The temporal evolution of precipitation is an intriguing issue and this manuscript presents a statistical analysis of convective and stratiform rain based on Markov chain modelling. The use of radar derived precipitation rather than gauge observations provides better rainfall spatial distribution over a region (e.g. an area of 15 by 15 km in this study). However, the authors did not manage to produce a quality research paper from a good idea, simply because the methodology presented by this manuscript is incorrect. I hope my comments below can be helpful for the authors.

Validation Method

The major problem of this manuscript is that the authors did not use a correct method to verify "rainfall is well described by a Markov chain of order on with three states" (L16, P6226). What the authors did is to check whether the stationary probabilities by the Markov chain are close to the actual probabilities. Actually these should be identical at all. The reason is simply that the Markov chain with a transition probability matrix as Equation (5) has stationary probability as Equation (9). I hope the following proof can be helpful for you.

Following your notations in Equations (5) an (9), we just need to show

$$(PA_0,...,PA_m)\begin{pmatrix} P_{00} & \cdots & P_{0m} \\ \vdots & \ddots & \vdots \\ P_{m0} & \cdots & P_{mm} \end{pmatrix} = (PA_0,...,PA_m)$$

For any $i = 0,...,m$, we derive the left-hand of the above equation

$$(PA_0,\cdots,PA_m)(P_{oi},\cdots,P_{mi})^T = \sum_{i=0}^{m} PA_i P_{ij} = \sum_{i=0}^{m} \frac{N_i}{N}\frac{N_{ij}}{N_i} = \frac{1}{N}\sum_{i=0}^{m} N_{ij} = \frac{N_j}{N} = PA_j,$$

which is equal to the right-hand.

How to verify that a Markov chain is a good model for your data has to be done more carefully. The authors can provide some physical explanations followed by verification of prediction capability.