Reply to Referee 1:

Overall this article provides an interesting study to show case how a given system compares between different platforms. This work validate the robustness of the models.

Reply: Thank you for your comments on the manuscript. Your suggestions on certain expressions in the manuscript are very insightful.

1. 3A4000 CPU works at 1.8-2.0GHz, it seems that the specific platform used for experiments are 1.8GHz. So when citing the power comsumption number, 40w instead of 30w should be used to be fair; and this statement in the Conclusion section also needs a correction: "The platform used in this study is Loongson 3A4000 quad-core 2.0GHz CPU, 497 offering a peak operational speed of 128GFlops"

Reply: Thank you for the constructive comment. The suggestions about the frequency, power consumption, and peak computing speed of the Loongson 3A4000 CPU are useful for us to improve the manuscript. Actually, based on the relevant information provided by the official website of Loongson Technology, the Loongson 3A4000 CPU can work within the frequency range of 1.5GHz ~ 2.0GHz, with 1.8GHz considered its base frequency. At this frequency, the thermal design power is 40W. Under extensive computational loads, its dynamic frequency can peak at 2.0GHz,

with power consumption reaching 50W, achieving a peak computation speed of 128GFlops. In the comparison table of platform parameters (Table 4), the base frequency of the 3A4000 CPU was selected to represent the platform's CPU frequency. Some expressions in the manuscript may not be sufficiently clear. I will modify these statements according to your suggestions and incorporate them into the revised manuscript.

2. The LoongArch architecture is not direct compatible with MIPS architecture. But Loongson does provide a binary translation software to run MIPS software with small performance loss.

Reply: Thank you for the information you provided about Loongson binary translation technology. LoongArch instruction set compatibility is achieved through Loongson's binary translation technology, allowing it to support instruction sets such as MIPS, X86, ARM and others. In the LoongArch-based Linux operating system, Loongnix, provided by Loongson, not only can it execute native LoongArch programs, but it can also run software designed for Windows, Android, and Linux programs using MIPS, X86, ARM instruction sets through translation with slight efficiency loss. In order to better understand the application performance of the LoongArch architecture on the meteorology and air quality models, a platform equipped with the Loongson 3A6000 CPU was obtained recently, which is the latest product released by Loongson. To enhance the

universality of our study, the WRF-CAMx model system was built on the LoongArch architecture platform using source code compilation and installation, instead of directly run MIPS modeling system using binary translation software. The CAMx modeling system can also run stably on the LoongArch platform, and the performance evaluation for the same simulation case are shown in Figure 1 and Figure 2 in the following.
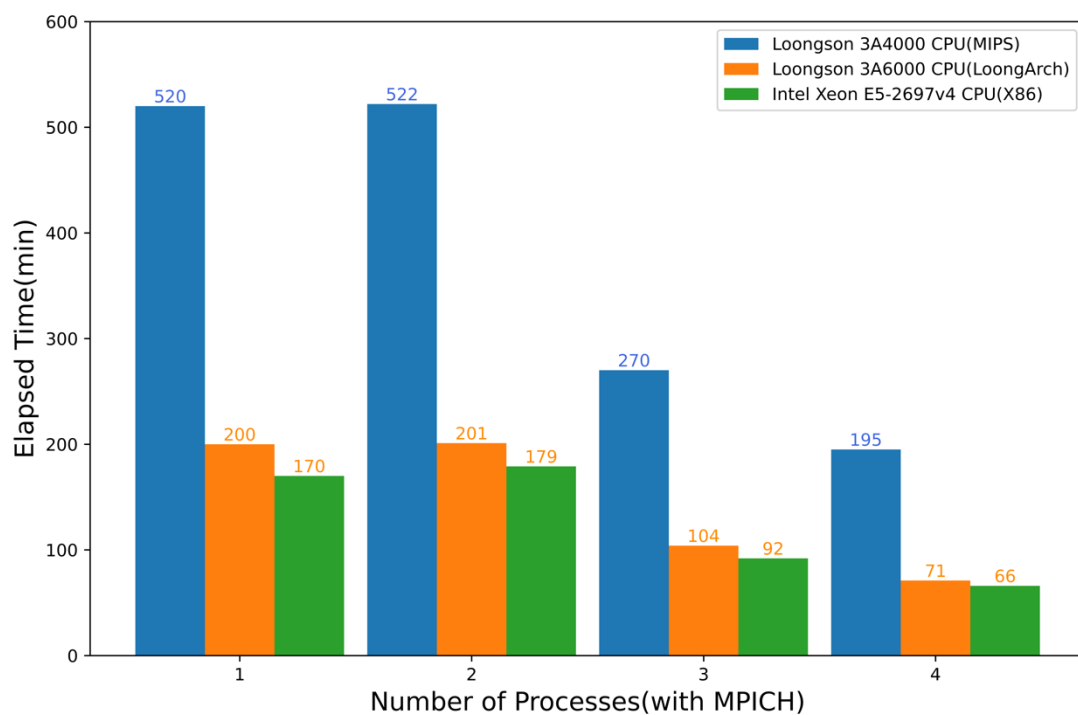

Figure 1. Elapsed time of CAMx model running the same simulation case with MPICH for 24 hours on the MIPS, LoongArch and benchmark platforms.
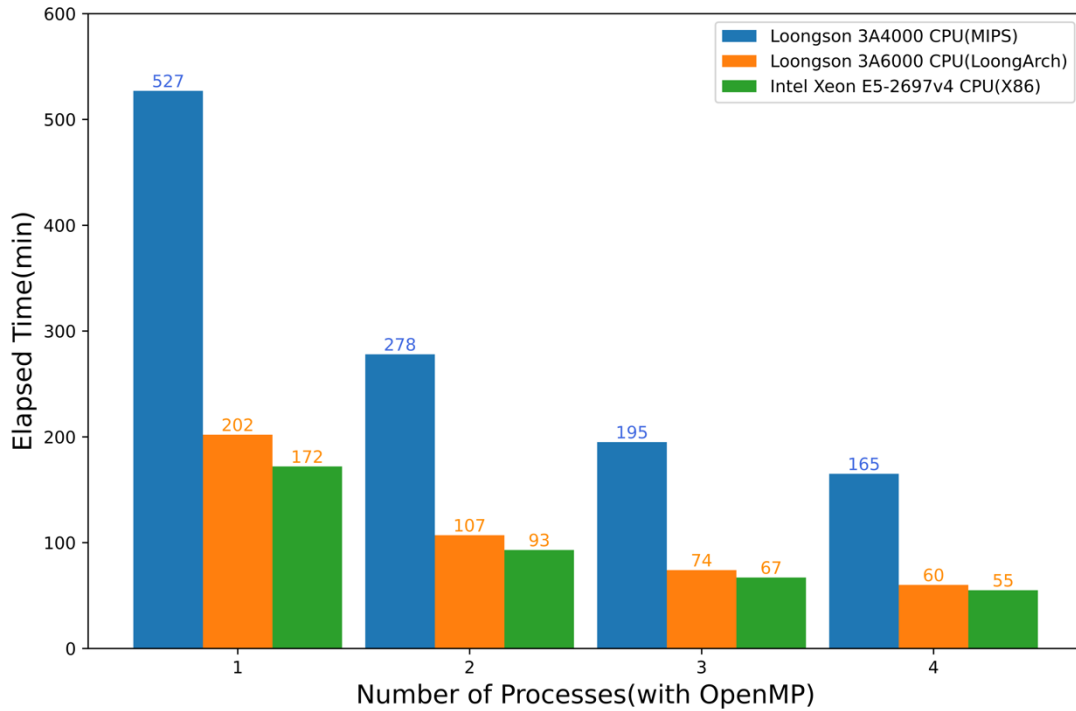
Figure 2. Elapsed time of CAMx model running the same simulation case with OpenMP for 24 hours on the MIPS, LoongArch and benchmark platforms.

The time of CAMx model running simulation case for 24 hours in the modeling system are shown in Figure 1, it can be observed that the computing capability of the Loongson 3A6000 LoongArch platform for CAMx model is slightly lower than the E5-2697v4 (X86) benchmark platform under single-core conditions. Additionally, the Loongson 3A6000 CPU has four physical cores and eight logical cores, and when the number of processes called by MPI matches the number of physical cores, the computational load is evenly distributed across each core. Although the Loongson 3A6000 supports hyper-threading, further increasing the number of processes, CPU starts to schedule logical cores to allocate computational load. Thread scheduling will result in additional overhead and reduced computational efficiency. The new results about LoongArch CPU platform

will be incorporated into the revised manuscript. Thanks again for the expert's encouragement of this work.