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Greenhouse gases induced wildfire risk in Brazil and Africa

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Part I: Brazil Vegetation fires are the second largest source of greenhouse gas emissions to the atmosphere. The reduction of the climatic impact of these emissions is related to the vegetation susceptibility to fire (fire risk), as well as to the understanding of possible implications of changes in atmospheric circulation on fire risk in the nearf uture. This study evaluates the environmental susceptibility to fire occurrence based on a Potential Fire Index (PFI) for two large regions: Brazil. Two climate simulations from the ECHAM5/MPI-OM climate model have been used to calculate the PFI: present day (1980-2000) and an experiment for the end of the twenty-first century (2080-2100). The results indicate that the proposed PFI methodology could properly reproduce the areas with the highest fire incidence under present conditions. Moreover, it was found that under greenhouse warming conditions the PFI foresees an increase in the fire risk area, particularly for the Amazon region. We concluded, furthermore, that changes of vegetation predicted to occur in the future lead to substantial modifications in the magnitude of the PFI, and may potentially extend the length of the fire season due to induced longer drought periods as compared to current conditions. PART II: Africa Based on regional climate model simulations conducted with RegCM3, the impact of anomalous climate forcing on the environmental vulnerability to wildfire occurrence in Africa is analyzed by applying the Potential Fire Index (PFI). Three distinct vegetation distributions have been analyzed for present day (1980-2000) and for the end of the twenty-first century (2080-2100). We demonstrated that under current conditions the PFI is able to detect the principal fire risk areas which are concentrated in the Sahelian region from December to March, and in the subtropical Africa from July to October. It was found that under greenhouse warming conditions the PFI shows an increase of the fire risk area, particularly for the latter region.