

# 2<sup>nd</sup> Gregory G. Leptoukh Online Giovanni Workshop

Application of Giovanni for  
classifying weather types associated  
with aerosol episodes over Indo-  
Gangetic Plains, India

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# Aerosol episodes over Indo-Gangetic Plains

- The present work investigates the synoptic weather and atmospheric conditions favoring the accumulation of aerosols over Ganges Basin during the period 2001-2010. Based on AERONET data series over Kanpur **277** days were defined as Aerosol Episode (AE) days, associated with daily-mean  $AOD_{500}$  above the decadal (2001-10) mean + 1STDEV ( $AOD_{500} > 0.928$ ).
- Data set used (Kanpur-AERONET, **Giovanni Terra-MODIS, Giovanni TRMM rainfall**, NCEP/NCAR mean sea level pressure and Geopotential heights).
- Via the advanced statistical techniques Factor and Cluster Analysis (*Kaskaoutis et al., 2014, Climate Dynamics*), 6 clusters of weather were identified to be associated with aerosol extremes over Kanpur, which present significant monthly variation.

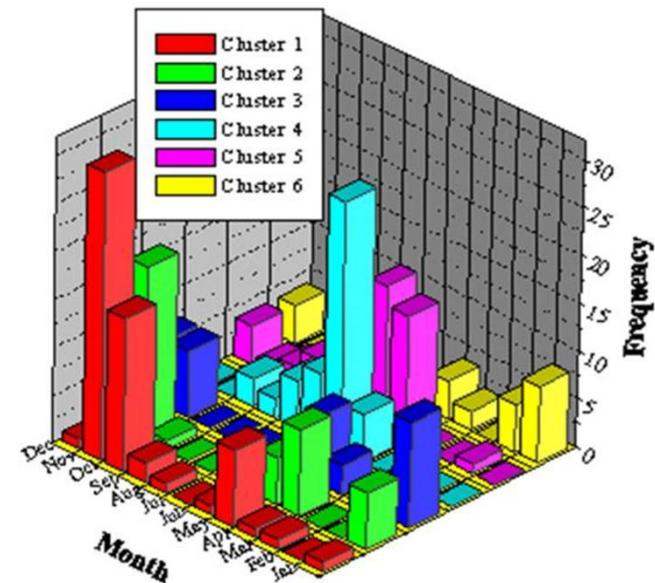
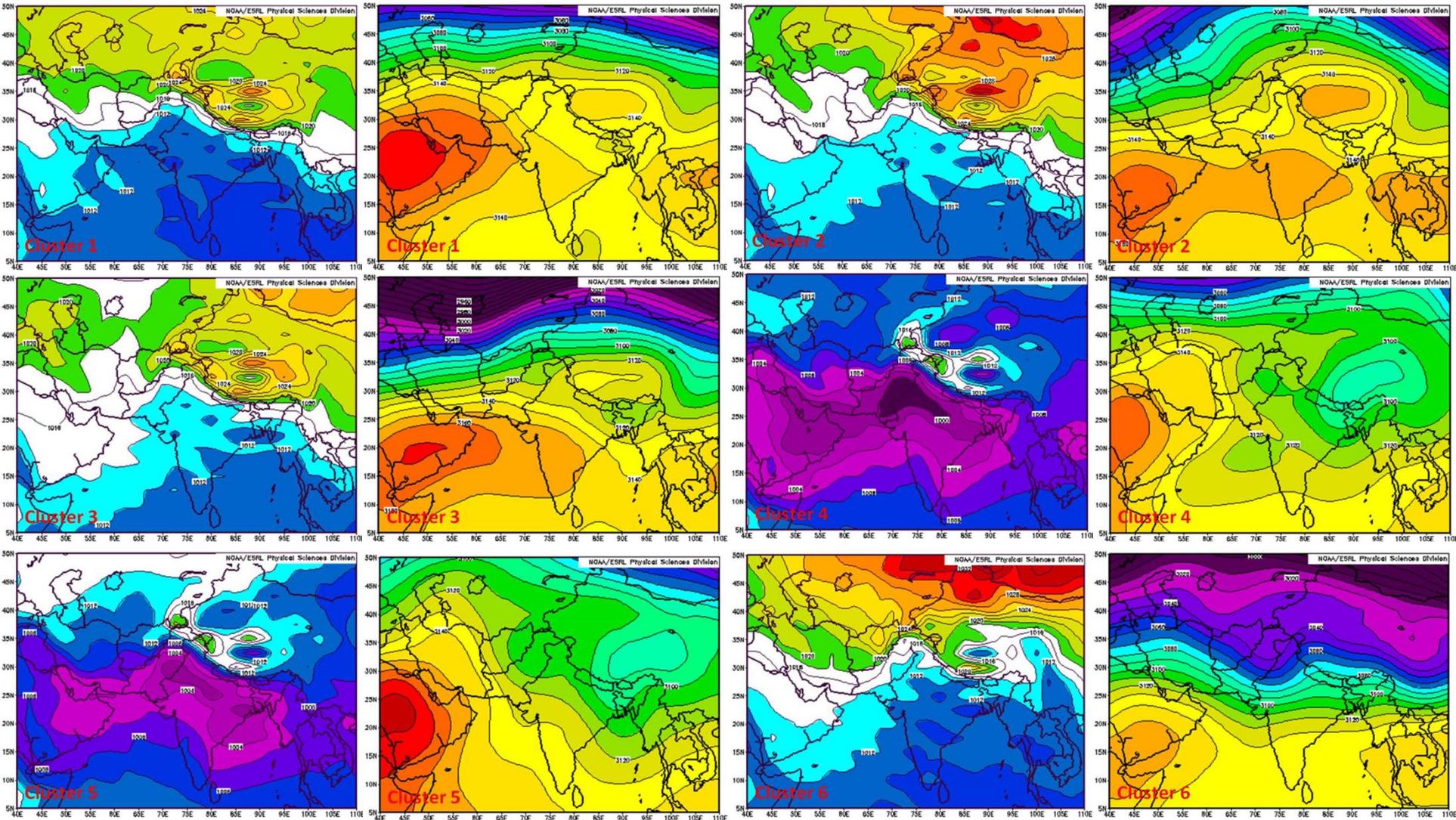


Figure 1: Monthly variation of the frequency of occurrence for each Cluster.

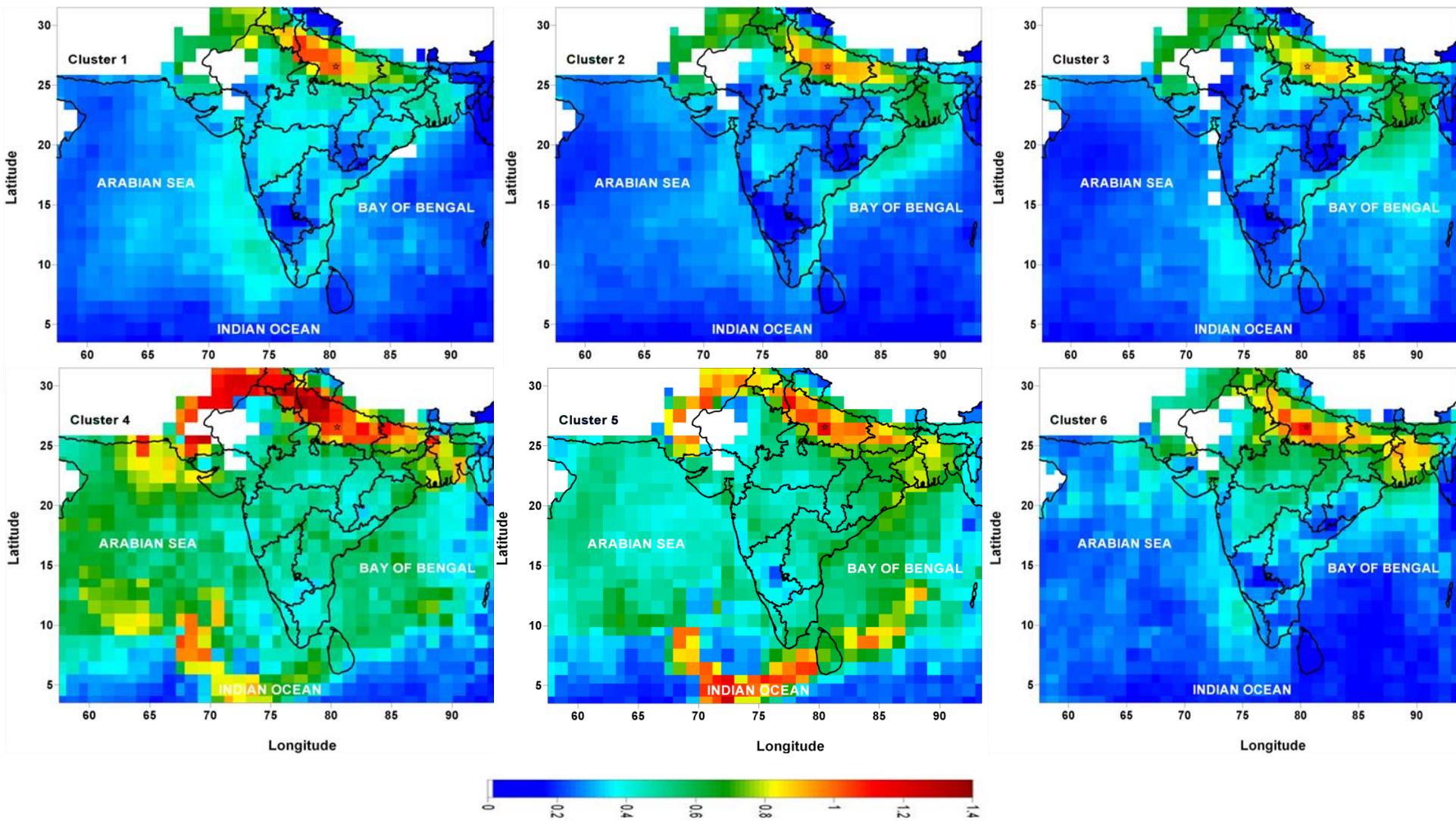
# Weather clusters



**Figure 2:** Composite mean maps of mean sea level pressure (MSLP) and Geopotential Heights at 700 hPa for the six atmospheric circulation clusters identified for the AE days over Kanpur during the period 2001-2010.

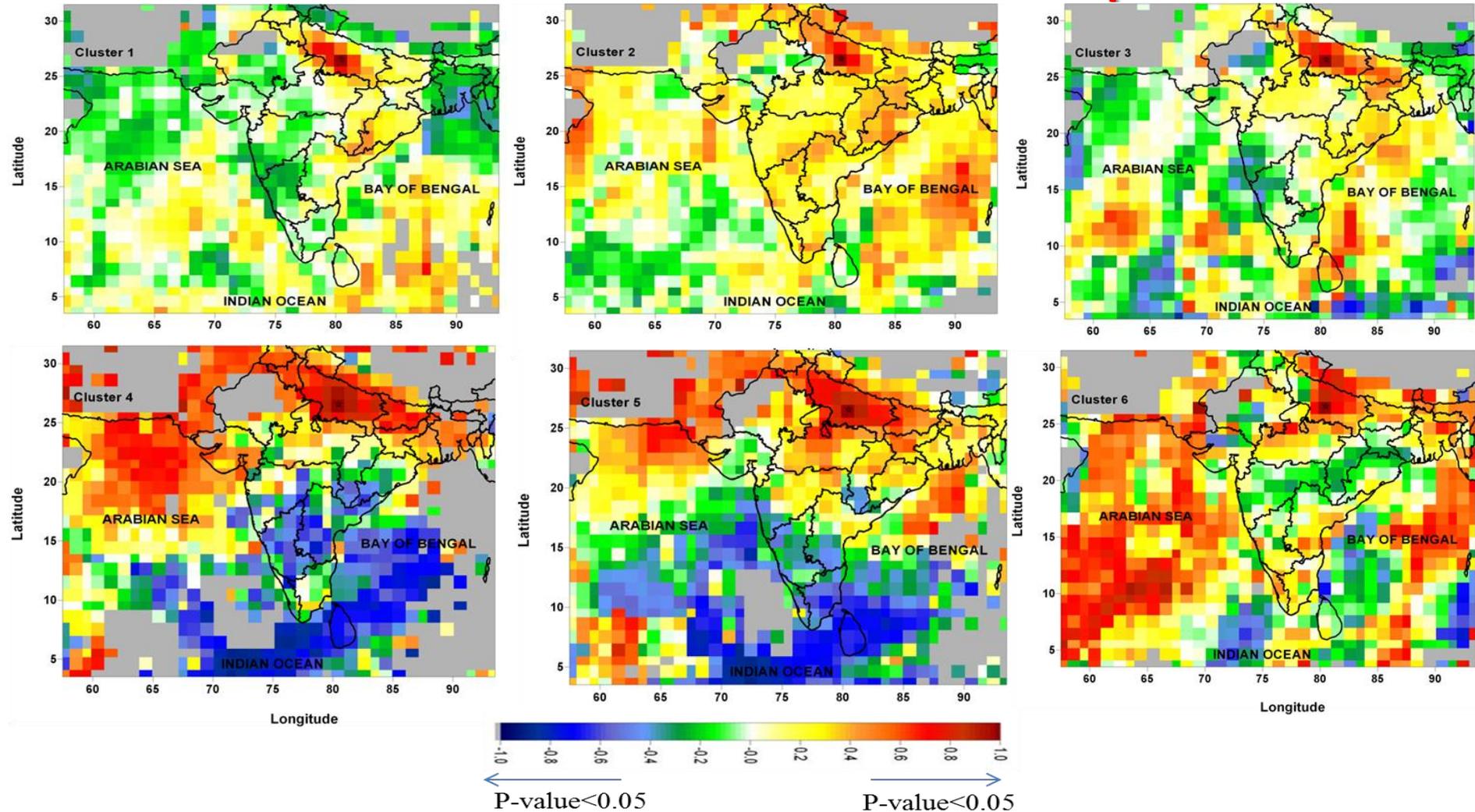
**Cluster 1 (62 days – 22%); Cluster 2 (55 days – 20%); Cluster 3 (38 days – 14%); Cluster 4 (48 days – 17%); Cluster 5 (51 days – 19%); Cluster 6 (23 days – 8%).** [For more details, see Kaskaoutis et al., 2014, *Climate Dynamics*, 43:2313–2331]

# Giovanni MODIS AOD for each weather cluster



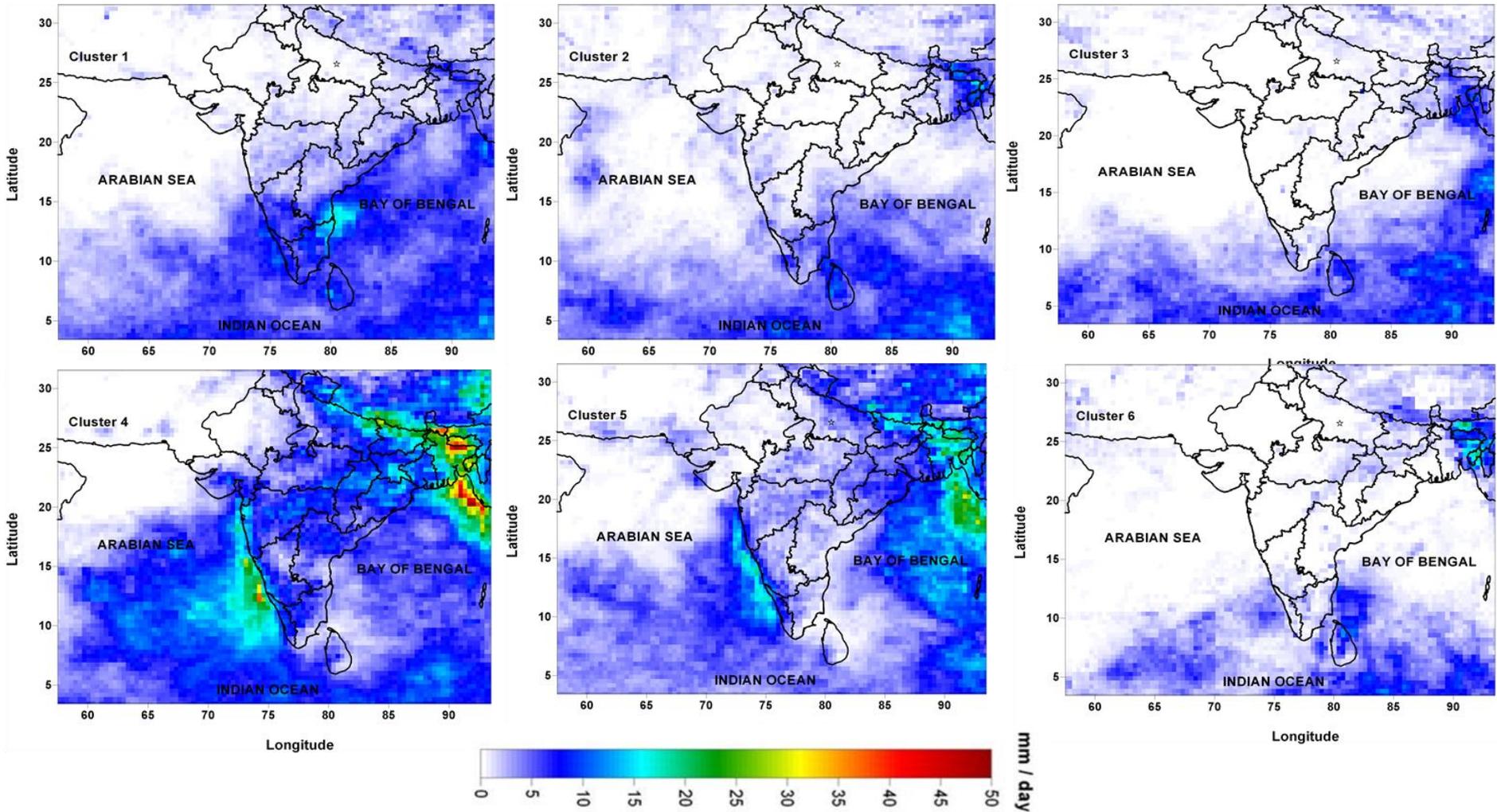
**Figure 3:** Spatial distribution of the mean Terra MODIS AOD<sub>550</sub> over Indian sub-continent and adjoining oceanic regions for the six atmospheric circulation clusters. The white areas correspond to lack of data (bright surfaces) or insufficient number of valid pixels.

# Correlation between Kanpur MODIS-AOD with the rest MODIS-AOD pixels



**Figure 4:** Spatial distribution of the correlation coefficient values obtained from the linear regression between the daily MODIS AODs over Kanpur and the AODs over the remaining pixels for each atmospheric circulation cluster. The lack of sufficient days for the regression analysis, i.e. less than the one third of the frequency for each cluster, corresponds to gray.

# Giovanni TRMM Rainfall for each cluster



**Figure 5:** Mean spatial distribution of precipitation (in mm/day) for each atmospheric circulation cluster. The rainfall data correspond to TRMM 3B42RT product downloaded from TOVAS-Giovanni.