P-T-t history of granulites from the Schirmacher Oasis, East Antarctica

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Granulite facies rocks in the Schirmacher Oasis, Central Dronning Maud Land, East Antarctica consist of metapelites (Qtz + NaKfs + Pl + Sil + Grt + Rt + Phl ± Zn Spl) intruded earlier by metanoritic dykes and metagabbro (Opx1 + Pl1 ± Cpx1 ± Grt1 ± Prg ± Ilm ± Qtz) and later by enderbitic gneiss and metamafic dykes (Opx ± Cpx1 + Pl + Ilm ± Qtz ± Kfs) – all multiply deformed and metamorphosed. Reaction textures (Ravikant and Kundu, 1998) and geothermobarometric studies on these rocks indicate two distinct stages in their P-T evolution – a prominent essentially isothermal decompression from 8±1 kbar, 800±50 ^{o}C to 5±1 kbar, 700±50 ^{o}C and near isobaric cooling evident from growth of coronal garnets in many of the rocks.

Sm-Nd isochrons based on whole rocks and minerals (mainly coronal garnet) of the enderbitic gneiss give indistinguishable ages (616±52 and 632±8 Ma, 2σ errors) and initial Nd isotopic ratios (_Nd = 0±0.04 and 0.25±0.28), respectively. While the similarity in the wholerock and mineral ages indicates that the above two stages occurred sequentially within a short interval at about 630 Ma, the near chondritic initial Nd isotopic ratios suggest derivation of dioritic magma from a crustal mafic source formed much earlier, probably ~ 1.2 – 1.0 Ga (Jacobs et al., 1998; Moeller et al., 1998).

The remarkable similarity in the timing (~ 630 Ma) of high-grade metamorphic events both in the Lurio Belt, Africa (Kroner et al., 1997) and the Schirmacher Oasis, Antarctica supports their spatial continuity before breakup of the Gondwanaland as proposed by Shackleton et al., (1997).

References

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Geochemistry and pollution of groundwaters from the north-western side of Campi Flegrei caldera (Naples, Italy)

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Introduction

The concentrations of major and minor ionic species have been detected in groundwater from the north-western side of Campi Flegrei caldera (Naples, Italy). In attempting to define the role of agricultural pollutants as groundwater contaminants we focused particular attention on the distribution and speciation of nitrogen in sampled waters.

The circulation of shallow water occurs through volcanic pyroclastic levels. Because of the vertical and lateral variations in granulometry, constipation and lithification of the volcanites, the shallow aquifer result to be subdivided in superimposed strata, which result to be separated by relatively impermeable volcanic levels.

Water geochemistry and pollution

On the base of geochemical data three zones can be individualized south of Patria lake: I-zone around the lake: Ca-bicarbonate waters circulating in a very shallow stratum, II-zone moving to the south: alkali-bicarbonate waters coming from a deeper aquifer fed by meteoric supply, III-zone, in the south-eastern part of the studied area: alkali-sulphate chloride waters which composition indicate a different source (probably the presence of a volcanic-magmatic component) and a different pathway of waters into the aquifer. Among the three zones some differences have been found: I-zone: nitrates are under the EC limits for drinking waters (50mg/l), no ammonia or nitrites have been detected; II-zone: nitrates are generally under the E.C. limits and little levels of ammonia and nitrites have been found, only in some samples nitrates exceed fixed limits; III-zone: nitrates are under the E.C. limits for all but one sample showing very high nitrate contents (112.56 mg/l).

Tab. 1: mean pH and temperature values and concentration ranges (mg/l) of ionic species by waters type.

Water type	No. of samples	pH	T°C	NO2	NO3	NH4	F
1	4	7.21	19.5	ab.*1	9.11	tr.*2	1.46
2	23	7.03	18.3	0.20	30.3	0.12	2.59
3	5	7.67	19.3	ab.*1	30.1	ab.*1	8.94

1: Ca-bicarbonate waters; 2: alkali-bicarbonate waters; 3: alkali-sulphate chloride waters. *1ab.=absent; *2 tr. =trace

Data show that generally the aquifers result to be isolated with respect to the superficial agricultural pollution. In some cases abnormally high nitrates contents indicate the presence of wells in which filtrate contaminated waters from the surface.