Reconciling social and scientific narratives of the monsoon onset in Bangladesh

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Introduction: We know that the annual income of agricultural workers in some monsoon regions decreases when the monsoon onset is delayed. Providing information about the monsoon onset could therefore be very useful in monsoon countries like Bangladesh. This may sound like a simple task. However, the task becomes difficult when we see that different monsoon definitions give very different results over Bangladesh. How do we responsibly choose a definition to use when generating climate information for local populations? Surely, we are in danger of confusing people if the information does not correspond to their previous perceptions about the monsoon.

We have devised a method that compares societal perception about the monsoon onset to of monsoon onsets generated from different monsoon definitions and data sets. Let's have a look at how we use this procedure, using Sylhet, in north-east Bangladesh, as an example.


Monsoon definitions:
Wind
Rain 5mm
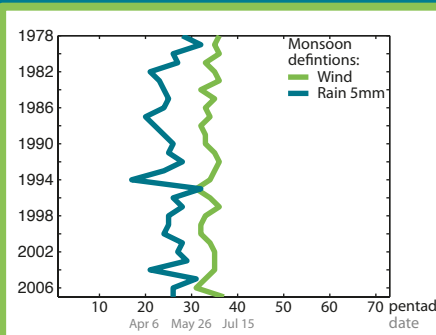
For the region of Sylhet in north-east Bangladesh, two monsoon definitions give these two time series. But how can we know which is best to use when informing the public, farmers, policy makers, NGO's and so on?
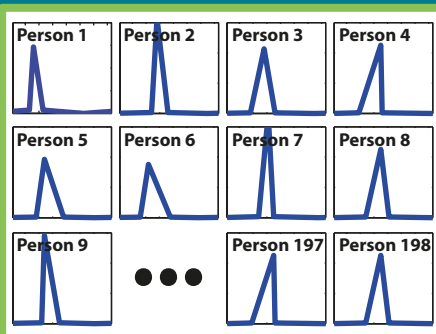

EARLIEST NORMAL LATEST

Well, firstly we asked the people themselves. We asked nearly 200 people in Sylhet about when they thought the latest, normal, and earliest monsoon onset could occur.
[with Abu Syed (right) and Nabir Mamnun (middle) from BCAS]

Normal onset
Earliest onset   Latest onset
ε
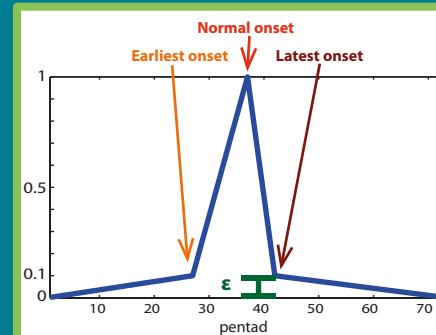
With this information, we construct a probably mass function (PMF) around the respondents answers. Firstly we centralize the answers around the centre point of the year, and construct function with the highest point at 1 and using the ratio epsilon to construct the tails.


score(1987)= log(0.06)
0.06
1987
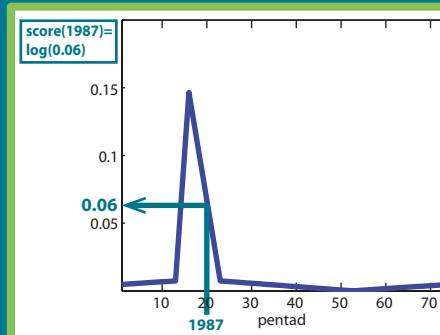
We normalize the PMF and translate it back to the respondents original answers. Then we take the log of each onset in the time series from a specific definition. We normalize this between 0 and 1 and take the mean. This gives us our log-likelihood score.

Person 1 Person 2 Person 3 Person 4
Person 5 Person 6 Person 7 Person 8
Person 9 ••• Person 197 Person 198

We do this for each of the 194 respondents. We get a score for each person and each definition. This basically tells us how well the time series from each definition agrees with the peoples' perceptions.

Rain definition SCORE 0.79
Wind definition SCORE 0.64
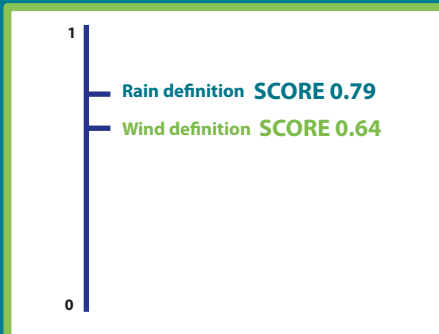
Overall, in this example, we see that the rain definition agrees best with the peoples perceptions in Sylhet.

generated time series
rain definition
wind definition
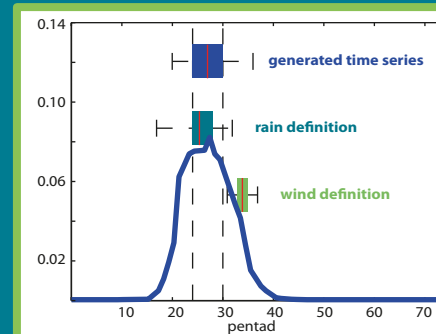
Taking a closer look, we can see why the rain definition got the best score. Here we see the average PMF for all the respondents. We see that the box-plot for the rain definition more closely resembles the box-plot we generated from the average PMF.

Here is some information about the monsoon in Sylhet that we are confident is relevant to you...

So now we are more confident that if we use the rain definition the climate information we generate will be more relevant to the people of Sylhet.

We used this method in 6 different locations in Bangladesh to compare 8 different monsoon definitions to the farmers' perceptions. We found that no single monsoon definition was most appropriate across the whole country. This demonstrates that if we want to provide climate information to aid climate adaptation, we have to take a local approach. Our method offers a novel way to analyse perception so that we can guide this local level research. If nothing else, we connect to the local people that we are trying to inform.