

mixing, which might lead to ground water isotopic values falling between the values of rain water and sea water (which is 0,0 by definition); there could be an evaporative enrichment of the heavier isotopes (undetectable due to a large uncertainty in the slope of eq. (2)) during the pre-monsoon months of relatively lower humidity, thus reducing the slope of the δD - $\delta^{18}O$ line.

Notwithstanding the above possible perturbations, our result clearly shows that the ground water in Lakshadweep mainly originates from local precipitation and recharge. Limited data on the rain water samples are in agreement with the data from other tropical islands.

The mean δ values for the ground waters during April are $-2.3 \pm 0.3\text{‰}$ ($\delta^{18}O$) and $-11 \pm 3\text{‰}$ (δD); and during December $-2.7 \pm 0.6\text{‰}$ ($\delta^{18}O$) and $-11 \pm 3\text{‰}$ (δD). (These averages do not include rain water data.) It is clear that there is no significant seasonal difference in the isotopic composition of the ground waters as is expected in tropical regions⁴.

Furthermore, when we compare the $\delta^{18}O$ and δD values of ground waters from two islands separated by a few degrees latitude (Minicoy at $8^{\circ}17'N$ and Chetlat at $11^{\circ}41'N$ during April and Kavaratti at $10^{\circ}33'N$ and Bitra at $11^{\circ}36'N$ during December), we see no significant difference. However, there seems to be a small difference in the δ values of the precipitation between summer and winter. Ground waters average out such variations. The slopes and intercepts of eqs. (2) and (3) are in agreement within 1σ errors. The sea water intrusion cannot be estimated accurately because of the scatter. We can only conclude that it is too small to show up with these uncertainties.

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Use of the sphalerite geobarometer for estimation of pressure of formation of metamorphosed sulphide deposits

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The variation in FeS content of sphalerite enclosed in pyrite is useful for estimation of the lithostatic pressure of formation. Its applicability on two metamorphosed sulphide deposits from Rajasthan and Gujarat has been tested. The computation of pressure by this method comes close to the estimation of pressure by traditional geobarometry.

THE variation in FeS content of sphalerite, when buffered by coexisting pyrite and hexagonal pyrrhotite, is a function of pressure and is independent of temperature over a considerable range. This has given rise to the concept of sphalerite geobarometer¹⁻⁴. This geobarometer has been widely used to estimate the pressure successfully⁴⁻⁶.

Scott⁷ suggested the use of sphalerite inclusions that are totally encapsulated in pyrite for pressure calculation, because such inclusions were equilibrated during or near the peak metamorphic condition and had been isolated from further reaction during subsequent retrograde conditions. As such, these may provide reliable computation of pressure.

This method is used to estimate the pressure and to check its validity in case of metamorphosed sulphide deposits at Deri-Ambaji and Rampura-Agucha which are highly metamorphosed.

The sphalerite inclusions, showing such equilibrium conditions as stated above⁷, were selected for electron microprobe analysis (Figure 1, a and b). These sphalerite inclusions are totally encapsulated in pyrite and are accompanied by pyrrhotite. The pyrrhotite in association with sphalerite was etched by HI to see its nature which revealed the hexagonal form of pyrrhotite. X-ray diffraction was also carried out to confirm the nature of pyrrhotite which also showed the hexagonal form of pyrrhotite due to its single sharp (102) peak. Blebs of chalcopyrite are totally absent in the grains of sphalerite. Sphalerite inclusions were analysed by Jeol 733 Superprobe electron microprobe in the Dionyz Stur's Institute of Geology, Bratislava (Czechoslovakia). The operating conditions of the electron microprobe were as follows: The accelerating voltage of 15 kV, a beam current of $0.1\mu A$, 10 sec counting time. Standards were triolite (stoichiometric, natural) and pure Zn and Mn metals. The analysis from the sphalerite inclusions encapsulated in pyrite from both deposits are listed in Table 1. In Table 1, only Fe%, FeS mole% and the computed pressures are shown.

From Table 1, it can be observed that Fe% varies in