

# The three igneous rock series of Iceland

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**Abstract** – *Volcanism in Iceland appears to have been confined to volcanic systems throughout its history. During Late-Pleistocene and Holocene times some 41 volcanic systems have been active in Iceland and its insular shelf. An examination of a scrutinized data set of 1378 major element chemical analyses of rocks from the 41 volcanic systems, confirms that three volcanic rock series have developed in Iceland, i.e. a tholeiitic, an alkalic and a transitional alkalic series. The chemical and petrographical characteristics of the three series are discussed. Each volcanic system has only developed basaltic rocks relating to one rock series. A refinement of the nomenclature of the IUGS Subcommittee on the Classification of Igneous Rocks (Le Maitre, 2002) is proposed for the basalts, and for the intermediate and silicic rocks of the transitional series. Mixing and hybridization appear to be very common among the intermediate rocks. A special case is the Hekla suite where the more evolved intermediate rocks are considered to be hybrids of transitional mugearite and tholeiitic dacite. The frequency distribution of the analyzed volcanic rocks indicates that 75% are basalts, 14% intermediate rocks and 11% silicic rocks. However, there is a distinct bimodal distribution of compositions in the tholeiitic and transitional alkalic series. The tholeiitic rock series is confined to volcanic systems in the rift zones which delineate the crest of the MAR in Iceland. The alkalic and transitional alkalic systems are confined to the flank zones. The tholeiitic volcanic systems are estimated to be responsible for 80% of the volume of the extruded rocks during the time span under consideration. Alkalic volcanic systems were initiated in some parts of the volcanic zones 2–3 Ma ago. Flank zones producing transitional alkalic rocks may have been active in northeast and southeast Iceland during Late Tertiary.*