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The impact of abrupt land cover changes by savanna fire on the Australian contemporary monsoon

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About 25% of Australia is covered by tropical savanna ecosystems. In these areas, dry-season fires are the largest natural or anthropogenic disturbance, and around 70% of the total Australian extent of burning per year is caused by savanna fire. The changed surface properties immediately following a fire and during the re-growth period can lead to a significant modification of the surface-atmosphere coupling. A fire/re-growth scheme has been developed for the Cubic-Conformal Atmospheric Model that describes the immediate impacts of a fire as well as vegetation re-growth. In good qualitative agreement with observations, initial sensitivity studies show that the fires lead to abrupt changes in the surface radiation and energy balances. The boundary layer changes lead subsequently to a regionally significant stronger convection and an intensification of the cyclonic circulation in the area of the Pilbara heat low. There is an enhanced moisture flux into the lower troposphere that helps to increase precipitation. Given a temporal overlap of the re-growth period and the monsoonal wet-season, there is a significant influence on the simulated precipitation associated with the Australian summer monsoon.

In order to improve the signal-to-noise ratio and cover a broader range of the natural system dynamics, 90 independent scenarios spanning the years from 1979 to 1999 are deployed. A grid computing paradigm is a core component of this element of the project. We apply the parametric modelling engine NIMROD/G for all aspects of process control, error, resource and data handling, as well as the distribution of the modelling system to cluster sites around the globe. Around 150 CPUs are made avail-

able for the overall experiment. The system is interactively set up and controlled via the NIMROD portal and viewer web-interfaces. In addition to the physical conclusions, specific challenges discussed here include the long runtime of each experiment, the heterogeneous computing environments and the large data volume.