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Crustal Evolution and Gold Metallogeny in Peninsular India - Studies for Exploration Target Selection.

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Gold metallogeny in Peninsular India is episodic having distinctive temporal distribution with peaks at different geological periods of crustal evolution. Gold provinces are confined along convergent margin settings in the four cratonic areas that have evolved separately and stitched subsequently to give rise the landmass of Peninsular India. The cratonic areas evolved independently with more or less distinct tectono-metallogenic signatures and known as Dharwar, Bastar, Singhbhum and Bundelkhand craton. The Archaean greenstone belts with their characteristic gold metallogeny are best developed in Dharwar craton. This type is present in Singhbhum craton also. The Archaean greenstone belts of Dharwar craton comprise three types of schist belts with characteristic metallogeny. The intensely and multiply deformed Mid-Archaean greenstones of Sargur-Nugihalli type host a distinct metallogeny with gold deposits associated with magnesium rich volcanics (Kempenkote in Dharwar craton and Kundrekocho in Singhbhum craton).

Late Archaean volcanic dominated Kolar – Hutti- Ramagiri- Jonnagiri type greenstone belts of Dharwar craton have a distinct type of gold metallogeny hosting all the major gold deposits of the country. Almost all the producing gold mines belong to this type. Mega gold deposits of the country represent this category (Kolar- 803 tonnes Au ; Hutti-+ 100 tonnes Au). Additionally, in this set up Algoma type iron formations also host gold mineralization .

Late Archaean Dharwar type greenstone belts covering more than two third of the total greenstone belt area of the Indian shield are more prevalent in Dharwar craton. The sediment to volcanic is much higher than Kolar – Hutti type greenstone belts. Promising gold metallization of this type are restricted in Chitradurga, Shimoga and Gadag schist belts. Banded iron formation (BIF) hosted gold prospects are located in these belts (Chinmulgund, Ajjanahalli). Occurrences of quartz pebble conglomerate with gold are reported from this domain.

Indian Peninsula witnessed wide spread ensialic orogeny during Palaeo- Meso Proterozoic period. The gold metallogeny is reflected by association of gold and copper in the Aravalli Fold Belt, Singhbhum Fold Belt, Delhi Fold Belt, Sakoli Fold Belt and Mahakoshal Fold Belt etc. This type of deposits are generally copper-gold and gold-copper types, the relative abundance of copper and gold varies widely. Recently a large gold deposit (+ 100 tonne Au) with subordinate copper has been established from Bhukia area in Aravalli Fold Belt. Mineralisations are classified as Volcanogenic massive sulfide (VMS), quartz-pebble conglomerate (QPC), Iron oxide copper gold IOCG and lode gold types by various workers. Besides this, primary gold is found in the southern granulite province, south of granite- greenstone terrain of

Dharwar craton and porphyry type of copper-gold association in Proterozoic Malanjkhand granite. Secondary gold in laterites, as residual concentration, are found in ^{different} parts of Peninsular India contributing to recent placers.

The Precambrian geology of Peninsular India is very similar to that of Australia, Brazil, Canada and Africa, but total gold endowment is much lower than the others. In last three decades through exploration MECL has established 58.82 tonnes of gold metal from Archaean greenstone belts and 66.23 tonnes of metal from Proterozoic Fold Belts" in India. There are world class deposits in Indian Archaean greenstone belts and Proterozoic Fold Belts, hence intensive search is called for these geological provinces and more attention is desired than they have received so far.

