[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-AS Atmospheric Sciences, Meteorology & Atmospheric Environment

[A-AS01]High performance computing for next generation weather, climate, and environmental sciences

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A lot of advanced simulation studies are being conducted by high performance supercomputers such as K computer, Earth Simulator in various fields including meteorology. The high performance supercomputers enables us to conduct numerical simulations and data assimilation of observation big-data (huge high-density and high-frequency data) with an order of magnitude higher resolutions and ensemble numbers than those with previous supercomputers. In addition, the post-K computer will be available as a successor of K, and studies for the post-K computer was started. At the Atmospheric Science session co-organized by the Meteorological Society of Japan, we comprehensively pick up this topic in the Atmospheric and Hydrospheric Sciences Session of this 2018 Union Meeting that enables to comprise the atmospheric, oceanic and land sciences. This session aims to promote recent studies related to the issues on high performance computing in weather, climate, and environmental studies using the K computer and other supercomputers, and to enhance discussions on future directions of numerical simulations in meteorology.

[AAS01-P01]Development of a parallel spherical harmonic transform library: design and performance (preliminary)

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Keywords:Parallel computing

The spherical harmonic transform (SHT) is a typical method to describe the dynamical core in climate models (e.g. MIROC). SHT is a combination of two transformation: a Fourier transformation in longitude and an associate Legendre transformation in latitude. Therefore, a simple way to introduce SHT in parallel computing is to apply domain decomposition in latitudes only, involving a relocation in latitudes before/after the Legendre transformation. However, the number of maximum processors is limited by the size of latitude dimension, which is an obstacle to more efficient computing. Recently the `physics' routines in a climate model have become more and more complex and expensive, thus the heavy computation significantly suffers from the limitation. A new (yet-another) library, ***Flageolet***, has been developed to help parallel processing of SHT in particular for climate models like MIROC, to support more flexible domain decomposition, following the approach adopted in several 3D FFT libraries. This study presents a design of ***Flageolet*** and show preliminary results of the performance tests for various sizes of domain around T213 or more, examined on the Earth simulator.