Response to Reviewer 1 Comments

**Point 1:**  Most of the content describes the well-known principle of the existing models, which are neither novel nor related to the input harmonization topic in the title. It is suggested that the authors re-organize the manuscript and add more details on the input harmonization topic in the title.

**Response 1:**

Thank you for your remarks.

The authors have restructured the manuscript by incorporating additional information about context and objectives in sections 1, 2 and 3. Additional information about the input harmonization topic as indicated in the title has been also incorporated in section 2.14 and a new section (2.15) has been created.

Point 2: The meaning of harmonization is not quite clear. Is this a module that can handle the input data and convert them to files for different ATD models?

**Response 2:**

The meaning of “harmonization” has been clarified, it is written in the paper as follows:

Section 1.1: “In the paper, the term “harmonization” is employed to describe the process of constructing and employing AT&D models. This harmonization is essential to guarantee that, regardless of the specific model employed within its designated scope, the results remain highly comparable. Among these disparities, three primary categories can be distinguished: those attributed to the model itself, those linked to the input data utilized, and those arising from user choices.

The aim of the harmonization process is threefold:

• To offer direction during model development, ensuring consistent representation of physical phenomena, especially concerning the relationship between atmospheric turbulence and the diffusion coefficient for pollutants.

• To offer guidance on constructing input data for the model, including factors like the atmospheric wind and turbulence profile, the appropriate roughness value, and the specification of the source term within the AT&D model.

• To provide users with guidance that constrains potential individual choices, particularly concerning numerical parameters or mesh settings.

As atmospheric dispersion modelling continues to evolve as a research area over time, it becomes evident that certain decisions must be made. These decisions should be of a generic nature, guided by harmonization principles, rather than being tailored individually for each study.”

Harmonization must be seen as a data process, not as a “module”. See section 1.3.

Section 1.3: ”The harmonization process ensures that the mathematical and theoretical representation of physical phenomena remains consistent, regardless of the level of simplification used by the model. Additionally, harmonization implies that the input data used for modelling are sufficiently well-defined to eliminate any need for interpretation during use.”

Point 3: There are many citation errors throughout the paper, which appears that the reference tool did not work well. The authors should correct these mistakes.

**Response 3:**

Thanks for this remark. The authors have corrected all these mistakes.

Point 4: The evaluation is comprehensive, but it is not clearly related to the harmonization part. Instead, it is more like a model intercomparison. The authors should explain the relationship between these results and harmonization topic.

**Response 4:**

The Section 3 focuses on the potential improvement of harmonization, it is written in the paper as follows:

“In Section 1.3, the focus shifts to the application of AT&D models to a massive release across various model types. The primary objective of this section is to emphasize the significance of harmonizing each aspect when utilizing AT&D models. This section is then not directly focused on the application of harmonization practices, since those practices are most relevant for prediction cases within the regulation context. Instead, Section 3 illustrates how each parameter can significantly impact the results, underscoring the importance of harmonizing these practices.”