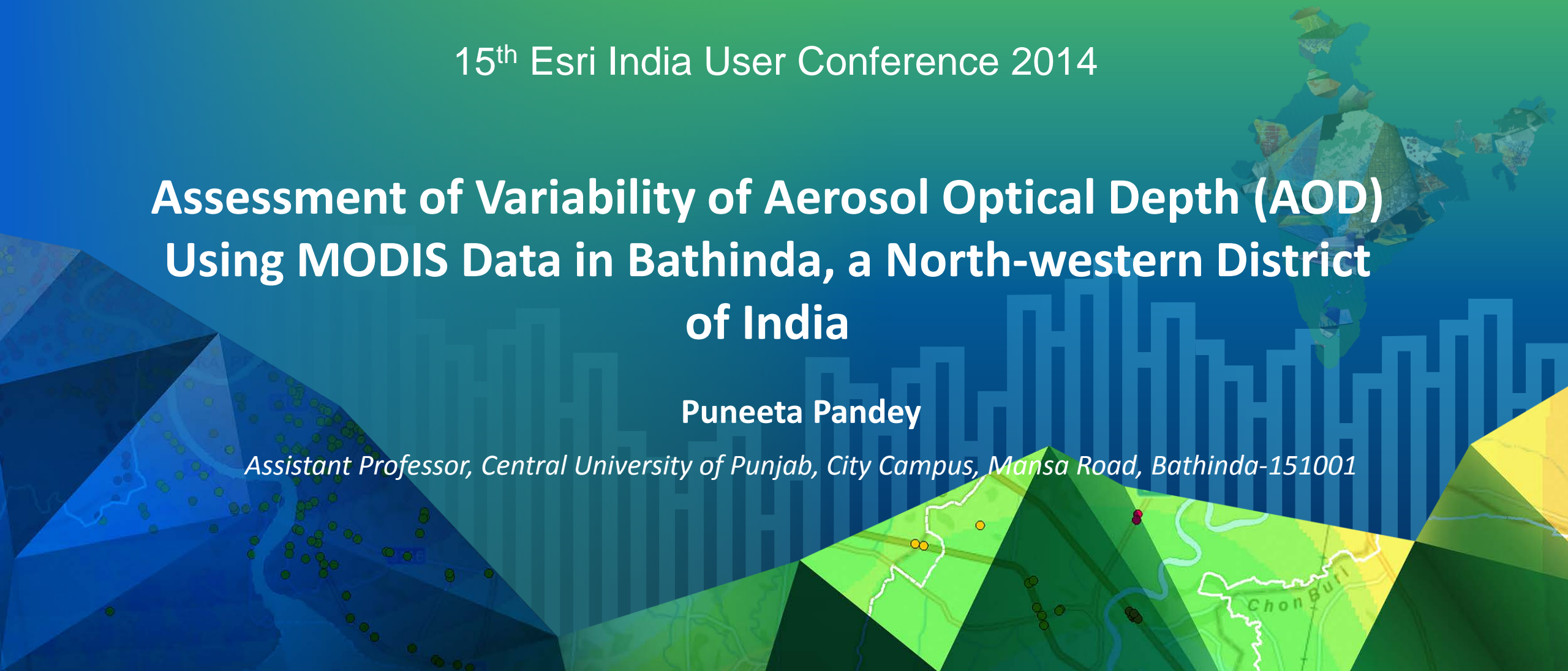


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Assessment of Variability of Aerosol Optical Depth (AOD) Using MODIS Data in Bathinda, a North-western District of India

Puneeta Pandey

Assistant Professor, Central University of Punjab, City Campus, Mansa Road, Bathinda-151001



Introduction

- With elevated levels of air pollution in the recent years, there has been greater emphasis on developing effective strategies for management of air quality.
- Aerosols have a distinct property of affecting the earth's radiation budget both directly and indirectly.
- Satellite data have been proved to impart important information by computing indirect estimates of air quality.
- In this context, Aerosol Optical Depth (AOD) is one of the key parameters determining the air quality of a region since it is indicative of aerosol concentration.
- The objective of the present study is to assess the spatial and temporal dimensions of aerosol load over Bathinda, a north-western district in the state of Punjab, India.
- The study reports the concentration levels of aerosols over the entire year of 2013 for the district of Bathinda, Punjab, India using remote sensing and GIS.

Data and Methodology

- **Study Area :** The district of Bathinda is situated between 29°33' to 30°36'N latitude and 74°38' to 75°46'E longitude in the southern part of the state of Punjab.
- **Softwares:** ArcGIS, ENVI Image Processing software
- **Data:** The MODIS instrument is operating on both the Terra and Aqua spacecraft. It has a viewing swath width of 2,330 km and views the entire surface of the Earth every one to two days. Its detectors measure 36 spectral bands between 0.405 and 14.385 μm , and it acquires data at three spatial resolutions- 250m, 500m, and 1,000m.
- **Method:** The least- clouded MODIS scenes at 10km spatial resolution were acquired for all the months of 2013 and processed in Digital Image Processing software. Spatial distribution maps for AOD were generated in ArcGIS software using Spatial Interpolation tool of 'Spatial Analysis'.

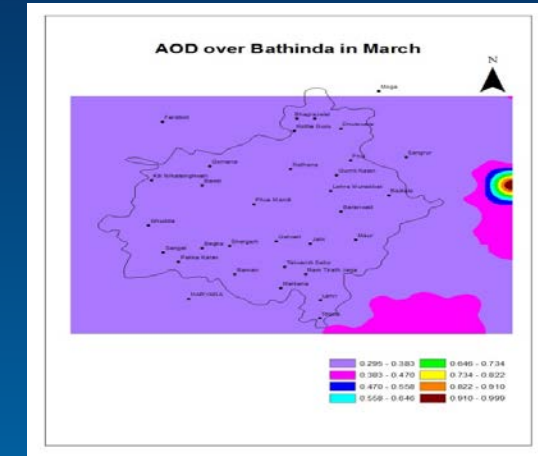
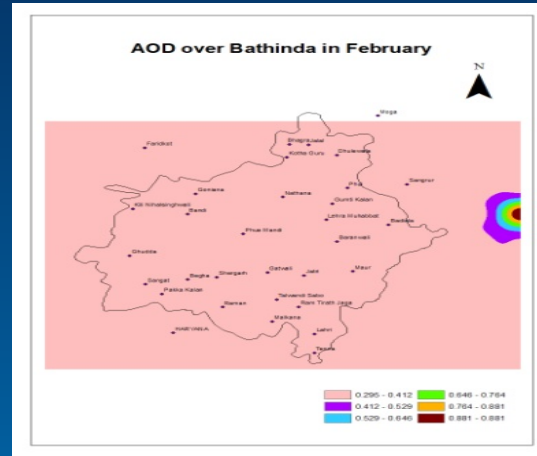
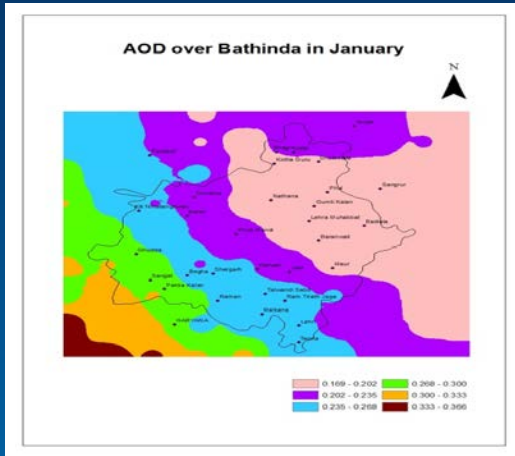


Fig 1: AOD over Bathinda in January

Fig. 2: AOD over Bathinda in February

Fig 3: AOD over Bathinda in March

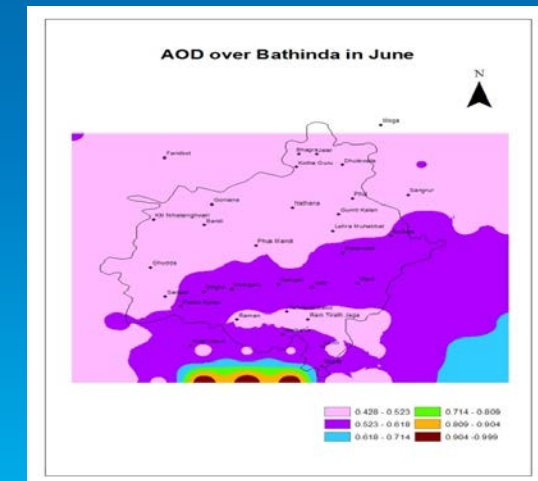
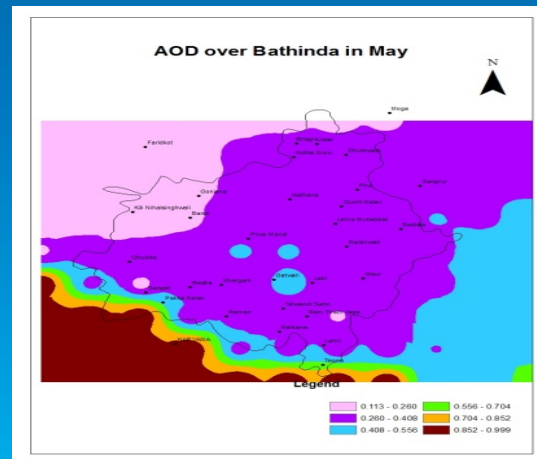
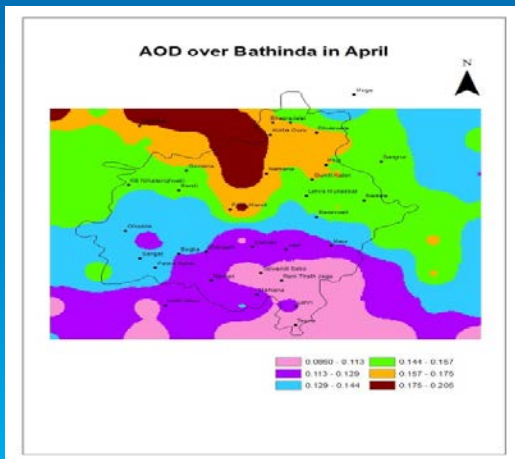


Fig 4: AOD over Bathinda in April

Fig 5: AOD over Bathinda in May

Fig 6: AOD over Bathinda in June

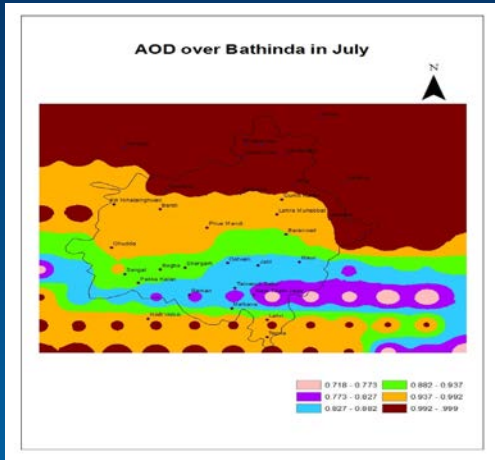


Fig 7: AOD over Bathinda in July

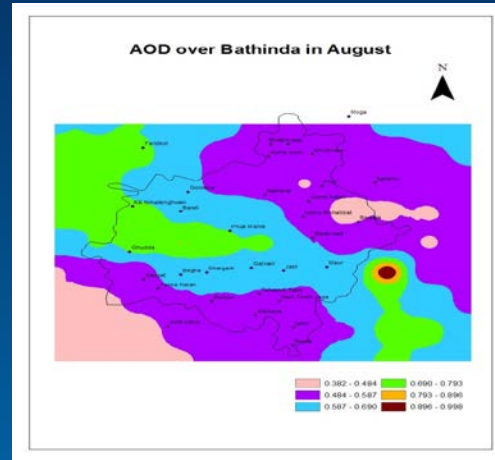


Fig 8: AOD over Bathinda in August

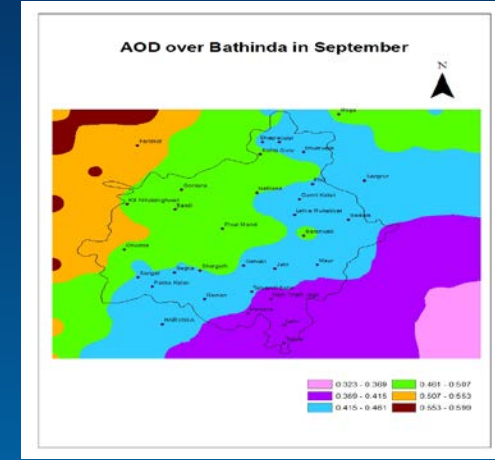


Fig 9: AOD over Bathinda in September

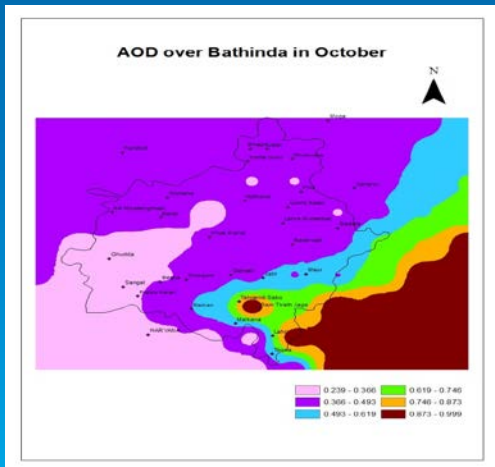


Fig 10: AOD over Bathinda in October

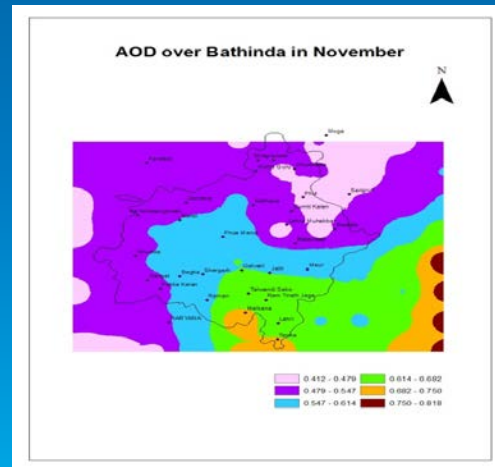


Fig 11: AOD over Bathinda in November

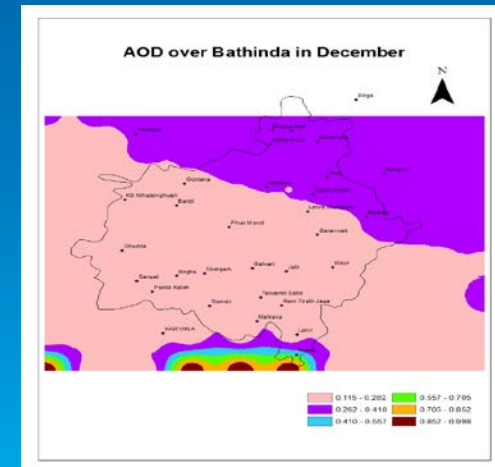


Fig 12: AOD over Bathinda in December

Fig 10: AOD over Bathinda in October Fig 11: AOD over Bathinda in November Fig 12: AOD over Bathinda in December

Table 1: Monthly maxima and minima of AOD in Bathinda for 2013

Month	Minima	Maxima
January	0.169	0.366
February	0.295	0.412
March	0.295	0.383
April	0.086	0.205
May	0.113	0.556
June	0.428	0.618
July	0.718	0.992
August	0.484	0.69
September	0.369	0.507
October	0.239	0.873
November	0.412	0.818
December	0.115	0.41

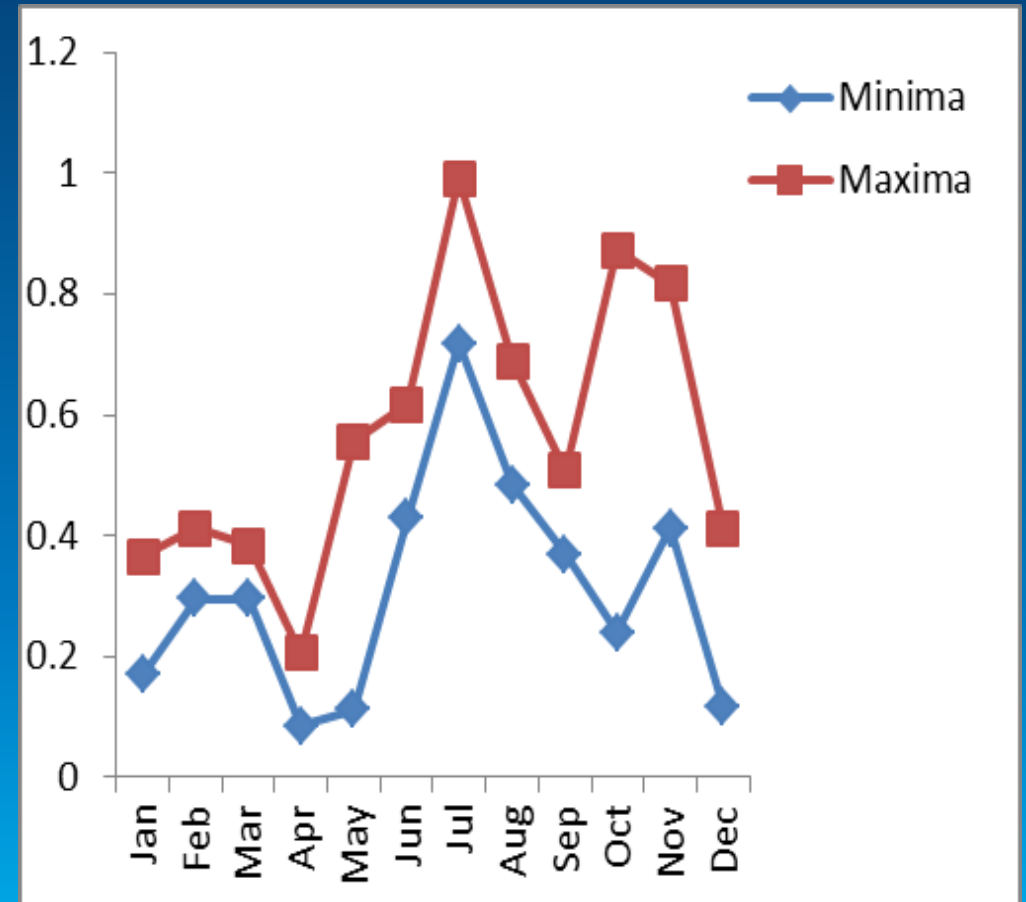


Fig. 13: Temporal trend of AOD variations in Bathinda

Conclusion

- An analysis of AOD values for all the months reveals lowest AOD values during January, April and December; while highest AOD values were observed during the months of March, July, October and November.
- Further, a distinct periodicity with quarterly maxima and minima was observed on analyzing the monthly variations for the entire year of 2013.
- Since the city of Bathinda has been subjected to rapid industrialization and urbanization in the last few years, such study shall be essential in establishing baseline data and management of air quality in the region.

Discussion/ Q & A