Two distinct spatial and temporal variations of PM2.5 and PM10 concentrations in Mongolia

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Abstract

PM2.5 and PM10 data for the 4 distinct sites of Mongolia from 2008 to 2020 is found …. …

Keywords: particulate matters, concentrations of PM10 and PM2.5

1. Introduction

2. Data & Methods

2.1. Study area descriptions

Fine and coarse particulate matter monitoring sites were located at Dalanzadgad (43.57°N, 104.42°E), Sainshand (44.87°N, 110.12°E) and Zamyn-Uud (43.72°N, 111.90°E) in the Gobi Desert, and at Ulaanbaatar (–) in capital city of Mongolia (Figure **??**).

The map demonstrates: - (spring wind speed, it … - elevation with the population number.

The spring is defined as dust season for Mongolia, and Gobi is the one of the 3 major Asian dust sources those are Gobi, Taklamahan and Sahara.

In the last 2 decades, due to poverty and natural disasters there is population immigration has taken place from the rural to urban, especially to capital city of Mongolia. Due to tiny infrastructure to provide the mega city with the dense population, it introduces the urban pollution.

Therefore, Ulaanbaatar air particulate matter mainly reflects the coal burning, and partly, natural dust.

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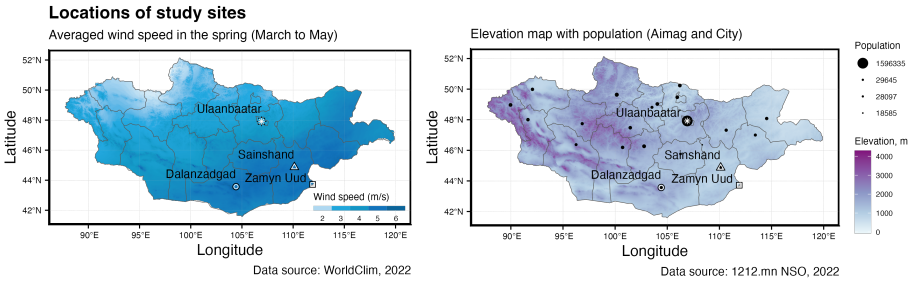

Figure 1: Study sites

Table 1: Data

Table 1. Measured data

	Location		Measured and collected data						Missing data	
SITE	COORDINATE	ELEVATION	TOTAL[1]	WS&WD[2]	VIS[3]	OPC[4]	PM2.5[5]	PM10[5]	PM2.5	PM10
Ulaanbaatar	47.92°N, 106.92°E	1350 m	76656	72603	72886	33241	67940	68777	11.4%	10.3%
Dalanzadgad	43.57°N, 104.42°E	1470 m	60336	46332	33812	-	46066	49172	23.6%	18.5%
Sainshand	44.87°N, 110.12°E	947 m	59040	50513	49720	-	47111	47313	20.2%	19.9%
Zamyn Uud	43.72°N, 111.90°E	967 m	67392	62432	63948	-	57317	58512	14.9%	13.2%

[1] Equipment height: 15 meter at urban site (Ulaanbaatar), 2 meter at Gobi sites (Dalanzadgad, Sainshand and Zamyn Uud); [2] Measurement range: 0–60 m/s; 0-365 degrees. Instrument model: Wind speed and direction PGWS-100, Gill, England; [3] Range: 10–20 000 m. Visibility meter PWD10, Vaisala, Finland; [4] Optical Particle Counter; [5] Range: 0.003–100 mg/m3, Flow rate: 20 L/m, Suction rate: 2 L/ m. Measured by Kosa monitor ES-640, TDK Co. LTD, Japan;

2.2. Study data and data analysis

2.2.1. Data

Particulate matter with aerodynamic diameters less than 2.5 μm (PM2.5) and 10 μm (PM10) were measured at these sites using an instrument that measures light scattering by air- borne particulates. Meteorological parameters, including wind speed, wind direction and visibility were determined by automatic instruments and are detailed in previous articles (Jugder et al., 2011, 2012; Nishikawa, Sugimoto). The instruments for measuring particulate matters were placed 2.0 m above the ground level (AGL) at Dalanzadgad, Sainshand and Zamyn-Uud (Table **??**). Wind sensors and visibility (meteorological optical range-MOR) sensors with a maximum measurement range of 20 km were installed at a height of 3 m AGL at the three Gobi sites. At the Ulaanbaatar site, the wind sensor height and a visibility sensor was placed at 15 m AGL.

2.2.2. Datasets

Datasets were obtained from measurements at Dalanzadgad, Sainshand, and Zamyn-Uud from January 2009 to May 2018, and at Ulaanbaatar from the end of April to May 2008. The data used in the study are based on hourly means derived from 1 and 10 min averages. Additionally, the WMO defines