

The Age of the Park Volcanics Group SE Southland.

The Event:

Shallow intrusive rocks with some extrusive rocks make up the Park Volcanic Group in SE Southland. They exist in rocks of the Triassic-Jurassic age. They include andesites, dacites and some ignimbrite. The rocks are primarily andesites and suggest emplacement in a back arc setting near an island arc system to the east. The prominent hill near Pomahaka suggests a sill, a shallow intrusive event, but the top of the layer is never exposed. These rocks make up the only volcanic rocks exposed in the Southland Syncline which formed off the east coast of Australia when New Zealand was still part of Australia. These volcanic rocks have been dated as they give the youngest age of the Southland syncline. ①

Dating techniques for older rocks:

Dating of older rocks (about 200ma) requires techniques with a half-life of greater than 1 million years. This is to get the accuracy required.

Argon-Argon Dating

Argon-argon (or $^{40}\text{Ar}/^{39}\text{Ar}$) dating is a radiometric dating method invented to supersede potassium-argon (K-Ar) dating in accuracy. This technique differs from the K-Ar technique in that prior to measurement in a mass spectrometer, the sample is irradiated with neutrons in a nuclear reactor and some of the ^{39}K (present as a known fraction of the total K in the rock) is converted to ^{39}Ar . The half-life of ^{40}K is 1.248×10^9 ②

Other dating techniques:

Three other useful techniques are ^{14}C , Rb-Sr and ^{40}K - ^{40}Ar . These techniques use isotopes to give the old ages of rocks. These measure radioactive decay and from that an age can be determined. Carbon 14 is no good because it is only used for young ages. ^{40}K - ^{40}Ar is used to date the old rocks of this area. Potassium is converted to Argon and the Argon gas is trapped in crystals. ②

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The Park Volcanic rocks have been dated using two techniques from above and are 200ma old.