# NOTES

## REGIONAL GEOCHEMICAL SURVEYS IN SELECTED GREENSTONE BELTS OF KARNATAKA

### Introduction

Exploration for gold, base metals, chromite and preliminary studies for PGE mineralisation are being carried out as part of the activities of Geological Survey of India (GSI) in different greenstone belts of Karnataka. These continued efforts over the past few decades have resulted in establishing considerable resources of gold, some of which are being exploited by the State and Central Governmental agencies. Most of these exploration activities were confined to the areas marked by ancient/old workings, obvious surface indications and in the extension areas of the known deposits. Assessment of the potential of all such areas has more or less been completed by the GSI. Identification of new target areas for gold and other mineral commodities in the greenstone belts of Karnataka, extending over an area of about 40,000 km$^2$, has therefore become essential to establish additional mineral resources to meet the ever growing demand.

Regional geochemical surveys are an established and extensively applied tool the world over to quickly survey vast geological tracts for selection of anomalous areas. Therefore, the Indo-French working Group on Mineral Exploration and Development identified Regional Geochemical Inventory as one of the many collaborative projects. Accordingly BRGM (Bureau de Recherches, Geologique et Miniers) of France and the GSI drew up a collaborative programme for regional geochemical inventory by upstream mineral exploration focussed on the Karnataka (Dharwar) craton. The technical work programme was executed in four phases over a period of about three years.

### Objectives of the regional geochemical surveys

The main objectives of the GSI-BRGM project are:

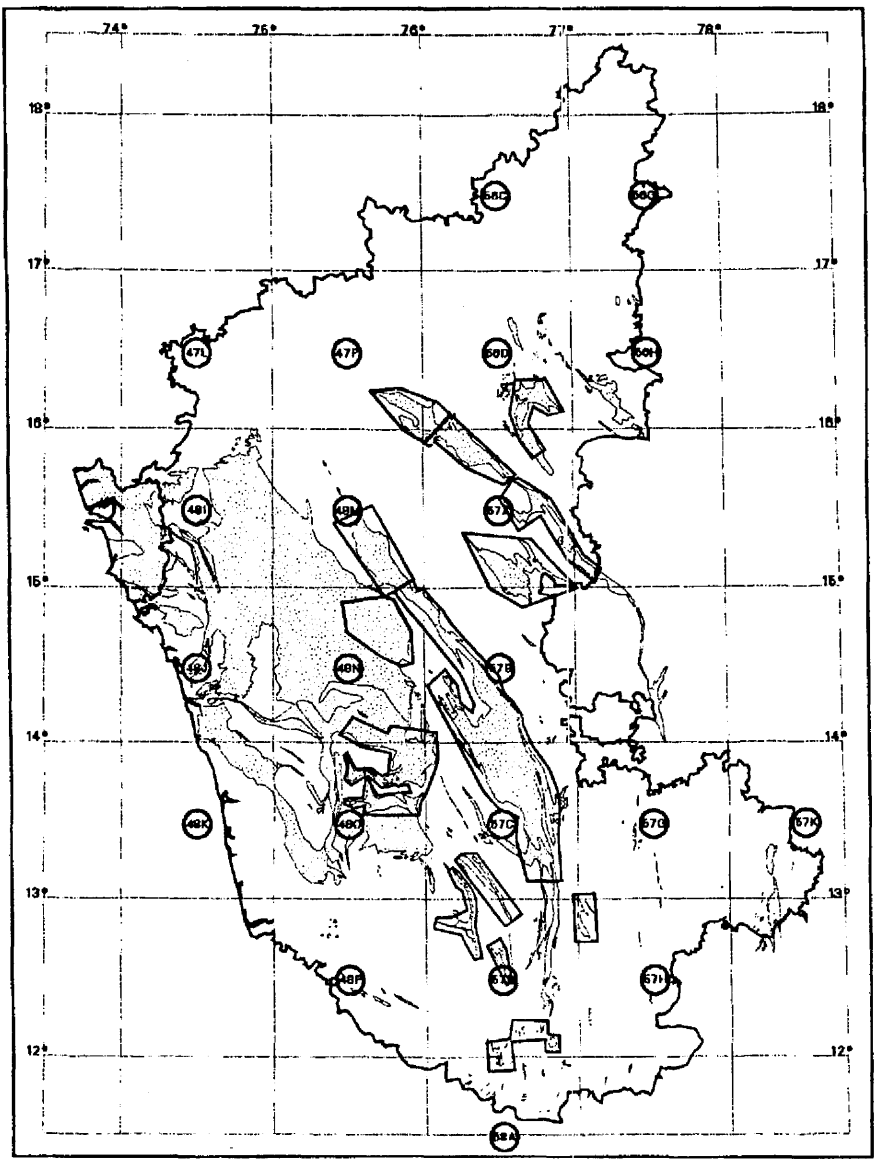
(i) to carry out a targeted geochemical inventory over selected areas of the greenstone belts of the Karnataka craton.
(ii) to identify at the end of the programme, targets worthy of further development by Indian Institutions or by either Indian or foreign investors.
(iii) to prepare promotional files on these targets, and
(iv) to ensure maximum transfer of know-how from BRGM to GSI.

### Area selection and orientation surveys

An area of 15,000 km$^2$ of the greenstone terrain of Karnataka was selected for coverage by regional geochemical stream sediment and alluvial (heavy mineral) surveys after processing and interpreting all the available data on lithology, structure, known mineralisation (gold, basemetals, chromium and PGE), surface manifestations of mineralisation, lineament and litho facies maps derived from satellite imagery and airborne geophysical data. Orientation geochemical stream sediment and alluvial surveys were carried out in and around several known gold deposits/prospects and the reported PGE occurrences. Different granular fractions of the sediment samples were analysed for gold and multi-elements in both GSI and BRGM laboratories. The density of sampling and size fractions to be analysed during regional surveys were finalised after processing the analytical data.

**Regional exploration**

Regional geochemical stream sediment and alluvial (heavy mineral) surveys were carried out over an area of 13,600 km$^2$ in different parts of Karnataka including the Hutti-Maski, Hungund-Kushtagi-Hagari, Sandur, Gadag, Chitradurga, Nuggihalli-Aladahalli, Krishnarajpet, Holenarsipur, Kunigal and parts of Sargur and Shimoga-Dharwar belts (Fig.1). Stream sediment and alluvial samples were collected at average densities of about 1.74 and 0.16 samples per km$^2$ respectively, as indicated by the orientation surveys. About 2 kg of sediment comprising fine silt/clay and 12 litres of alluvial gravel (-5 mm size) were collected from each location. –120 size fractions



(< 125 μ) from all the samples have been analysed for gold, down to a limit of 10 ppb by GF-AAS (MIBK) method and for multi-elements by ICP-AES method. The mineral constituents of all the heavy concentrates from alluvial samples were studied under a binocular microscope.

Geochemical maps depicting distribution of gold and other elements/group of elements along with maps showing the distribution of heavy minerals have been generated for different greenstone belts by using ARC/INFO, Syn ARC and GDM software. Geochemical maps of different elements/ elemental associations including interpretation maps can be generated to meet the requirements of the user agencies. In all 385 anomalous areas (mostly for gold) have been identified and prioritised based on geochemcial signatures, density of anomalies, geological milieu and field studies for follow up evaluation.

The geochemical maps already generated by these surveys will be made available to user agencies on payment basis. The prices of different maps are as follows:

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| 1. | Gold distribution map for 1000 $km^2$ area on 1:50,000 scale | Rs. 27,973 |
| 2. | Other element maps, for each element for 1000 $km^2$ area on 1:50,000 scale | Rs. 1,385 |
| 3. | Heavy mineral data map for 1000 $km^2$ area on 1:50,000 scale | Rs. 2,927 |

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## LOW COST WATER SAMPLER FOR SHALLOW WATER BODIES

*A simple, manually operated water sampler, that can be used for collection of water sample at desired depths from estuaries, near shore regions, lagoons, bays and lakes has been designed by the authors. The instrument is operated successfully in the Krishna estuary and Nizampatnam bay for collection of water samples to determine suspended sediment transport and nutrient diffusion. The instrument is found to be quite useful to sedimentologists and environmental researchers.*

### INTRODUCTION

Recently, an increasing number of investigations of effluent diffusion studies including mobility and residence time required for complete diffusion (Revichandran and Pylee, 1998) of effluents in estuarine (Anilkumar et al. 1998; Aagaard et al. 1998; Jiufa and Chen, 1998; Valdes and Real, 1998) and adjacently located nearshore regions and bays are attracting the attention of sedimentologists, marine chemists, environmental researchers, etc. However, the difficult