

Report on the outcomes of a Short-Term Scientific Mission¹

Action number: CA20108

Grantee name: Setareh Amini

Details of the STSM

Title: Enhancing Temperature Data Integrity Across European Cities Using the MetObs Toolkit

Start and end date: 25/04/2024 to 10/05/2024

Description of the work carried out during the STSM

During this period, I had the pleasure of working closely with a supportive team of Steven Caluwaerts to run the MetObs toolkit across several European networks as part of the FAIRNESS project. Our primary goal was to learn how to control data quality and fill gaps using this toolkit. However, we went beyond these initial aims, exploring additional scientific applications of the toolkit, which proved to be incredibly enlightening and valuable for me. Furthermore, Steven invited me to join their group meeting, which was very beneficial for me. This meeting was very insightful, as his Postdoc and PhD students shared their experiences and discussed their presentations from the Urban Climate section of the EGU conference. Their talks were not only informative but also inspired me with the idea of sharing and learning from each other's experiences. In general, his team is highly friendly and positive, which is undoubtedly a reflection of his excellent management and made my two-week stay highly enjoyable and productive. Let me present a more detailed overview of the work we carried out during the STSM project: Firstly, with Amber Jacobs's help, we installed the MetObs toolkit and prepared the necessary data and metadata inputs. This initial setup was crucial for the smooth operation of the toolkit. Then, with additional assistance from Thomas Vergauwen, we applied quality control measures. The toolkit offers various options to assess data quality from different perspectives. Next, we addressed the gaps in the datasets. The toolkit provides multiple methods for filling in missing values. For smaller gaps, we used linear interpolation. For larger gaps, we employed a method called debiasing with ERA5 data. This comprehensive approach helped us to obtain a complete dataset. We also conducted further analyses, including plotting diurnal cycles per Local Climate Zone (LCZ) for each season and calculating and plotting the Urban Heat Island (UHI) index for each city during the day. Additionally, we created heatmaps showing correlations at night. These analyses provided deep insights into urban climate patterns and helped us better understand the data. On Wednesday, I presented the results of applying the toolkit to data from three partner cities: Amsterdam, Novi Sad, and Bern. This final presentation was a significant moment as it led to a fruitful discussion and valuable recommendations from Steven and his team. Their feedback broadened my

¹ This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

perspective and will undoubtedly influence my future work. To support my statements, I've attached my presentation on the results of our collaboration during this STSM. Please scan the QR code for more details about the collaboration.



Overall, this experience has been incredibly valuable. I have not only improved my technical skills but also opened up opportunities for future collaboration and continued learning.

Description of the STSM main achievements and planned follow-up activities

During my stay, the biggest achievement for me was gaining confidence in working with data and visualizing it effectively. The first part of my project, which is part of the COST Action FAIRNESS project, involves creating a database of the temperature of European Networks, and I am supposed to control the quality of the data and visualize the data. Using the MetObs toolkit and reading its documentation for Quality Control, Gap Filling, and analysis greatly enhanced my skills in handling data. Not only did it help my work with various datasets, but it also contributed to improving different aspects of the toolkit itself, especially in how it works with different types of networks. In addition, Steven mentioned an almost-finished project about the impact of weather types on Urban Heat Islands (UHI). This project, done with one of his master's students, is now at the writing stage. Steven invited me to collaborate, which I find very exciting. However, my priority right now is to complete the first part of my own project as soon as possible. Once I move on to the second part of my project if Steven still needs collaboration, I'd love to join in, either remotely or in person. Moreover, once the latest version of the MetObs toolkit is released; I am very keen to continue using it. I plan to perform gap-filling and further analysis on more networks.

Overall, this experience was incredibly enriching. I gained practical skills in data quality control and gap filling, learned how to use the MetObs toolkit effectively, and had the chance to engage with a knowledgeable and supportive team. The opportunity to share and discuss our work in a collaborative environment was particularly rewarding, and I am grateful for the chance to contribute to and learn from such a dedicated group of researchers.