Numerical Simulation for Geomorphic Evolution in Taiwan with a Stream Erosion Model

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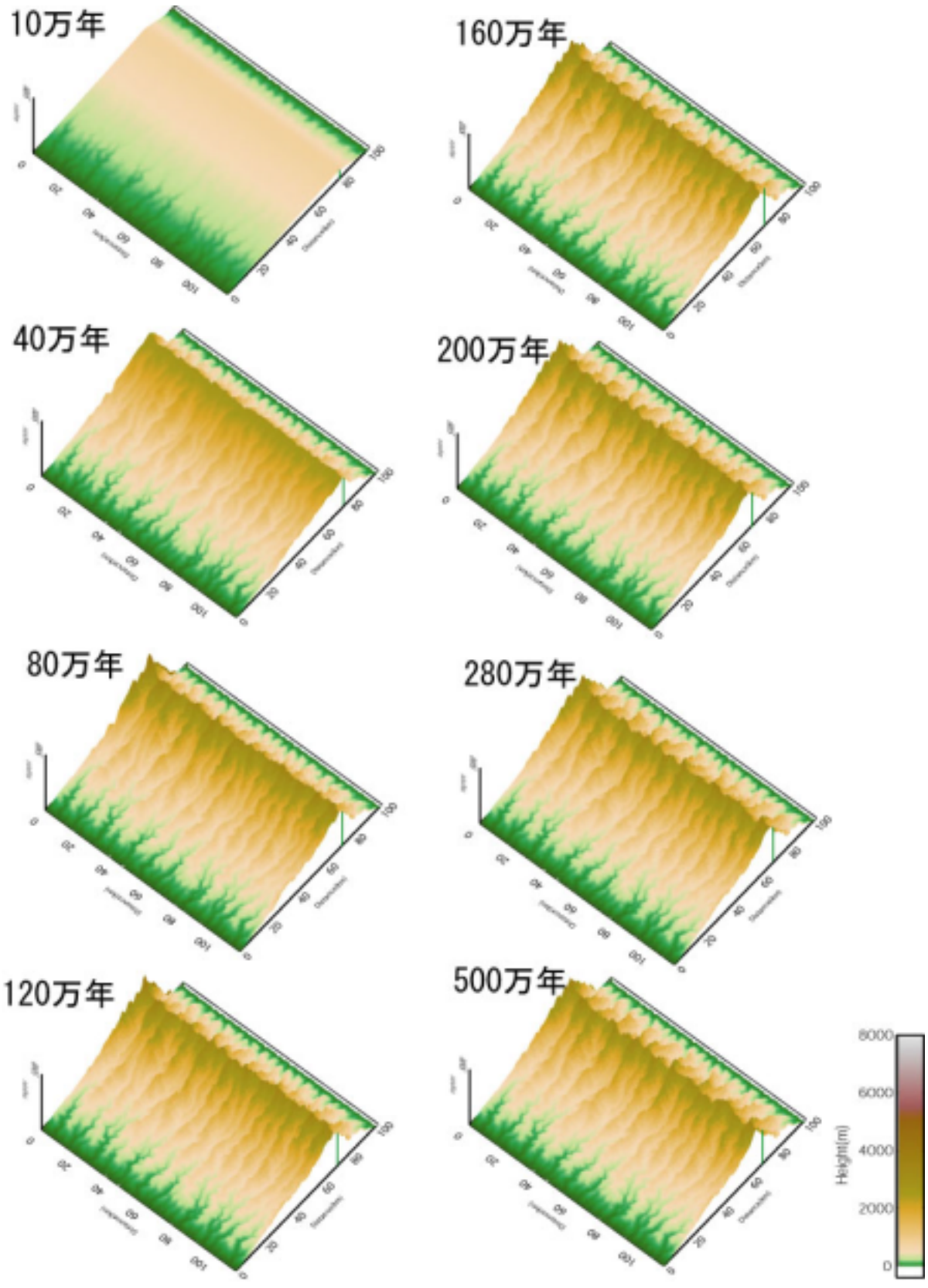
In general, landform evolves toward a dynamic stable state in which the two opposite processes of crustal uplift/subsidence and erosion/sedimentation are balancing with each other. On this basic concept we constructed a geomorphic evolution model by incorporating crustal uplift motion into a stream erosion model (Howard and Kerby, 1983). Discretizing this model in space and time, we developed a numerical simulation code of geomorphic evolution. With this code we made numerical simulation of mountain building in various situations, and found that the location of the mountain peak gradually migrates from the location of the maximum uplift axis toward the center of the crustal uplift region. The migration distance of the mountain peak is greater as the maximum uplift axis is farther from the center of the uplift region. The crustal uplift rate strongly affects the height of the mountain peak in the final steady state, but not its location. Taking these results into account, we tried to simulate the process of landform formation in Taiwan for the last 5 Myr. The maximum height of the central mountain range in Taiwan is about 3000 m on average, and its axis is located about 25 km east of the center of Taiwan. These characteristics in landform can be well explained by the present geomorphic evolution model, assuming the 3-5 Myr duration of steady crustal uplift with its maximum rate of 8 mm/yr near the eastern end of Taiwan. This result gives considerable validity to the so-called bulldozer model (Davis et al., 1983) for the mechanism of rapid crustal uplift motion in Taiwan.



平坦面が切り妻型に隆起する場合の時間変化