

Initiatives in the field of weather and climate for the HPC environment around 2030

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Weather and climate studies have benefited much from advancements in high-performance computing (HPC) to date. The continuous improvement in the peak performances from the Earth simulator (2002-, 40 TFlops), the K computer (2012-, 10.62 PFlops), and the supercomputer Fugaku (2021-, 288 PFlops) have helped us produce world-leading achievements. With the recent momentum toward building Digital Earths and advancements in data science, the demands for HPC in the weather and climate field will grow and grow for the time being at least. However, an integration of semiconductor is reaching its limits, and constraints in electric power do not allow rapid increase in the number of computing nodes. In addition, the architecture tends to be more heterogeneous such as introduction of accelerator such as GPU. Under these difficult circumstances for the supercomputer users, feasibility studies on Next-Generation Supercomputing Infrastructures were started last year to look ahead to around 2030, when the next flagship machine is expected to be appeared. In the field of weather and climate, major modeling group researchers in Japan gather together to share and discuss their status of model developments and scientific targets, and some models are provided to the architecture people as a benchmark set. In addition to these feasibility study, We will also introduce some related activity on the “Roadmap in computational science” and “research group on computational science and technology, meteorological society of Japan”. We would like to have an opportunity to discuss with model developers and users what we should do now to achieve science targets under the HPC environment in 2030.

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