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# The potential effects of climate change on malaria in tropical Africa using regionalised climate projections

V. Ermert (1), A. H. Fink (1), H. Paeth (2), and A.P. Morse (3)

(1) University of Cologne, Institute of Geophysics and Meteorology, Cologne, Germany (vermert@meteo.uni-koeln.de), (2) University of Würzburg, Department of Geography, Würzburg, Germany, (3) Universtiy of Liverpool, Department of Geography, School of Environmental Sciences, Liverpool, UK

The projected climate change will probably alter the range and transmission potential of malaria in Africa. The potential impacts of climate change on the malaria distribution is assessed for tropical Africa. Bias-corrected regional climate projections with a horizontal resolution of 0.5° are used from the *Regional Model* (REMO), which include land use and land cover changes. The malaria models employed are the *2010 version of the Liverpool Malaria Model* ($LMM_{2010}$), the Garki model, the *Plasmodium falciparum infection model from Smith et al. (2005)* ($S_{2005}$), and the *Malaria Seasonality Model* (MSM) from the Mapping Malaria Risk in Africa project. The results of the models are compared with data from the *Malaria Atlas Project* (MAP) and novel validation procedures for the $LMM_{2010}$ and MSM lend more credence to their results.

For climate scenarios A1B and B1 and for 2001-2050, REMO projects an overall drying and warming trend in the African malaria belt, that is largely imposed by the man-made degradation of vegetation. As a result, the malaria projections show a decreased malaria spread in West Africa. The northern Sahel is no more suitable for malaria in the projections. More unstable malaria transmission and shorter malaria seasons are expected for various areas farther south. An increase in the malaria epidemic risk is found for more densely populated areas in the southern part of the Sahel. In East Africa, higher temperatures and nearly unchanged precipitation patterns lead to longer transmission seasons and an increase in the area of highland malaria. For altitudes up to 2000 m the malaria transmission stabilises and the epidemic risk is reduced but for higher altitudes the risk of malaria epidemics is increased.

The results of the more complex and simple malaria models are similar to each other. However, a different response to the warming of highlands is found for the $LMM_{2010}$ and MSM. This shows the requirement of a multi model uncertainty analysis for the projection of the future malaria spread.