

Atmospheric Monitoring in Bhutan



ICIMOD

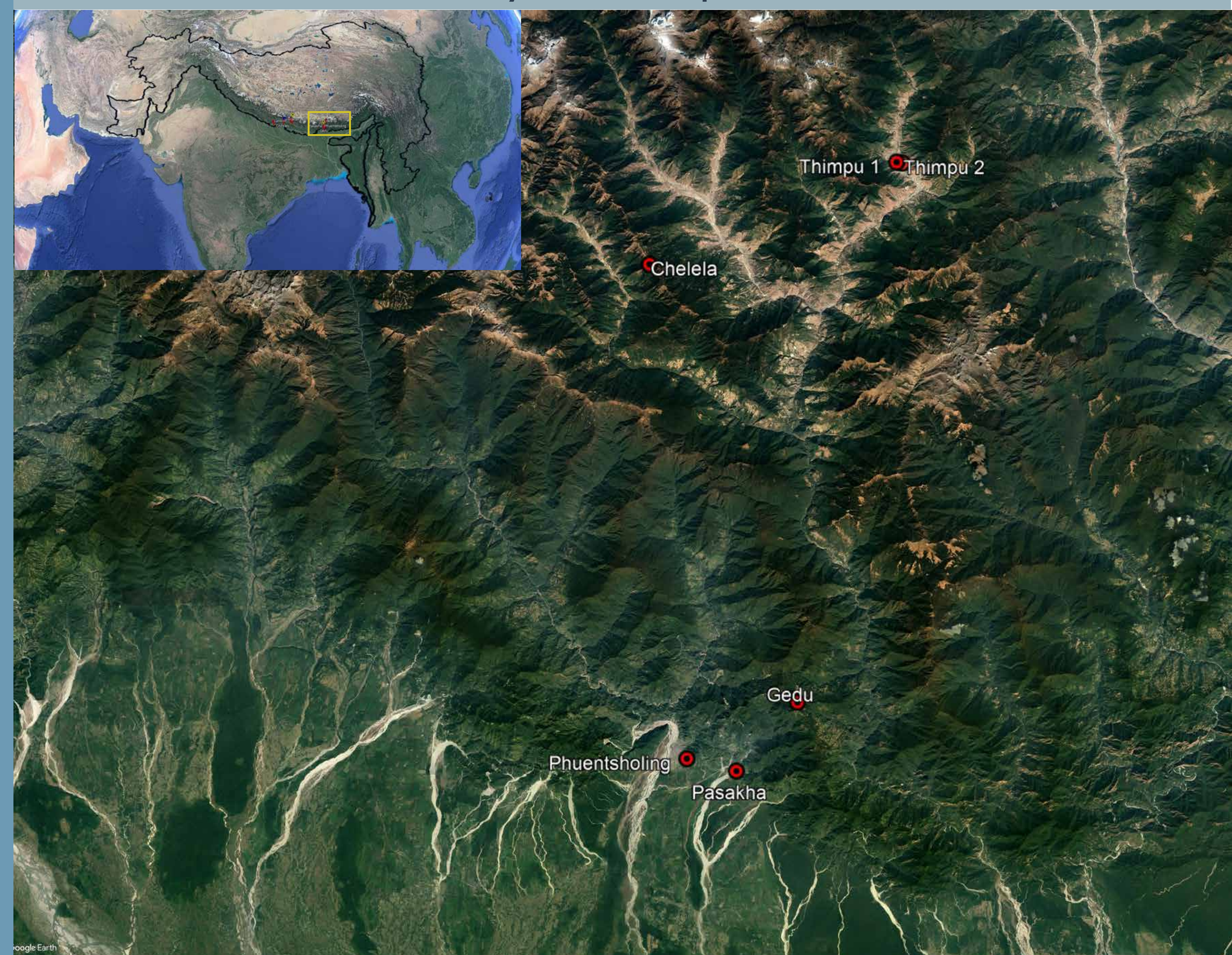
FOR MOUNTAINS AND PEOPLE

To improve our understanding of the physical, chemical, and biological aspects of air pollution, its health and environmental implications, and the transboundary transport of pollution, ICIMOD's Atmosphere Programme has partnered with government agencies in Nepal and Bhutan to set up Air Quality Monitoring Stations (AQMS) in these countries. In Bhutan, ICIMOD has partnered with the National Environment Commission (NEC) of the Royal Government of Bhutan.

Current status of AQMS in Bhutan

- Six AQMS are currently operating in Bhutan: two in Thimphu and one each in Pasakha, Phuentsholing, Chele La, and Gedu.
- The stations in Thimphu, Pasakha, and Phuentsholing provide data on meteorological parameters and on the mass concentration of fine particles. The stations in Thimphu and Phuentsholing also provide data on gaseous pollutants.
- Black carbon (BC) contributes to the melting of glaciers and snowfields. This is currently being measured at Thimphu as well as at the high altitude site at Chelela (4,100 meters above sea level).
- A climate observatory has been set up at Gedu (2,100 meters above sea level), on a peak overlooking the Indo Gangetic Plains. Once complete it will monitor greenhouse gases, as well as the transboundary inflow of pollutants from the plains to the mountains.

AQMS established by ICIMOD and partners across Bhutan



Thimphu 1: PM_{2.5}, PM₁₀, AOD, ozone, SO₂, CO, NO_x, visibility, meteorological parameters.



Pasakha: PM_{2.5}, meteorological parameters. Future measurement plans: SO₂, CO, NO_x.



Phuentsholing: PM₁, PM_{2.5}, PM₁₀, ozone, visibility, meteorological parameters.



Chelela: Black carbon, visibility, meteorological parameters.



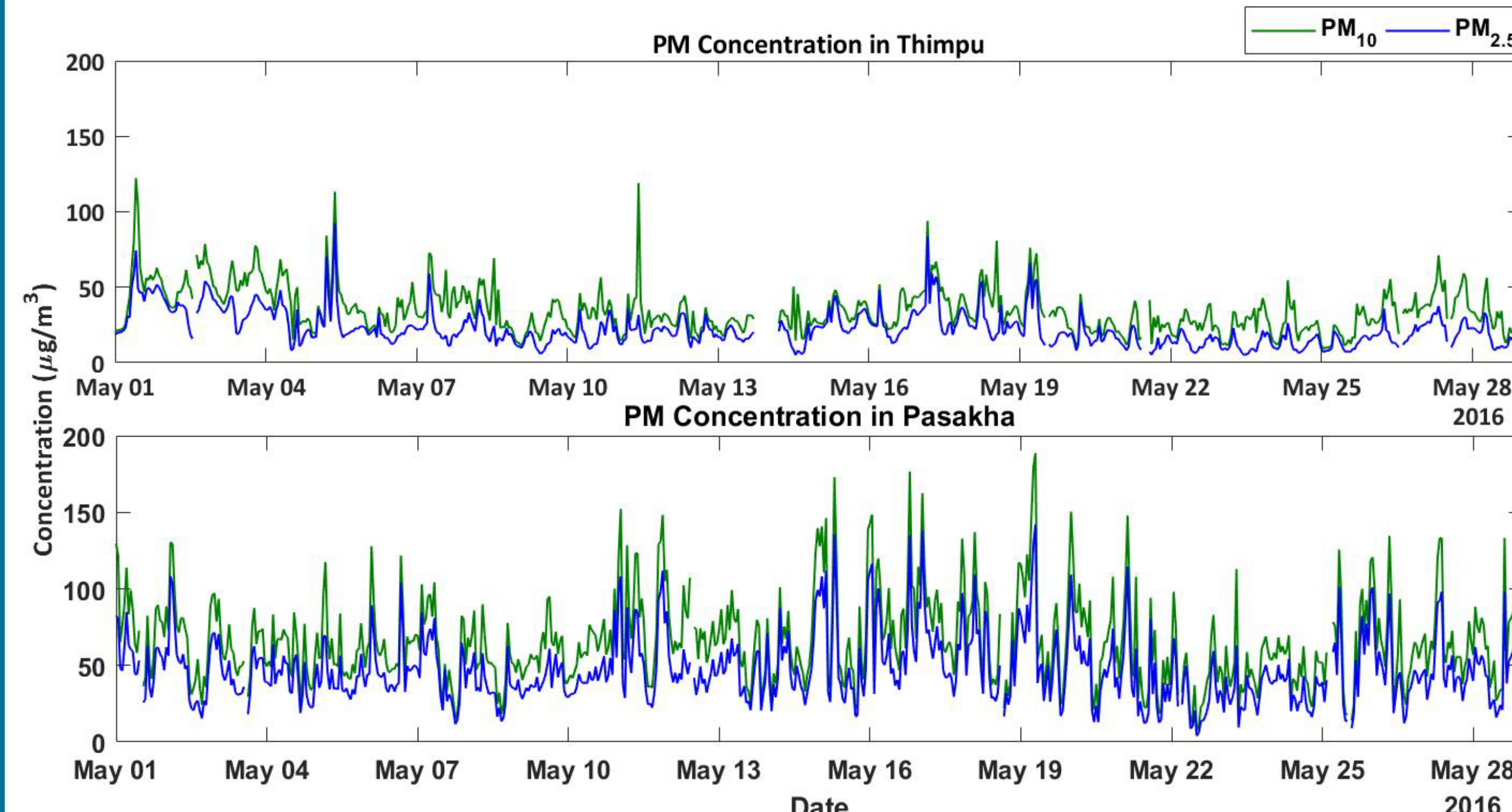
Gedu: CO, CO₂, CH₄, H₂O, meteorological parameters.

Future measurement plans: Airborne particle size distributions, aerosol scattering, solar radiation, black carbon.



Thimphu 2: PM_{2.5} and meteorological parameters

Ambient Particulate Matter (PM) Concentration



Hourly Average Black Carbon (ng/m³) in Chelela

