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Compositional and mineralogical zoning by inward crystallization of mafic magma: evidence from the Guwoon hornblende gabbro-diorite Complex, Hwacheon, Korea.

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The small body, ca. 1.3 by 1.6km, of a hot-air ballon shape hornblende gabbro - diorite Complex, in Gowoonri, Hwacheon, Korea consists of marginal diorite and central hornblende gabbro. The volumetrically dominant hornblende gabbro in the core of the Complex shows a zoned distribution with three layers distinguished by different dominant mafic mineral phases. From the margin toward the core of the hornblende gabbro body, the domintant mafic minerals change from amphibole phenocryst of nearly rounded shape in cross section with pyroxene pseudomorph through prismatic shape of amphibole to polycrystalline biotite aggregates.

Systematic variations in geochemical characteristics among three distinct zones of hornblende gabbro body are also observed. From the outer zone toward the core, major oxides such as MnO, MgO, and CaO show a decreasing tendency, whereas total FeO/(total FeO + MgO) value shows an increasing tendency. Concentrations of trace elements also show systematic variations. Where incompatible elements such as Ba and Th increase, compatible elements like Cr and Sc decrease from the margin toward the core.

The zonal distribution divided by change in dominant mafic mineral phase from pyroxene through amphibole to biotite, and systematic compositional changes in both major and trace elements from the outer zone toward the core of the hornblende gabbro body suggest that an inward crystallization mechanism played a major role in the formation of the hornblende gabbro in Guwoonri, Hwacheon, Korea.