

Brief information about the project

Name of the project	AP22686414 «Investigating the influence of meteorological factors on PM _{2.5} concentrations in Almaty, analysis of urban pollution transport using WRF-CHIMERE»
Relevance	Air quality degradation in Almaty, characterized by elevated PM_{2.5} concentrations, poses a pressing challenge both for human health and the surrounding environment. The formation of pollution episodes is linked to meteorological factors, emphasizing their crucial role in exacerbating air quality issues. Thus, this project aims to assess the underlying factors driving PM_{2.5} pollution episodes in Almaty and the impact of the episodes on the surrounding mountain environment. The objectives of the project will include analysis of PM_{2.5} pollution episodes, and evaluation of the influences of meteorological factors, specifically temperature inversions. Moreover, the evaluation of how PM_{2.5} pollution in Almaty affects the unique surrounding mountain environment, including glaciers will be conducted. For this, the study will employ advanced modeling techniques, specifically the WRF-CHIMERE modeling system, to simulate and assess the dynamics of PM_{2.5} pollution. After validating the model's efficacy in simulating meteorological background and PM_{2.5} concentrations, a detailed analysis will be undertaken to comprehend the interaction between the pollutants and the distinctive topography such as mountains. The study's findings are expected to advance our understanding of the complex interactions between urban air pollution, meteorological conditions, and mountainous environments. Moreover, the results can also be used to develop both local and regional air quality management strategies and policies.
Purpose	The goal of the project is to enhance our comprehension of the influence of meteorological parameters on PM _{2.5} concentrations in Almaty city and the impact of urban pollution on surrounding mountain areas, including glaciers.
Objectives	The expected results will comprise a minimum of two publications in peer-reviewed international scientific journals ranked within the top three quartiles based on the impact factor in the Web of Science database or with a CiteScore percentile in the Scopus database not less than 50. The following journals may be considered for submission: Atmospheric Environment, Aerosol, and Air Quality Research. Each article will contain information about this grant as the source of funding.

	The results of this project will be disseminated among potential users, the community of scientists, and the general public. In the final year of the project, university-level seminars will be organized to disseminate the main findings. Additionally, the project's outcomes will be published in international journals and presented at international conferences.
Expected and achieved results	1. Анализ эпизодов загрязнения $PM_{2.5}$ и исследование влияния метеорологических параметров. 2. Оценка эффективности интегрированной системы WRF-CHEMIRE при моделировании метеорологических параметров и концентраций $PM_{2.5}$. 3. Анализ воздействия загрязнения воздуха в городе Алматы на окружающую среду (горная система) с использованием модели WRF-CHEMIRE.
Research team members with their identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and links to relevant profiles	1. Tursumbayeva Madina, PhD, Senior Researcher: h-index – 5, Scopus: 57197808769, Web of Science: T-1763-2017; ORCID ID: 0000-0002-7526-8197
Использование	-
Приоритет в сравнении с реальными аналогами	-
List of publications with links to them	1. Rice S, Tursumbayeva M, Clark M, Greenlee D, Dharmadhikari M, Fennell A, Koziel JA. Effects of Harvest Time on the Aroma of White Wines Made from Cold-Hardy Brianna and Frontenac Gris Grapes Using Headspace Solid-Phase Microextraction and Gas Chromatography-Mass Spectrometry-Olfactometry. Foods. – 2019. – Vol.8(1). – 29. – https://doi.org/10.3390/foods8010029. 2. Tursumbayeva M., Koziel J.A., Maurer D.L., Kenessov B., Rice S. Development of Time-Weighted Average Sampling of Odorous Volatile Organic Compounds in Air with Solid-Phase Microextraction Fiber Housed inside a GC Glass Liner: Proof of Concept. Molecules. – 2019. - Vol.24(3) – 406. https://doi.org/10.3390/molecules24030406. 3. Zheksenbayeva A.K., Nyssanbayeva A.S., Tursumbayeva M.O. Dynamics of multi-year climatic changes of precipitation during the vegetation period in the north of Kazakhstan – 2019. – Vol. 6(438). - https://doi.org/10.32014/2019.2518-170X.174. 4. Tursumbayeva M., Kerimray A., Karaca F., Permadi D.A. Planetary Boundary Layer and its Relationship with $PM_{2.5}$ Concentrations in Almaty, Kazakhstan. Aerosol and Air Quality Research 2022, 22(8), 210294. https://doi.org/10.4209/aaqr.210294. 5. Baimatova N., Omarova A., Muratuly A., Tursumbayeva M., Ibragimova O. P., Bukenov B., Kerimray A. Seasonal Variations and Effect of COVID-19 Lockdown Restrictions on the Air Quality in the Cities

	of Kazakhstan Environmental Processes, 2022, 9(3), 48 https://doi.org/10.1007/s40710-022-00603-w 6. Mukhtarov R., Ibragimova O.P., Omarova A., Tursumbayeva M., Tursun K., Muratuly A., Karaca F., Baimatova N. An episode-based assessment for the adverse effects of air mass trajectories on PM_{2.5} levels in Astana and Almaty, Kazakhstan Urban Climate 2023. 49, 101541 https://doi.org/10.1016/j.uclim.2023.101541 7. Tursumbayeva M., Muratuly A., Baimatova N., Karaca F., Kerimray A. Cities of Central Asia: New hotspots of air pollution in the world Atmospheric Environment, 2023, 309, 119901 https://doi.org/10.1016/j.atmosenv.2023.119901
Patents	-
!!! Along with the completed form, please attach to email relevant photographs and video materials that can be used to visualize and present the project on the web page.	

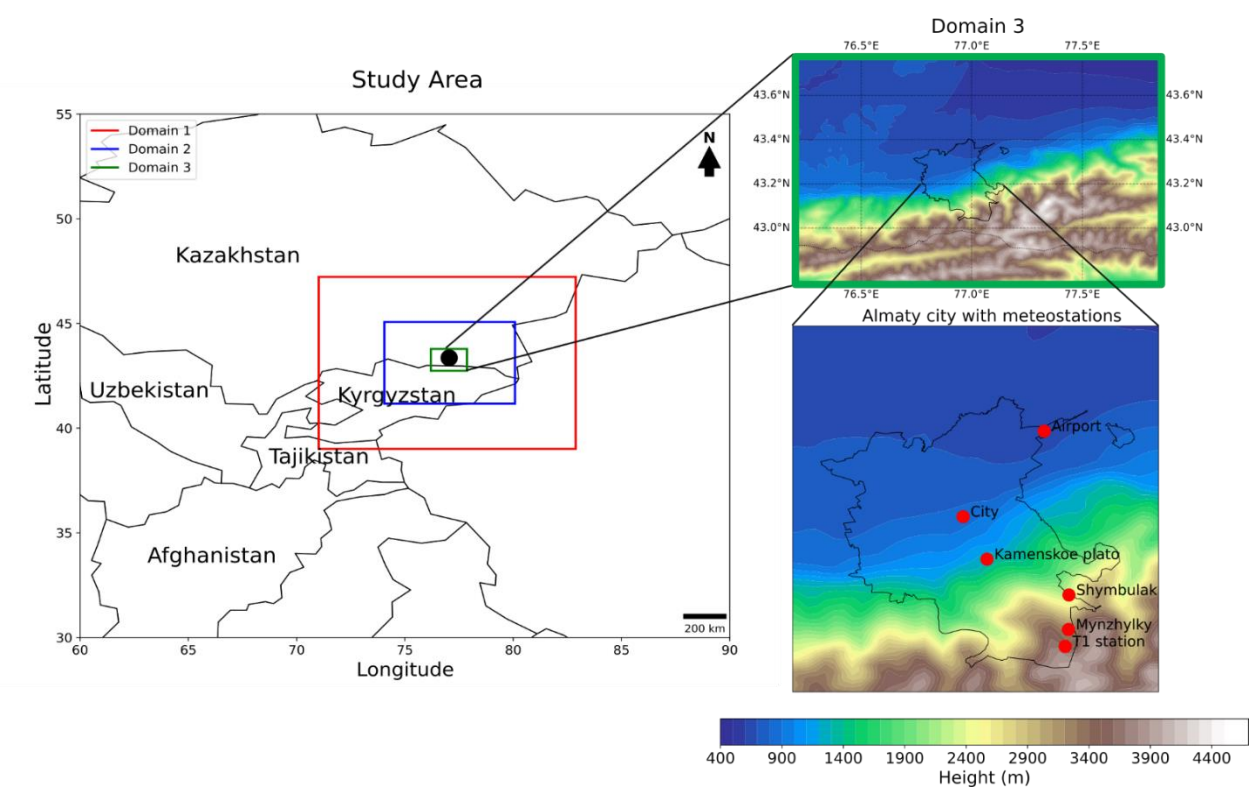


Рисунок 1. Study area: model domains and key station locations