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Exploring the effects of adaptation policies on sea-level rise-induced migration at continental scale

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Accelerating sea-level rise (SLR) in the course of the 21st century will lead to population displacement and migration, the intensity and patterns of which will largely depend on the type and efficiency of adaptation strategies pursued. Thus far, the potential feedbacks between adaptation and SLR-induced migration have not been considered in continental-scale assessments. This study explores the effect of three coastal adaptation policy scenarios – 1) 'build with nature', 2) 'hold the line', 3) 'save yourself' – on migration due to SLR, using a gravity-based population downscaling model calibrated to the Mediterranean region. The policy scenarios are consistent with the socioeconomic developments described under the Shared Socioeconomic Pathways (SSPs). Combining these with a range of SLR scenarios, we produce spatial population projections from 2020 to 2100 that allow for estimating SLR-induced migration with and without adaptation. Preliminary results show that, without adaptation, SLR may lead to migration of 10 million (SSP1-RCP2.6) to 16 million (SSP3-RCP4.5) people currently living in low-lying coastal areas of the Mediterranean until 2100. With adaptation, the number of migrants until 2100 could be reduced by 2.1 million under the 'build with nature' scenario (SSP1-RCP2.6) and by up to 6 million under the 'hold the line' scenario (SSP5-RCP8.5). These results suggest that adaptation can be effective in reducing the number of migrants due to SLR, in particular when engineered solutions such as dikes are pursued. However, while the number of SLR-related migrants can be reduced by 50% under the 'hold the line' scenario, impacts would be high in case of protection failure during extreme sea level conditions. Allowing for exploring the effects of different adaptation policies on SLR-induced migration, we anticipate that our findings can provide a suitable basis for decision-making, for example in adaptation planning or regional development planning.