

# Hawaiian Islands formed through extrusive volcanic activity

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Scientists generally believe that the Hawaiian Islands formed primarily through endogenous growth, or intrusion, in which hot magma intrudes into a rock and then solidifies before it reaches the surface. However, a new study suggests that the islands may actually have formed primarily through extrusion, which occurs when a volcano erupts and magma reaches the surface and flows away from the eruption site before cooling and solidifying.

Flinders et al. used gravity data from historical land surveys along with recently compiled marine gravity data to estimate the volumes of intrusive material, which can be identified by its higher density, below all of the known volcanoes throughout the Hawaiian Islands.

Contrary to previous studies, which had estimated that intrusions account for about 65 to 90 percent of the total volume of the islands, the authors find that the volcanoes of the main Hawaiian Islands are composed of less than 30 percent dense intrusive material, on average. This suggests that the islands are not built primarily through endogenous growth, as had been thought, but rather through extrusive growth.

**More information:** Flinders, A. Intrusive dike complexes, cumulate cores, and the extrusive growth of Hawaiian volcanoes, *Geophysical Research Letters*. DOI: [10.1002/grl.50633](https://doi.org/10.1002/grl.50633), 2013 <http://onlinelibrary.wiley.com/doi/10.1002/grl.50633/abstract>

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