Development of a Modular Interactive Planet Simulator

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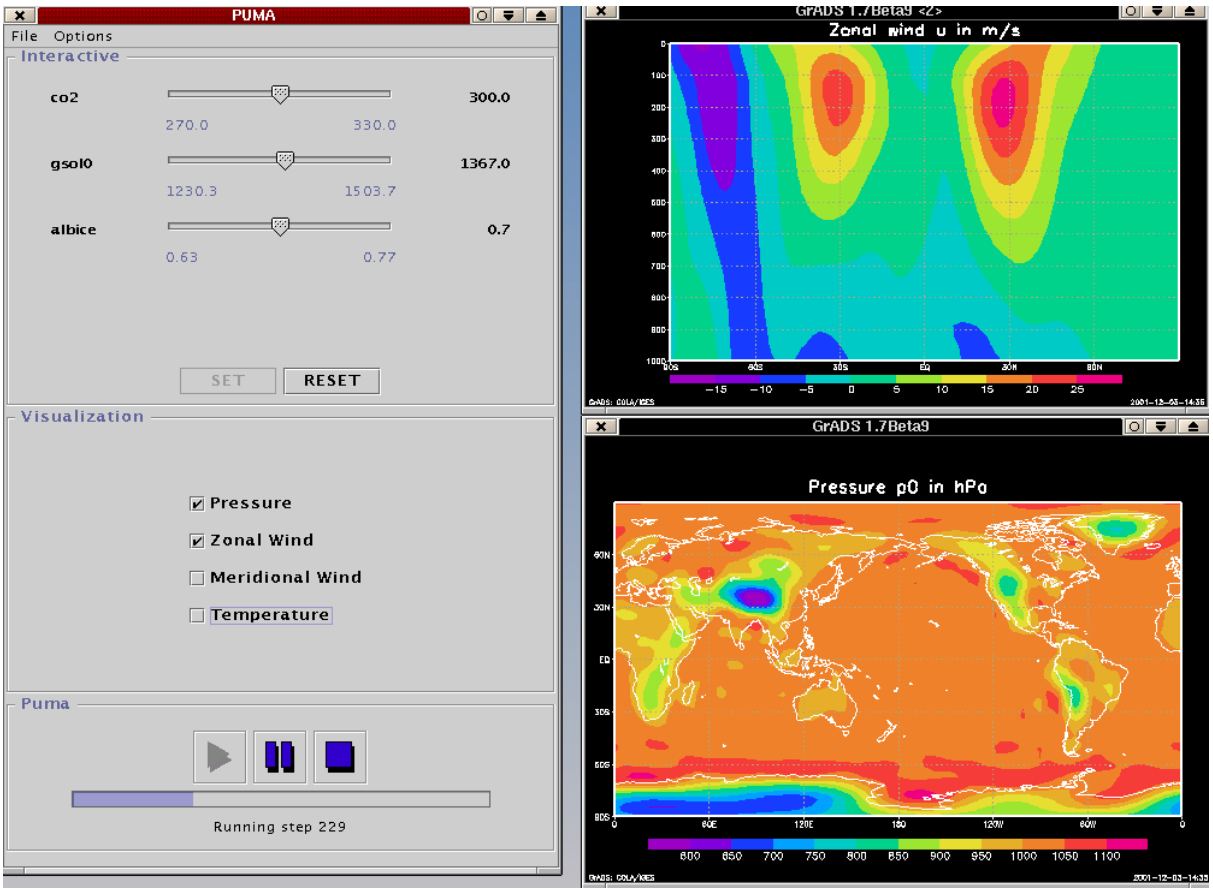

Fig.: 1 Screenshot of Planet Simulator in interactive mode

TheThe **Planet Simulator** is designed as an EMIC (Earth Models of is designed as an EMIC (Earth Models of model,model, with itsmodel, with its priorities set to performance, easymodel, with its priorities set to perform the Planet Simulator are:

ModularModular approach: The code The code is split into modules, which can be m The code independent from otherindependent from other modules. Where applicapable there isindependent from other m purposes,purposes, e.g. ocean models of different complexity or transfpurposes, e.g. ocean models of diffe differentdifferent hardwardifferent hardware, e.g. parallel scalar machines versus vector processor mac modularitymodularity is either on code level (modularity is either on code level (FORTmodularity is eithe larger components with an coupling interface (MPCCI).

Interaction: The planet simulator can run in basically two The planet simulator can run in basically two modes whichwhich don't require any parameter changes during the run which don't require any parameter ch interactiveinteractive mode provides the userinteractive mode provides the user withinteractive mode provides t aa set of contra set of controls (sliders, buttons, menus), that have a direct effect on the running model. Tha interactiveinteractive mode is designed tinteractive mode is designed to aid in tuinteractive mode is designe applications are education and online visualization of climate experiments.

Portability: The development process The development process is done and tested on The development proces systems.systems. Cusystems. Current devesystems. Current development platforms include Cray vector mach processorprocessor workstations, Linux-PCs and Linux-cluster with upprocessor workstations, Linux-PCs and MPIMPI (Message Passing Interface) is used for multiprocessor andMPI (Message Passing Interface) is used f the modules is strict FORTRAN-90 code, avoiding any vendor specific constructs or libraries.

Readability:Readability: ThoughThough optimized for performance, the code is writtenThough optimized f studentstudent can learn the structurestudent can learn the structure and organization very fast. This leads tostuc makesmakes themakes the planet simulator an idealmakes the planet simulator an ideal training too comprehensive models later.

Scalability: The The model can be run The model can be run on selectable resolutions, for each of its larger c like atmosphere, ocean, ice, depending on the need for fast processing or high resolution.

Status: The atmospheric component of the planet simulator is the The atmospheric component of the planet s 19981998),1998), 1998), while the ocean component is MOM-3. Ice- and vegetation components are u development, while more components will be introduced during the next two years.

Availability: The planet simulator and its source code will be freely The planet simulator and its source code w atat the end ofat the end of 2003. Scientist, that participate in the development process have permanentat the en toto the sources of the planet simulator. The atmospheto the sources of the planet simulator. The atmosp many tools can be downloaded from our website "http://puma.dkrz.de/puma".

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