best GUI color setup is.

Well, I really appreciated all of your observations, and I am thankful for your feedback.



A GUI Screenshot is given on the next page where different palettes are employed.


DINSOL
Year: -130000
DINSOL-v1.0
SUMMARY
Year -130000
Solar Constant 1366.00 [W/m^2]
Latitudinal points 90
Calendar 365
Parameterization Berger (1978)
Eccentricity 0.038209
Obliquity 24.242044 [dg]
Precession 48.320690 [dg]
Northern Hemisphere
Spring 21.00 / MAR
Summer 14.11 / JUN
Autumn 12.87 / SEP
Winter 19.52 / DEC
Perihelion 5.74 / MAY
Aphelion 4.24 / NOV
Insolation (65N) 217.10 [W/m^2]
Insolation (23N) 386.35 [W/m^2]
Eccentricity
Obliquity
Precession of Equinoxes
Daily Insolation [W/m^2]
Comparison to Current [W/m^2]
Day length [Hours]
x <- y <- seq(-10, 10, length=400) # input files f(x,y)
z <- outer(x, y, cone) # z values from cone function
R programming language
length : 16.135 lines : 348
Ln : 280 Col : 43 Pos : 13.507
Windows (CR LF)
UTF-8
INS
30°C
Tarde chuvosa
Pesquisar
10:39
25/11/2022