

DESCRIPTIVE MODEL OF ANORTHOSITE Ti

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DESCRIPTION Ilmenite (and rutile) deposits in granulite metamorphic terranes intruded by anorthosite-ferrodiorite-clan plutons. Two subsets (1 and 2) distinguished below (see fig. 19).

GEOLOGICAL ENVIRONMENT

Rock Types (1) Andesine anorthosite massifs in granulite-facies country rocks (associated mineralization includes rutile if andesine is antiperthitic).

(2) Ferrodiorite-type intrusive rocks (gabbro, charnockite, jutunite) generally younger than anorthosite, with associated ilmenite ± apatite mineralization.

Textures Granulation in anorthosite, quartz platy and blue where present.

Age Range Most, and perhaps all, between 900 and 1,500 my. in age.

Depositional Environment Lower crust, intrusion under hot, dry conditions.

Tectonic Setting(s) Not well known.

Associated Deposit Types None known.

DEPOSIT DESCRIPTION

Mineralogy: (1) Ilmenite ± rutile

(2) Ilmenite ± apatite

Deposit value is much greater if intergrown magnetite and ulvospinel are absent.

Texture/Structure (1) Disseminations to veinlets along anorthosite margins, hosted by both impure anorthosite and adjacent country rock.

(2) Both concordant layers within or at base of ferrodiorite-clan sheets, and vein-like massive bodies in underlying structural units (especially anorthosite).

Alteration None related to ore.

Ore Controls (1) High-temperature metasomatism between Ti-Fe oxides-rich country rock, and anorthosite, coupled with unknown processes in anorthosite magma. Especially concentrated in swarms of anorthosite sills.

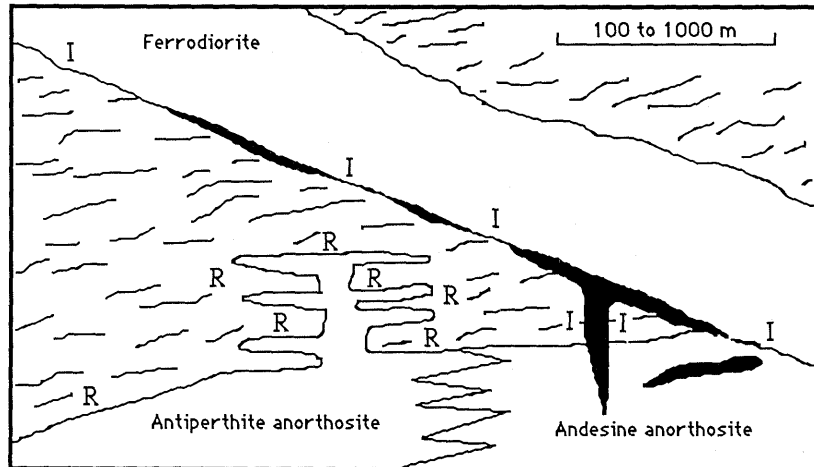
(2) Immiscible Ti, P liquid in ferrodioritic magma, forming both cumulate-like bodies and fracture fillings.

Weathering Residual enrichment may occur in weathering zone.

Geochemical and Geophysical Signature (2) High Ti, P, and Zr. Magnetic anomalies.

EXAMPLES

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| (1) | Roseland, USVA | (Herz and Force, 1984) |
| | Plums Hidalgo, MXCO | (Paulson, 1964) |
| (2) | Roseland, USVA | (Herz and Force, 1984) |
| | Sanford Lake, USNY | (Gross, S. O., 1968) |
| | Laramie Range, USWY | (Eberle and Atkinson, 1983) |



EXPLANATION

- Massive ilmenite-apatite
- ▨ Granulite-facies country rock
- R, Disseminated rutile
- I, Disseminated ilmenite

Figure 19. Cartoon cross section of a typical anorthosite ferro-diorite intrusion showing relation between different forms of Ti concentrations.