

rocks constituting the series are mainly surface flows. The gabbro flows are often of immense thickness. The diabase flows are usually much thinner, and frequently pass in their upper parts into porphyrites and amygdaloids. Many flows are porphyritic or amygdaloidal throughout. The beds of quartz-porphyry and felsite are abundant in certain districts, but usually have no great lateral extent, but while a single flow may be traced but a little way, frequently a group of flows of the same general character may have a great extent and thickness. But even the groups of flows cannot be regarded as general formations for the whole of the Lake Superior basin.

Since the number and thickness of the volcanic beds as well as the detritals vary greatly, the Keweenaw series as a whole is widely variable in different districts in its character and thickness. Structurally, Irving has divided the series into two parts, a lower division, in which eruptives are present, and an upper division, in which eruptives are absent. In any one section of the Keweenawan, at the lower part of the lower division, are generally found numerous volcanic flows, with few or no detrital beds. In passing toward the middle of the series the sandstones and conglomerates become more and more numerous and of greater thickness. Still higher the sandstones and conglomerates become predominant, and finally volcanic products disappear, the upper ten or fifteen thousand feet of the Keweenaw series being wholly composed of mechanical detritus. A given detrital bed varies from a mere seam of narrow local extent to thick beds of sandstone and conglomerate, one of which has been traced by Marvine for more than one hundred miles. The most general detrital formation is the upper sandstone and conglomerate.

The Keweenawan rocks extend about the entire area of the Lake Superior basin. They appear upon the east shore of Lake Superior, cover a large area of Keweenaw Point, northern Wisconsin, eastern and northeastern Minnesota, and a great area about Lake Nipigon. A similar set of volcanics, occupying a like stratigraphical position, is also known adjacent to Hudson Bay, and this may be a contemporaneous series.