

Development of a general circulation model for the Earth type planetary atmosphere AGCM6

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<http://www.gfd-dennou.org/arch/agcm6/>

The GFD Dennou Club Atmospheric General Circulation Model version 6 (AGCM6) is now being designed and developed as a tool that helps us to construct an understanding of dynamics and perform a comparative study

of the planetary atmospheres. The major target of AGCM6 is to develop a software structure which enables us to change the model geometry and to build in or remove physical and/or dynamical processes with ease. This means that AGCM6 will be actually a series of virtual models which cover the dynamical hierarchy from a simple geophysical fluid dynamical model to a full GCM and also cover the planetary parameters ranging from Venus, Earth to Mars. Also aimed are 1) to incorporate a network transparent and self-descriptive data structure, and 2) keep portability which guarantees execution on various types of computers.

In these days, GCMs of the Martian and Venus atmospheres have been developed by various groups to simulate, to a certain extent, the

characteristic features observed in each atmosphere, respectively. However, from the viewpoint of understanding the simulation results and making a comparative study of the planetary atmospheres, current GCMs, to say nothing about GCMs of the terrestrial atmosphere, are becoming too complicated and/or specialized in each planet.

Now, we have developed a spectral primitive equation model which is a prototype model of AGCM6 dynamical core. The source code is written by Fortran 90 and follows the Japan Meteorological Agency Fortran 90 coding rule (Muroi et al., 2002). For spectral transformation in the model, we use ISPACK library (Ishioka, 2002) and SPMODEL library

(Takehiro et al., 2002). ISPACK is a toolkit library for developing spectral numerical model, and SPMODEL enables us to improve readability of the source code.

We are proceeding to develop the AGCM6 dynamical core which is incorporated with the network transparent and self-descriptive data

structure. The data format follows the gtool4 netCDF convention (Toyoda et al. 2000), and gtool4 Fortran 90 library (Toyoda et

al. 2002) is used for constructing data input/output subroutines. We are performing Held-Suarez test with AGCM6 dynamical core and

considering a suitable program structure which makes it easy to apply for the planetary atmospheres and to generate reduced system models.

References

AGCM6: <http://www.gfd-dennou.org/arch/agcm6/>, GFD Dennou Club.

Ishioka 2002: <http://www.gfd-dennou.org/arch/ispack/>, GFD Dennou Club.

Muroi et al. 2002: Tenki 49, 91-95 (in Japanese), <http://www.mri-jma.go.jp/Dep/fo/mrinpd/coderule.html>.

Takehiro et al. 2002: <http://www.gfd-dennou.org/arch/spmodel/>, GFD Dennou Club.

Toyoda et al. 2000: <http://www.gfd-dennou.org/arch/gtool4/>, GFD Dennou Club.

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