



Loss of safe land on atolls highlights need for immediate emissions reductions to support coastal adaptation

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The impacts of climate change and sea level rise are posing substantial threats to the long-term habitability of low-lying atolls. As of today, the sparse data coverage of these islands limits the ability to assess and respond to climate change related risks.

Advances in coastal digital elevation models provide data for very remote coastal regions with low vertical bias. Here, we combine the Intergovernmental Panel on Climate Change regional sea level rise projections under its illustrative emissions scenarios, with the coastal digital elevation model CoastalDEM and COAST-RP, a dataset of storm tide return periods to assess the exposure to rising sea levels and coastal flooding of 166 atolls. Our results show that in 2050 and under a very low emissions scenario (SSP1-1.9), atoll area exposure to SLR and coastal flooding will amount to 35% [34-36%] and that only 64% of atoll area can still be considered safe. By the end of century and under the same scenario, only 61% can be considered safe. Under an intermediate emissions scenario (SSP2-4.5), a scenario roughly capturing projected warming under current policies and actions, the share of safe land further reduces to 58% by 2100. By 2150, only 58% or 51% of the land can still be considered safe under the very low and intermediate emissions scenario respectively. Our results show that the habitability of atolls is already threatened in the near future, but that near-term mitigation can limit the pace at which atolls are flooded in particular beyond 2100. Our results imply that in addition to immediate and rapid emission reductions in line with the Paris Agreement, remaining adaptation options must be enabled and implemented today to reduce the future exposure of atolls.