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## Simulating multiple wave human dispersals out of Africa

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Human fossil and archeological findings indicate that Anatomically Modern Humans (AMHs) may have migrated from Africa into Eurasia multiple times during the last glacial period. However, mtDNA-based genetic data (haplogroup L3 & its daughters M, N) appear to be more consistent with a single wave dispersal ~ 70-60 ka, coinciding with one of the driest periods in northeastern Africa.

To reconcile this discrepancy and better understand the migration routes and interactions of different groups of AMHs, we developed a new version of the Hominin Dispersal Model (HDM, version 2). The phenomenological reaction diffusion model simulates a realistic human dispersal in a spatio-temporally varying climatic environment. In our configuration, we introduce a group which represents individuals which dispersed into Asia prior to 60 ka and a group which migrated into Eurasia post-60 ka. An ensemble of parameter sensitivity experiments suggests that their interaction caused a characteristic east-west gradient in admixture across Eurasia, which is consistent with latest genetic datasets, which reveal a faint signal of pre-60 ka dispersal waves in Southeast Asians and individuals from Papua New Guinea. Moreover, our simulations provide new insights into possible migration routes of AMHs. Based on this analysis we propose a new hypothesis to explain the increased Neanderthal DNA percentage in present-day Asians relative to Europeans.