

## Brousil, Matthew Robert

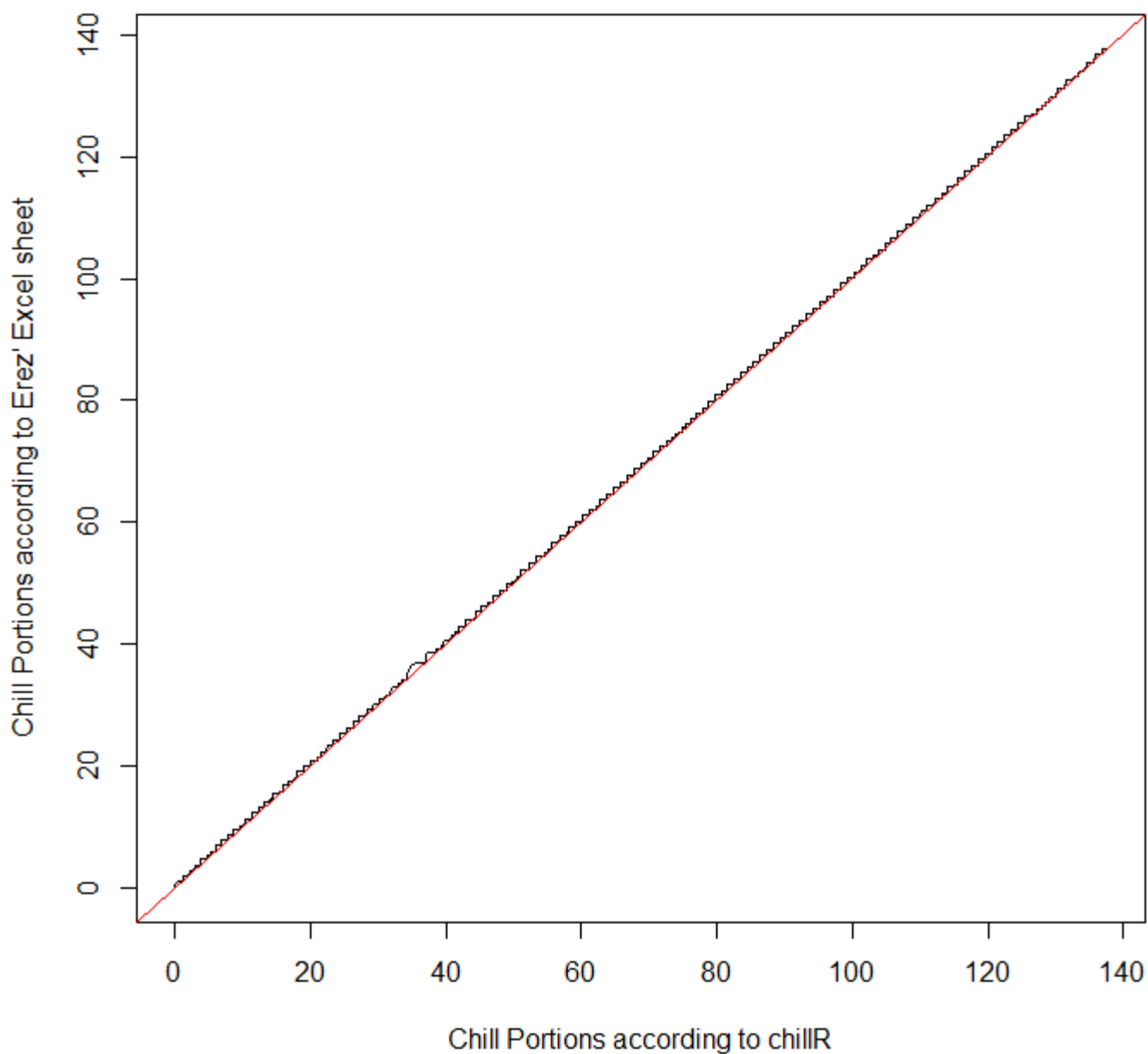
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**From:** Eike Luedeling <luedeling@uni-bonn.de>  
**Sent:** Tuesday, November 27, 2018 4:12 PM  
**To:** Brousil, Matthew Robert  
**Subject:** RE: Question about chillR::Dynamic\_Model()  
**Attachments:** local\_hourly.csv; dynamic-excel.xls

Hi Matthew,

Thanks for the clarification. This is now something I can work with.

Well, most of the problem seems to have arisen from lines 11 and 12 of the Excel sheet, which contain temperature data that distorts the final results. If you replace the temperatures in these rows (not the formula, which are needed) with the record you generated with chillR, results are a lot better aligned. See following plot (red is the identity line):



I'm attaching slightly modified versions of the files.

Admittedly, the results aren't entirely identical. I'm not totally sure why, and I don't have time to look very hard now, but I suspect that this small difference arises from rounding errors. The Dynamic Model is pretty extreme in that it contains enormous parameters that need to be processed. This may lead to the need to round numbers, which may be handled differently by different programs. It is also possible that this arises from adjustments I had to make to make the model computable. The Excel sheet prescribes an iterative process, where you advance one row at a time. In R, this is very inefficient, and since I always had the processing of large datasets in mind, I had to solve this challenge differently, without the need for such iteration. So the code in the package isn't entirely identical to what Erez' group produced. I don't think that this is the reason for the discrepancies, but I won't rule it out.

But you'll see from the figure that the differences are very small, certainly not meaningful. You have to consider that the Dynamic Model wasn't sent to us from heaven, but resulted from a best-bet estimation with massive assumptions. So

even if the chillR procedure doesn't perfectly replicate the Excel sheet, the errors that arise from the approximate nature of the model surely outweigh the errors introduced by chillR.

So I think you'll be ok with using chillR, if it serves your needs better than the Excel sheet. If the problem is really a rounding error, the chillR results may even be more accurate than what Excel produces.

Let me know if you have any other questions, or if you're not fully satisfied with my reply. I'm always grateful for comments that help me improve the package.

I'd also be curious to see any products that come out of your work!

All the best,  
Eike

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**From:** Brousil, Matthew Robert [mailto:[matthew.brousil@wsu.edu](mailto:matthew.brousil@wsu.edu)]  
**Sent:** Tuesday, November 27, 2018 20:53  
**To:** Eike Luedeling <[luedeling@uni-bonn.de](mailto:luedeling@uni-bonn.de)>  
**Subject:** RE: Question about chillR::Dynamic\_Model()

Hi Eike,

Thank you for your response, and my apologies for not providing more information. Here is more background:

I'm comparing chillR::Dynamic\_Model() and the Erez Excel dynamic model for consecutive daily temperature data that have Tmin & Tmax.

I take datasets containing Tmin and Tmax temperatures and generate: (1) hourly temperatures using chillR::stack\_hourly\_temps() and (2) chill portions using chillR::Dynamic\_Model(). I provide the resulting hourly temperature values from stack\_hourly\_temps() as input to both Dynamic\_Model() and the Erez Excel dynamic model and compare the results. The reason for comparing these two is that my research groups understands them to be equivalent and the chillR package is much more useful for our purposes (we have a large number of datasets). However, when I compare them I find that they differ. In my attached example, Dynamic\_Model() begins counting chill portions 4 days later than the Excel model and the portions differ by 0.001298573 on average.

I've attached the following files to show the workflow: (1) a script that walks through the steps I take in my analysis, (2) an example dataset snippet, (3) the Erez Excel dynamic model with the hourly data from stack\_hourly\_temps() inserted.

Thank you for your assistance,  
Matthew

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**From:** Eike Luedeling <[luedeling@uni-bonn.de](mailto:luedeling@uni-bonn.de)>  
**Sent:** Wednesday, November 21, 2018 12:22 PM  
**To:** Brousil, Matthew Robert <[matthew.brousil@wsu.edu](mailto:matthew.brousil@wsu.edu)>  
**Subject:** RE: Question about chillR::Dynamic\_Model()

Hi Matthew,

Thanks for your question, but you didn't give me enough information to look into this in a meaningful way. What are you trying to do, and what did you find?

Regards,  
Eike

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**From:** Brousil, Matthew Robert [<mailto:matthew.brousil@wsu.edu>]  
**Sent:** Wednesday, November 21, 2018 19:36  
**To:** [eike@eikeluedeling.com](mailto:eike@eikeluedeling.com)  
**Subject:** Question about chillR::Dynamic\_Model()

Dear Dr. Luedeling,

I'm writing in hopes that you might address a question about your chillR package.

My question is whether `chillR::Dynamic_Model()` is expected to differ from Dr. Amnon Erez's Excel Dynamic Model under any conditions? My understanding is that `chillR::Dynamic_Model()` is a transcription of the Excel model.

I'm applying `chillR::Dynamic_Model()` to temperature data that have been prepared using `chillR::stack_hourly_temps()` and comparing the output to a copy of Dr. Erez's Excel Dynamic Model provided by the University of California ([here](#)). I find that the output from `chillR::Dynamic_Model()` differs somewhat from the Excel model for some data sets. From what I can tell it's not an issue in my usage of the model, as the output of `chillR` and the Excel model is the same for an example data set provided within the Excel file itself.

Thank you for considering this question.

Sincerely,

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**Matthew Brousil**  
Data Manager, CEREO  
Washington State University