Intercomparison of Mid-latitude Storm diagnostics (IMILAST) - A project overview

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Urs Neu, ProClim-, Swiss Academy of Sciences

Slide 1.

It's a pleasure for me to present the project on Intercomparison of mid-latitude storm analysis and tracking methods (named IMILAST) here at EGU.

The list of authers has considerably increased compared to the program, thanks to efforts in providing first results. Special thanks goes to I. Rudeva and S. Gulev who have prepared first analysis of the intercomparison calculations.

2.

In this short talk I will at first briefly describe the background of the project, followed by its aims. Then I will show some first results of the intercomparison calculations and at the and look at the next steps.

3.

As for today 23 research groups from all over the world are taking part in the project. Some of the participants are among us in the audience and on the podium. Anybody who is interested is of course welcome to join the project.

4.

So what is the project IMILAST about?

In general, storms are among the most important natural disasters. The knowledge of future changes not only in tropical but also in extratropical storms are very important for disaster reduction planning and activities. However, the projections of future developments in frequency, intensity, life time etc strongly depend on the methodologies that are used for storm analysis. I have to emphasize that in this framework we do not speak about model uncertainties, but about differences in the analysis of the same model results or of observational data sets. Thus, it is very important to know about the specific possibilities, advantages or restrictions of the different methods that are used for extratropical storm analysis. This is necessary to be able to retrieve appropriate interpretations of specific results.

5.

Let me just show one example:

Here are two representations of the number of storms over the same period of about 20 years and using the same observational data set, but different analysis methods. To make things easier, I show here the same geographical sector of the Northern Hemisphere with the same orientation (which both is often not the case originally). We can see quite a lot of similarities in the patterns, but there are huge differences in the numbers. Why is that?

6.

I just mention one problem here: It starts with a very simple thing, namely counting. How do we count storms? Already here we have a couple of possibilities. I only show the two most extreme cases:
In case A we treat each time step separately and count 1 storm for every grid that contains a cyclone center at that time, as shown on the left graph. At the end we sum up for each grid all the storms for all time steps over the 20 years. In this manner, the same storm may be counted several times over its life time, i.e. once for each time step.
Case B: The other extreme is that we first analyse the whole track of all the storms, then define the point where the storm was strongest and then count 1 at the grid where this point is located. This means that the same storm only is counted once over its life time.

There are several possibilities in between these two cases, of course. It is not obvious which method is the best, that depends on what you want to look at. But there is no time here to discuss this further. And this is only one example of many that strongly influence the analysis output.

7.

The aim of the project is to provide an assessment of the different analysis methods, to discuss the advantages and disadvantages of these methods and in the end provide some kind of a handbook for users, which describes the specific informations that can be drawn from specific methods and helps to interpret the different results.

8.

What did we do until now?

First we have collected descriptions of the existing identification and tracking methods. Then we have defined a standard intercomparison experiment, where each group applies its specific method on exactly the same observational data set (we use ERA-40), and delivers a specified list of characteristics that can be compared afterwards. The calculations of the intercomparison are still ongoing.

9.

To give you a first impression of the results, I show you here four plots of the winter storm counts over the whole intercomparison period. Let's just forget about numbers and look only at some general features of the geographical distributions. The general patterns seem rather similar: The analysis coherently show activity centres southeast of Greenland, northwest of Scandinavia, and on the northwest coast of North America. However, there are discrepancies in the latitude of the main activity regions over the North Pacific. When we look further into the details, there are differences in the occurrence over the continents. These are not the regions where the frequency is highest, but these are the regions, that most people (except maybe ship crews) are interested in. If we look at North America, the pattern of the main activity centres are rather different. Please keep in mind, that we are not comparing different models or different data sets, but just different analysis methods.

10.

Now I present some analysis of four intercomparison calculation, done by I. Rudeva and S. Gulev. Here, the counting is done in the same way. Again, the location of the storm tracks is very similar, and the local maxima of cyclone numbers are more or less over the same region. However, there are large quantitative differences between the four methods, which is probably at least partly due to different definitions of storms.

11.

The upper pannels here show the differences between methods. Here we see again, that M21 has much higher numbers. M10 and M12 seem quite similar. In general the difference patterns resemble the overall patterns and mainly reflect quantitative differences. There are also differences over orography (e.g. Rocky mountains), because M12 has no orographical thresholds, while the other three have. The lower panels compare the time evolution of the numbers. What is very astonishing is the break in the storm numbers time series of M09. We will have to check for the reasons for that.

12.

These last panels compare the life cycle characteristics of the four methods. Here we see, that a high proportion of short life times and short travel distance might explain the higher numbers of M09 and M21. These two methods include more storms of short life time. The differences in propagation velocity might be due to the same reason, but this relation is not as straightforward.

13.

To conclude, let's briefly look at the next steps. As we have seen, we are just at the beginning. The next steps will be to continue the intercomparison calculations and then start the analysis of the corresponding results. Later on we will prepare a report on the results as you can see in the outline.

At the bottom you see the address of the project homepage where you can find all the informations. And, last but not least, let's say once again that everybody is welcome to join us.