

# KlimaCampus Kolloquium

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at the invitation of the Max Planck Institute for Meteorology

## Expansion of global drylands under a warming climate

Global drylands encompassing hyper-arid, arid, semiarid, and dry subhumid areas cover about 41 % of the Earth's terrestrial surface and are home to more than a third of the world's population. Ecosystems over drylands live at the margin of sustainability, where water is scarce for all or part of the year. Knowledge of how anthropogenic climate change will affect the terrestrial aridity and particularly the extent of global drylands is essential for water-resource and land-use management in these regions. By analyzing observations for 1948–2008 and climate model simulations for 1948–2100, we show that global drylands have expanded in the last sixty years and will continue to expand in the 21st century. By the end of this century, the world's drylands under a high greenhouse gas emission scenario are projected to be  $5.8 \times 10^6$  km<sup>2</sup> (or 10%) larger than in the 1961–1990 climatology. The major expansion of arid regions will occur over southwest North America, the northern fringe of Africa, southern Africa, and Australia, while major expansions of semiarid regions will occur over the north side of the Mediterranean, southern Africa, and North and South America. The global dryland expansions will increase the population affected by water scarcity and land degradations.

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