Comment on essd-2021-242

Anonymous Referee #2

Referee comment on "CAMS-REG-v4: a state-of-the-art high-resolution European emission inventory for air quality modelling" by Jeroen Kuenen et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-242-RC2, 2021

Review of CAMS-REG-v4: a state-of-the-art high-resolution European emission inventory for air quality modelling submitted to ESSD by Kuenen et al., 2021

The paper describes an air pollutant emission inventory for Europe which is now widely used in the atmospheric modelling community. The paper is interesting, complete and well written. It will for sure serve as a very welcome reference paper. I therefore recommend the publication in ESSD provided that the following minor comments are considered by the authors.

General: in some earlier documents, CAMS regional air pollutant emissions were referred to CAMS-REG-AP, as opposed to CAMS-REG-GHG for green house gases. Is it because CH4 is included here that the new reference is CAMS-REG, and is there still a CAMS-REG-GHG where CO2 (and other?) emissions would be reported?

Abstract P1 L15: EU countries are reporting simultaneously to LRTAP and European Commission for the NEC Directive, the second should also be mentioned here.

Introduction P2L44: Add that this is mainly for the "*European* air pollution community"

Introduction: It seems that UNFCCC is not just introduced as an analogy but also because it is the reference for CH4 emissions. In that case it would be worth discussing here information about the gridding of emission data reported to UNFCCC.

Section 2 P3L89: in the LRTAP process, CEIP also gap-fills nationally reported emissions to produce what they deliver on their website as "emissions as used in models". Are those used in the methodology? If not a few words are needed on the difference in gap filling methodologies compared to the approach developed here.

Section 2.2 P8L206: Unlike soil NOx, NMVOV from animal husbandry and manure application is not included in models biogenic emissions modules. Why GAINS has not been used for gap filling instead of just excluding those emissions?

Section 2.3.1: P10L262 why is CO_2 mentioned here?

Section 2.3.1 and 2.3.2: It appears (P11L285) that E-PRTR is not only used as proxy, but also withdrawn from the sectoral GNFR emission. This information is important and somewhat "hidden" in this section on spatial proxy. Please consider including it elsewhere. A word of explanation on the matching between E-PRTR subsectors and GNFR would also be helpful.

Section 2.3.4: and 2.3.7 P14L416: more details on the proxies for residential emissions would be appreciated. The exact relationship applied to population density and wood proximity should be used as residential emissions are not directly proportional to population density. But it should also be commented whether this only applies to wood combustion. More generally, fuel use for residential emissions are also very different between dense urban centres and suburban areas.

Section 2.3.6: as for residential emission, the exact relationship between traffic and emissions should be provided as the reference to "proxies" remains somewhat vague. Is only traffic density (and not speed) taken into account?

Section 2.7: more references are needed regarding the source of information for NMVOC and PM splits.

Section 3.1: P18L525: red dots at large point source locations are not visible in my printout.

Section 3.1: P19L537 could it be that the trend in residential emissions is also affected by inconsistent reporting of condensable in time? This would challenge drawing conclusions on the European coordination of actions to mitigate emissions.

Section 3.2.1 P21L575: suggest replacing "this" by "CAMS-REG-v4.2"