Urban clouds - Understanding clouds over urban areas

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Motivation

- Urban land use and human activities in cities modify the regional climate and thus the living conditions in cities.
- The urban heat island effect, the emission of anthropogenic aerosols, and the increased roughness length of cities shape atmospheric processes and clouds over urban areas in complex ways, in particular low-level convective and stratiform clouds.
- In view of global climate change and the uncertainties still associated with the role of clouds in the climate system, a complete understanding of all factors impacting clouds is urgently required.

Characteristics of urban areas
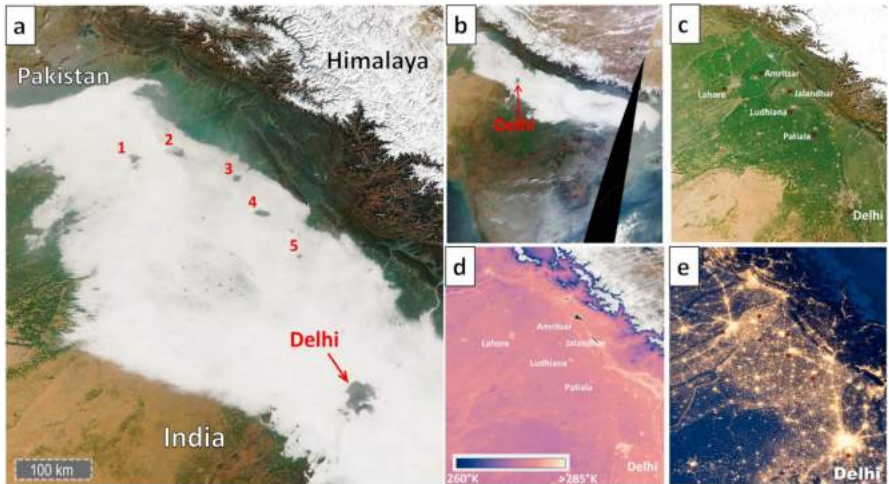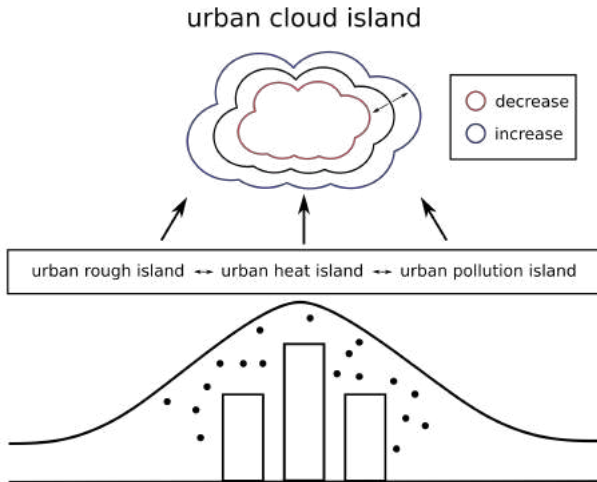
Heat release, Air pollution, wind barrier
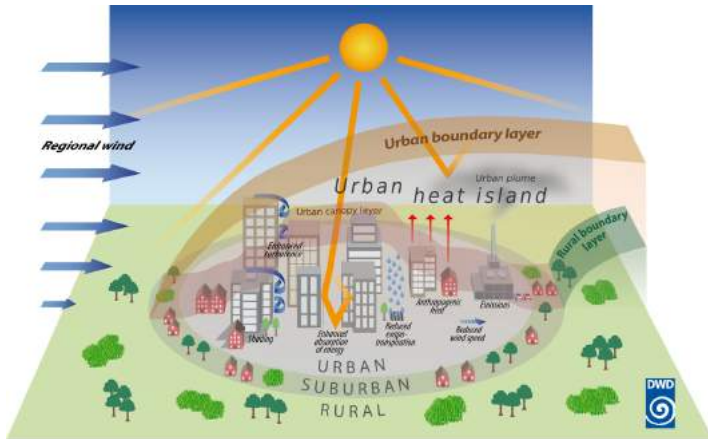
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Research question and aim

- How is air pollution and heat release in cities influencing urban cloud modifications and the urban climate?
- The aim of the project is the spatial and temporal analysis of urban clouds patterns and their main influences using satellite observations over Europe and machine learning.

Example of urban impacts on clouds: The Urban Heat Island

https://public.wmo.int/en/our-mandate/focus-areas/urban-development-megacities

Example of urban impacts on clouds from the satellite perspective

Concept

Main method

Machine learning models are used to understand parameter relationships in complex environmental systems, as the influence of meteorological parameters and aerosols on the properties of urban clouds.