The general methodology for nowcasting heavy/extreme rainfall events has been detailed in the manuscript. The following steps illustrates a typical nowcasting procedure using cloud properties acquired from the NASA Langley Cloud and Radiation Research Group (http://www-angler.larc.nasa.gov) which is derived from the Meteosat-8 images. A sample data for executing the code can be found at:

https://drive.google.com/file/d/1ooJCU04lqV4o6LvsxPBpRGdnQ4uc0NQQ/view?usp=share_link.

For executing the code, please download the sample data into the Data folder.

STEP 1: On executing the "main.py", an RGB composite image with red for visible reflectance, green for 3.9 µm brightness temperature, and blue for 10.8 µm brightness temperature is compiled. The composite image can be found in the Output folder.

STEP 2: The developed RGB composite image can be used as a visual tool to identify a window containing individual cloud clusters with cloud elements representing all the stages of cloud growth, typically containing several thousand pixels. The coordinates of the window (four corners as [latitude, longitude]) is to be provided. For the sample data let us consider the cloud cluster within the latitude-longitude: 9, 74, 9, 77, 12, 77, 12, 74.

STEP 3: Once the coordinates are entered, the corresponding T-r_e profile is generated, and can be found in the Output folder. In the next step we must identify the microphysical zones.

STEP 4: The T-r_e profile for the sample data is shown in Figure 1. The profile can be identified with a distinct rain washout zone and then a mixed phase zone. This is a typical characteristic of normal rainfall events. Moreover, the diffusion zone is absent. More details about the various implications of the microphysical zones can be found in the manuscript.

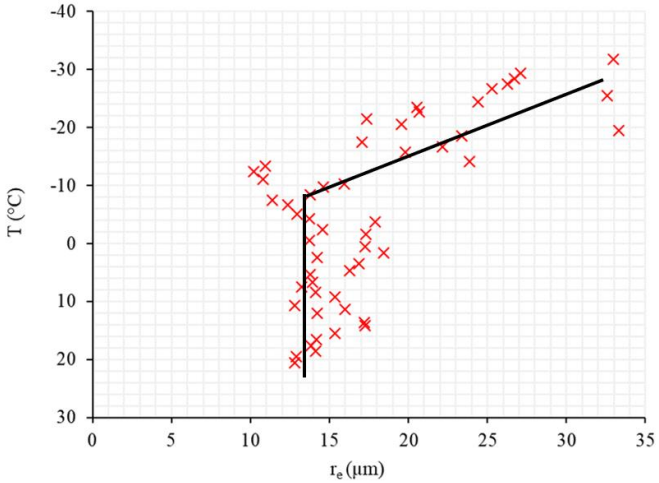

Figure 1: Derived T-r_e profile

STEP 5: The various characteristics of the T-r_e profile shall be extracted manually. In the present case as the diffusion zone is absent, $D_z = 0$; r_b is approximately 14 µm with a T_b of 20 °C; T_{14} is approximately 5 °C (as the rain washout zone marked by the vertical profile ranges from 20 °C to -10 °C); Finally, T_L = -10 °C, where the mixed phase zone starts. These values shall be inputted for computing the probabilities.

STEP 6: Finally, logistic regression is fitted and the nowcasted rainfall event is displayed (normal or extreme) along with its probability.