

GEOLOGICAL SURVEY OF INDIA

Iron Ore Deposits of Dharwar Craton: Sandur Schist belt

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**Geological Survey of India
Training Institute
Mission-V**





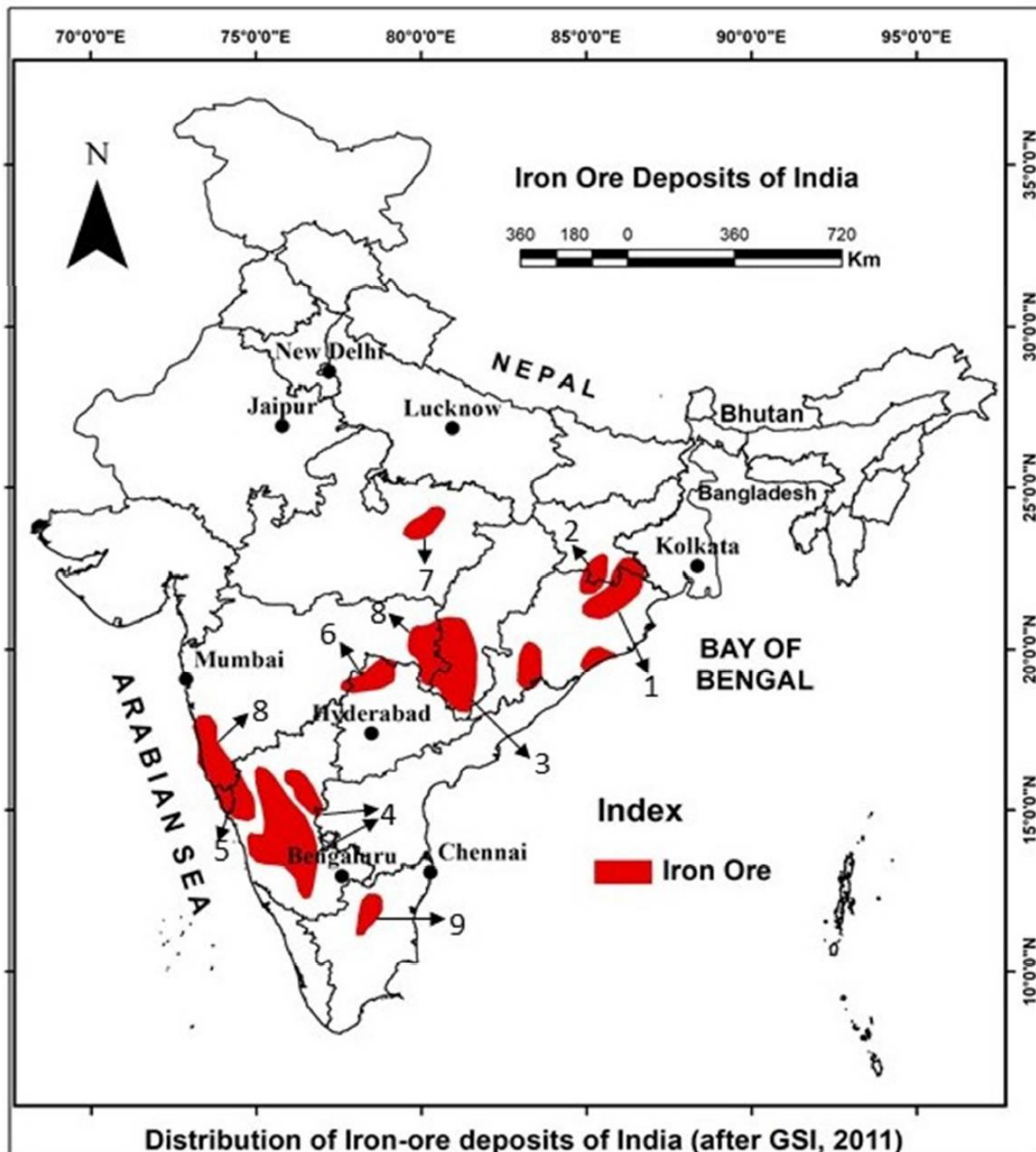
Outline of Presentation

- Iron ore deposits of India and Dharwar Craton
- Origin, types and the stratigraphic significance in Dharwar Craton
- Iron Ore prospects and deposits of Sandur schist belt and future.



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Distribution of Iron-ore deposits of India (after GSI, 2011)



IRON PRODUCING STATES OF INDIA:

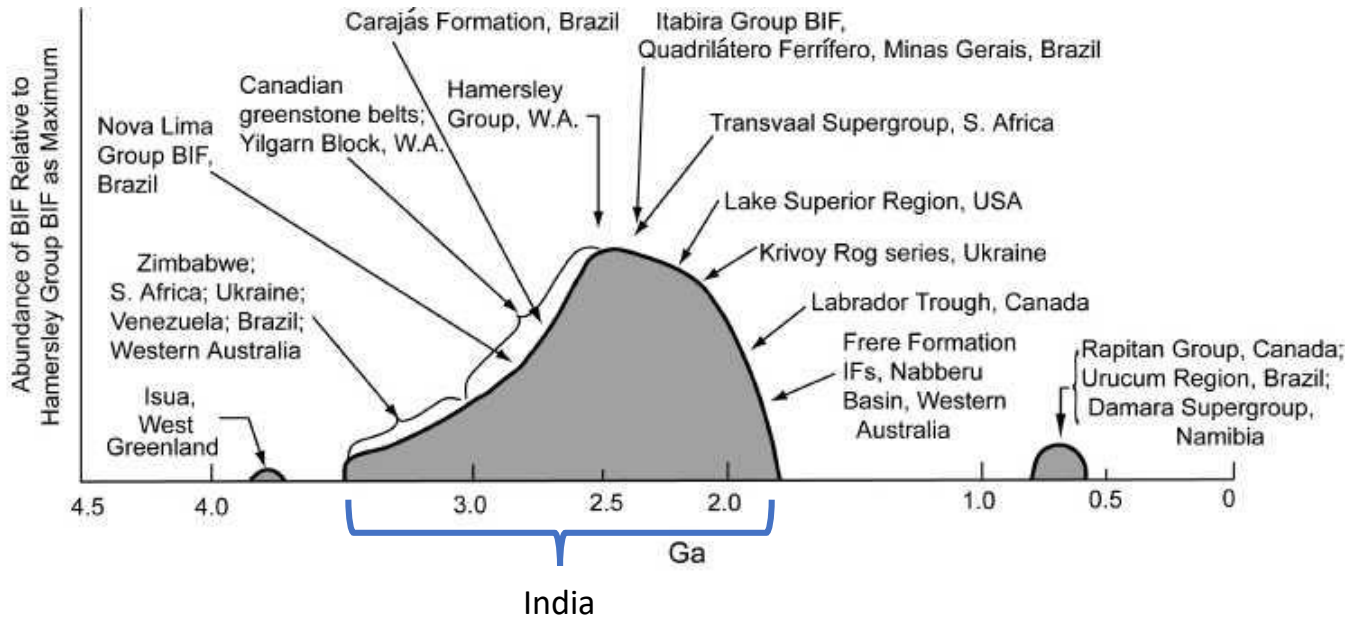
1. **Jharkhand** - Singhbhum district
2. **Orissa** - Sundargarh, Kendujhar, Mayurbhanj and Jajpur districts.
3. **Chhatisgarh** - Bastar and Durg districts.
4. **Karnataka** – Bellery and Vijayanagar districts.
5. **Goa** - North Goa and South Goa
6. **Maharashtra** - Surajgarh, Chandrapur and Ratnagiri districts.
7. **Andhra Pradesh**
8. small deposits are found in Assam, Meghalaya Nagaland, West Bengal, Himachal Pradesh, Uttar Pradesh and Jammu-Kashmir Tamil Nadu

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schematic diagram showing the relative abundance of Precambrian BIFs vs. time



(Klein, 2005)

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Table-7: Degree of Self-sufficiency in Principal Minerals & Metals, 2019-20 (P)

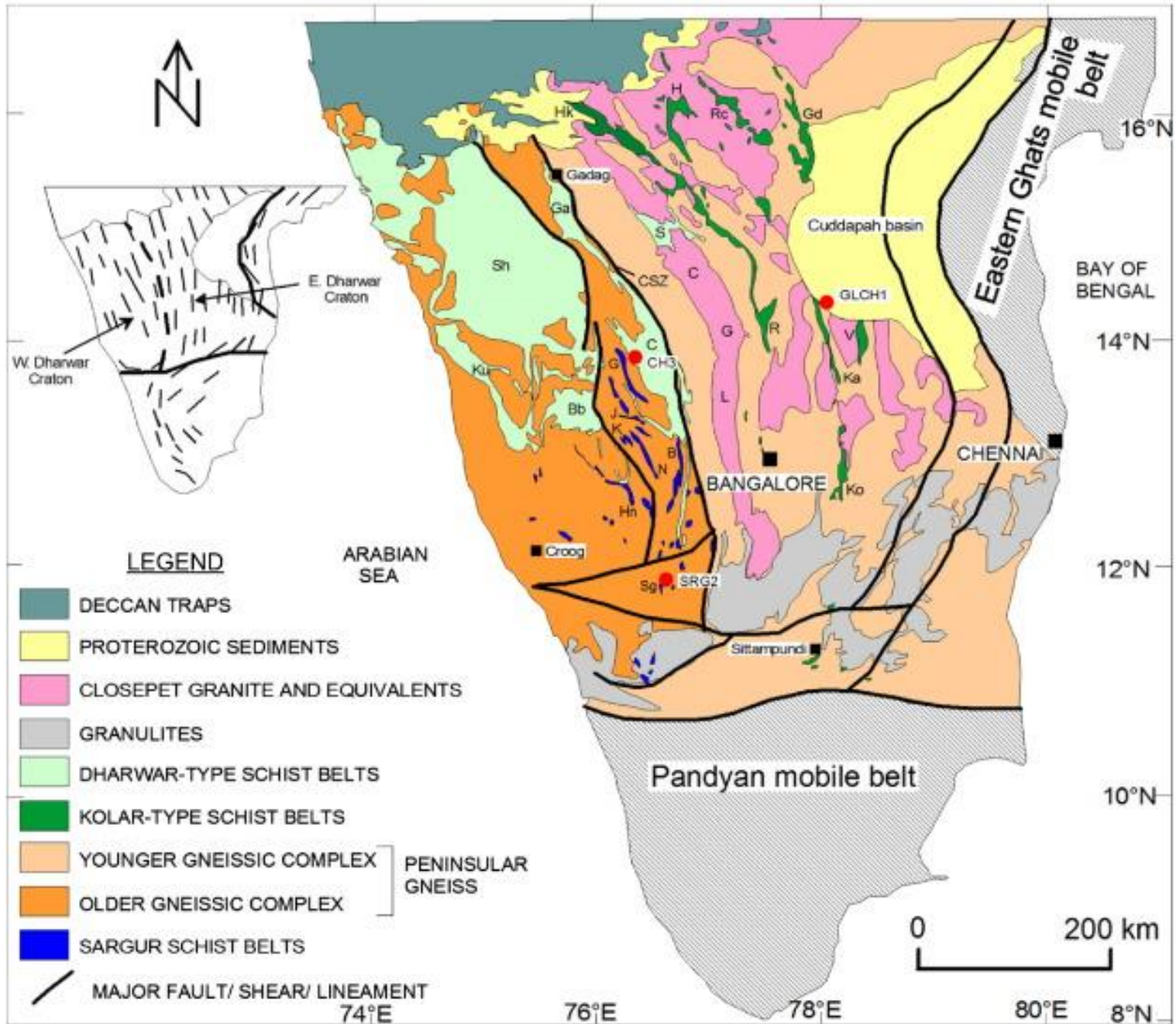
Sl. No.	Commodity	Demand/Domestic Consumption ('000 tonnes)	Supply/Domestic supply ('000 tonnes)	Order of self-sufficiency (%)
Minerals				
1.	Bauxite	24025	21824	91
2.	Chromite	2719	3929	100
3.	Iron ore	180685	246081	100
4.	Kyanite	1.1	3.50	45
5.	Limestone	328620	359332	100
6.	Magnesite	179.9	98	54
7.	Manganese ore*	6874	2904	42
8.	Rock phosphate (including apatite)*	9100	1400	15
9.	Sillimanite	23.4	13	56
Metals*				
10.	Aluminium (primary)	3416	3635	100
11.	Copper (cathode)	943	408	43
12.	Lead (primary)	306 ^{3L}	132	43
13.	Zinc	553 ^{4L}	516	93

Source: Production: MCDR Returns for production data.

MINERALOGY

Mineral	Fe content	Description
• Magnetite (Fe_3O_4)	72.4%	Black, most common
• Hematite (Fe_2O_3) nonmagnetic, most common	70%	Black,
• Limonite ($\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$) oxide	59-63%	Yellow, hydrated
• Siderite (FeCO_3)	48%	Carbonate ore
• Pyrite (FeS_2)	46%	Sulphide ore
• Goethite ($\text{FeO}(\text{oH})$)	62%	Hydrated oxide

THE DHARWAR CRATON





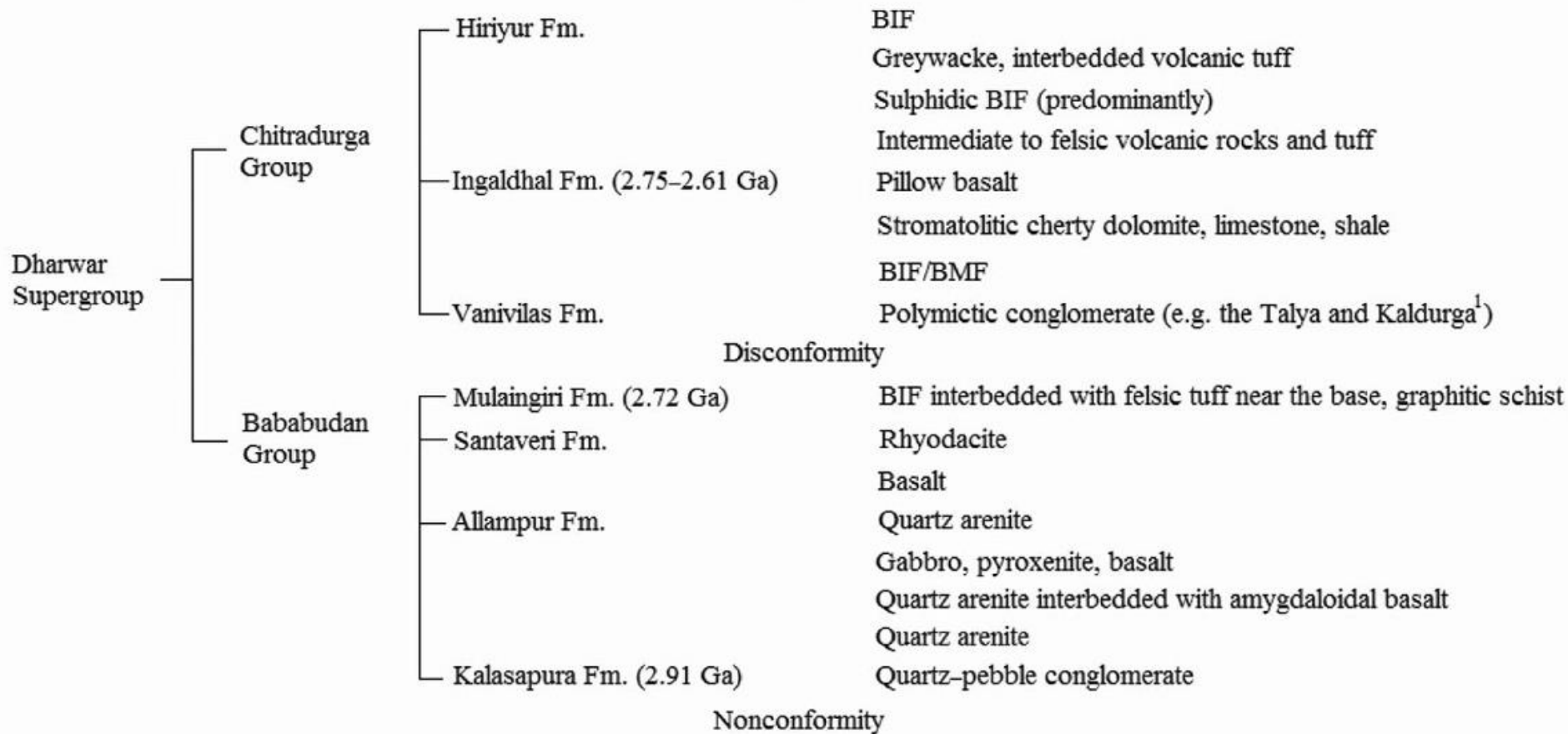
- **Karnataka is endowed with a number of Iron ore deposits.**
- **11% Hematite and 74 % Magnetite resources**
- The iron ore deposits in Karnataka can be classified in to
- **Sedimentary type**
 - BHQ, BMQ of Dharwarian Age
 - **Massive Ore** - including blue dust, float ore, laminated Ore etc.
- **Metamorphic type** – Associated with Sargur Supracrustals mainly associated with magnetite quartzite
- **Magmatic Type** - Magmatic Fe ore deposit with Ti-V association in Basic to ultrabasic rocks.

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2.6–2.5 Ga old gneisses and granitoids



Gneisses and granitoids with inclusions of older supra-crustal rocks (3.0–3.36 Ga, possibly > 3.5 Ga)

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Iron Formations of Karnataka

In Karnataka BIF occurs in four distinct settings. These, arranged in the order of their appearance, from bottom upwards are:

4. *Ranibennur* (Greywacke) Association (Ranibennur, Haveri, Gadag, Uttar Kannada).
3. *Chitradurga* (Carbonate) Association (Chikkanayakanahalli).
2. *Bababudan* (Oxide and Sulphide Association) (Bababudan, Kudremukh, Sandur).
1. *Sargur* (High grade Association) (Maddur-Malavalli).



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Table 2. PRINCIPAL LOCALITIES OF IRON ORE IN KARNATAKA.

Bellary	(Belagal, Donimalai, Kumaraswamy, Thimmappangudi, Devadari, Ramandurg)
Bijapur	(Hiremagi)
Chickmagalur	(Bababudan, Kudremukh, Gangrikal)
Chitradurga	(Mahadevankatte, Bhimasamudra, Vajra, Sasalu)
Dakshina Kannada	(Ajana, Arbadgudda)
Dharwar	(Kappatgudda, Doni)
Hassan	(Dodgudda)
Shimoga	(Shankargudda, Kumsi, Kodachadri, Agumbe, Shiddarhalli, Masanikere)
Uttara Kannada	(Apasarkonda, Yallapur, Anmod, Ramanguli)
Tumkur	(Chiknayakanahalli, Sondenhalli, Kenkere, Karekurchi, Doregudda)

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IRON ORE OF BELLARY- HOSPET SECTOR

- The iron ores of Bellary-Hospet sector are restricted to the **Sandur Schist Belt**, comprising volcano-sedimentary assemblages, surrounded by granitic rocks of Closepet suite.
- The rocks are deformed and metamorphosed and the iron ores are restricted to greenschist facies of rocks.
- **Naqvi** (2002) reported Sm-Nd age of **2704±84 Ma** for basalts of the belt and the granites within the belt have indicated U-Pb age of **2500-2600 Ma** (Ramakrishnan and Vaidyanathan, 2008).



Sandur Schist belt

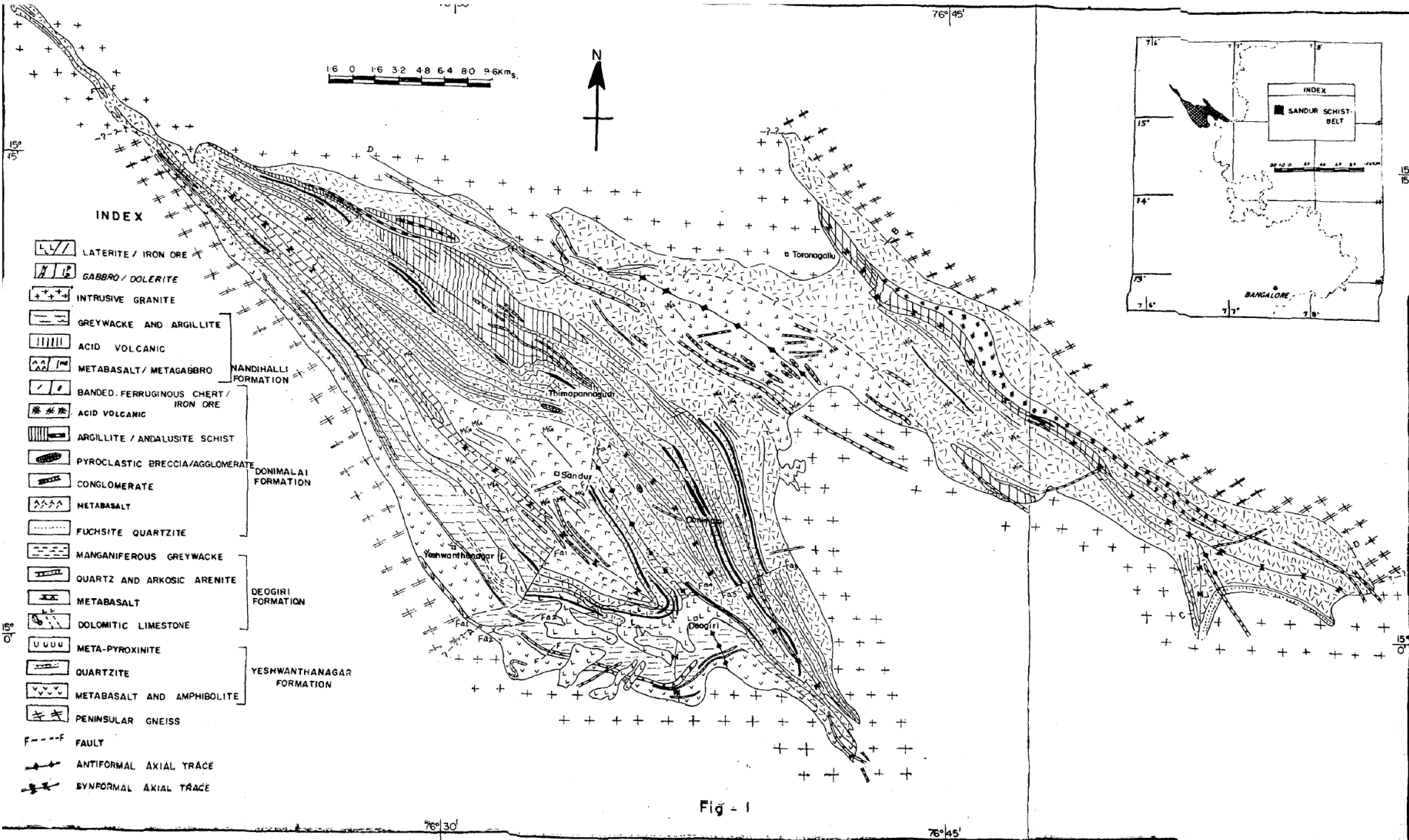


Figure 1. Geological map of the Sandur schist belt. Inset: Location map of the schist belt.

- The belt comprises an **elliptical amphitheater of elongated hills** with two prominent ranges viz.
- The **Eastern Copper Mountain** and
- the **Western Sandur Belt** and
- form continuous hill ranges with elevation between 900m to 1050m above msl and are composed of hard and resistant rocks, comprising BIF, iron ore, metavolcanics and less of metasediments.
- Lower altitudes and valleys are occupied mainly by softer metavolcanics and metasediments.

- BIF bands are narrow, discontinuous and numerous , showing sharp contact with other rocks. **BIF is represented mainly by BHQ, BMQ** with hematite and rarely by BHJ and banded-magnetite- grunerite quartzite.
- Hematite iron ore with variable grade are confined to the hill ranges, capping the bands of BIF. **Ore bodies are discontinuous** and tabular or lensoid in shape.
- **At depth**, iron ore bodies generally **transgress to BIF**. Ore bodies are classified into hard, soft and laminated and powdery types, based on physical nature and lump recovery factor.
- In general, **hard ore on the top** gradually passes downward to soft ore and ultimately to powdery ore. Lateral variation of ore types is also common, without any downward change of physical nature.

- 1) Copper Mountain range
 - Halkundi
 - Belagal
 - Vibhutigudda
 - Hargandona
- 2) Ettinhatti range
 - Ubbalagandi
 - Rajapuram
 - Konanharavu
- 3) Thimmapangudi range
- 4) NEB range
 - Bharatarayanharavu (Dalmia property)
 - Gogga property
 - Ingligi
 - Jambunathanhalli
 - Sankalapuram
- 5) Ramandurg range
 - Vyasankere
 - Ramandurg
- 6) Donimalai range
- 7) Devadari range
- 8) Kumaraswamy range

Among these, Donimalai, Devadari, Kumaraswamy and Ramandurga ranges have rich ore deposits.

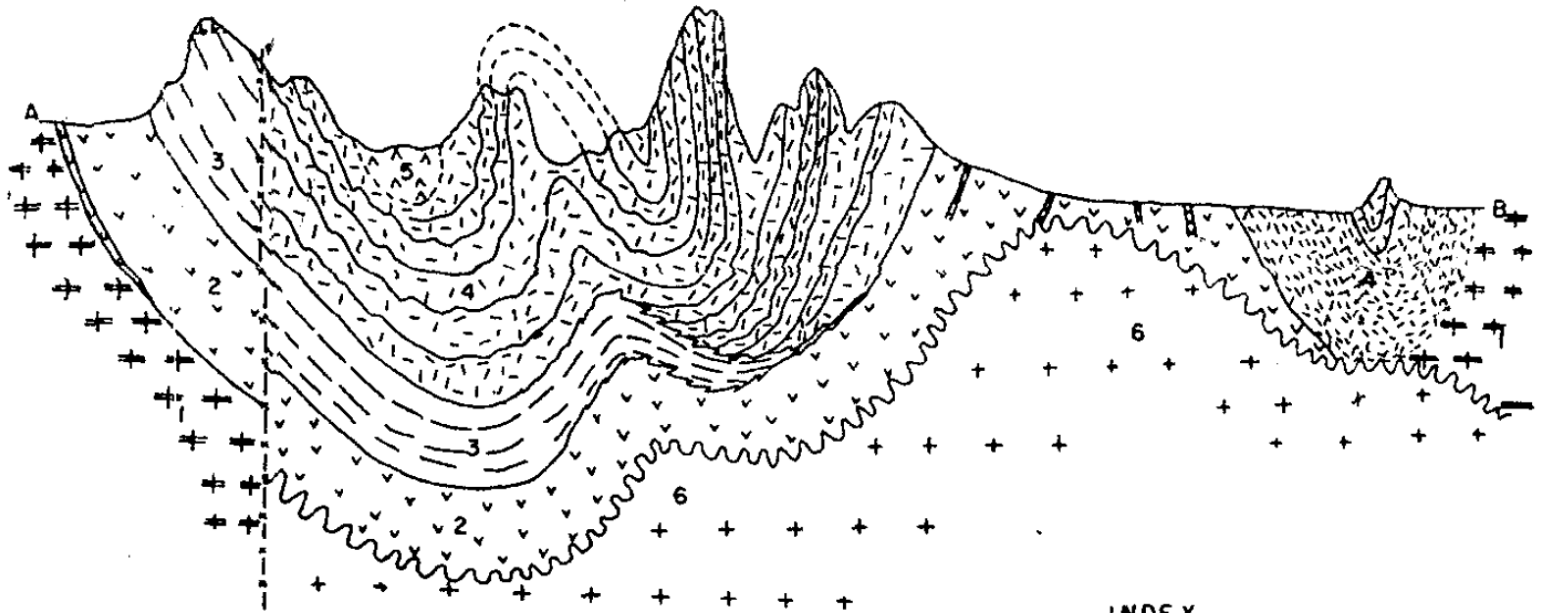


Fig - 4a

INDEX

- | | | |
|---|----------------|---------------------------|
| 6 | +++ | INTRUSIVE GRANITE |
| 5 | AAA | NANDIHALLI FORMATION |
| 4 | Diagonal lines | DONIMALAI FORMATION |
| 3 | Wavy lines | DEOGIRI FORMATION |
| 2 | Inverted V's | YESHWANTHANAGAR FORMATION |
| 1 | ++ | PENINSULAR GNEISS |

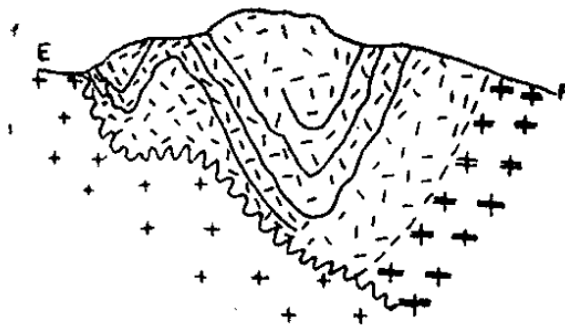


Fig - 4b

Figure 4. Interpretative geological sections—vertical scale exaggerated.
(a) Section across the schist belt (AB).
(b) Section across the southern part of copper mountain range (EF).

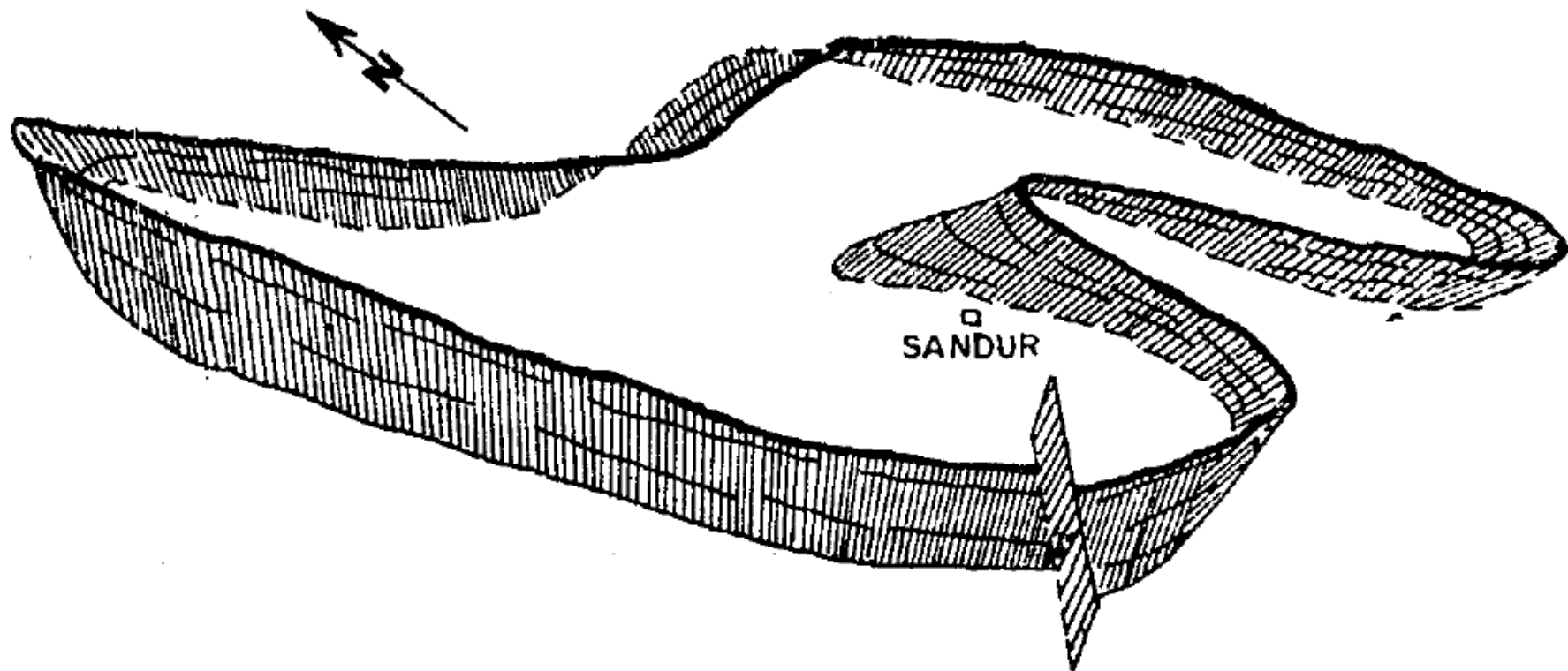
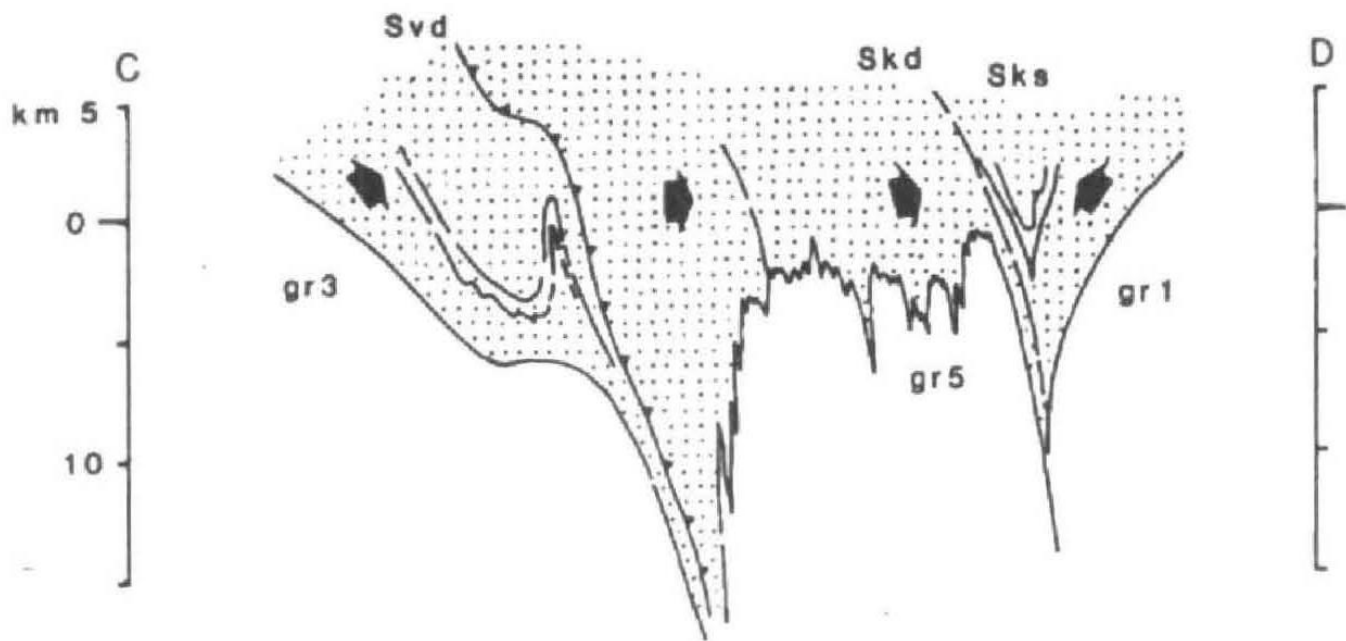


Figure 4 (c). Schematic three-dimensional representation of the Sandur basin structure.

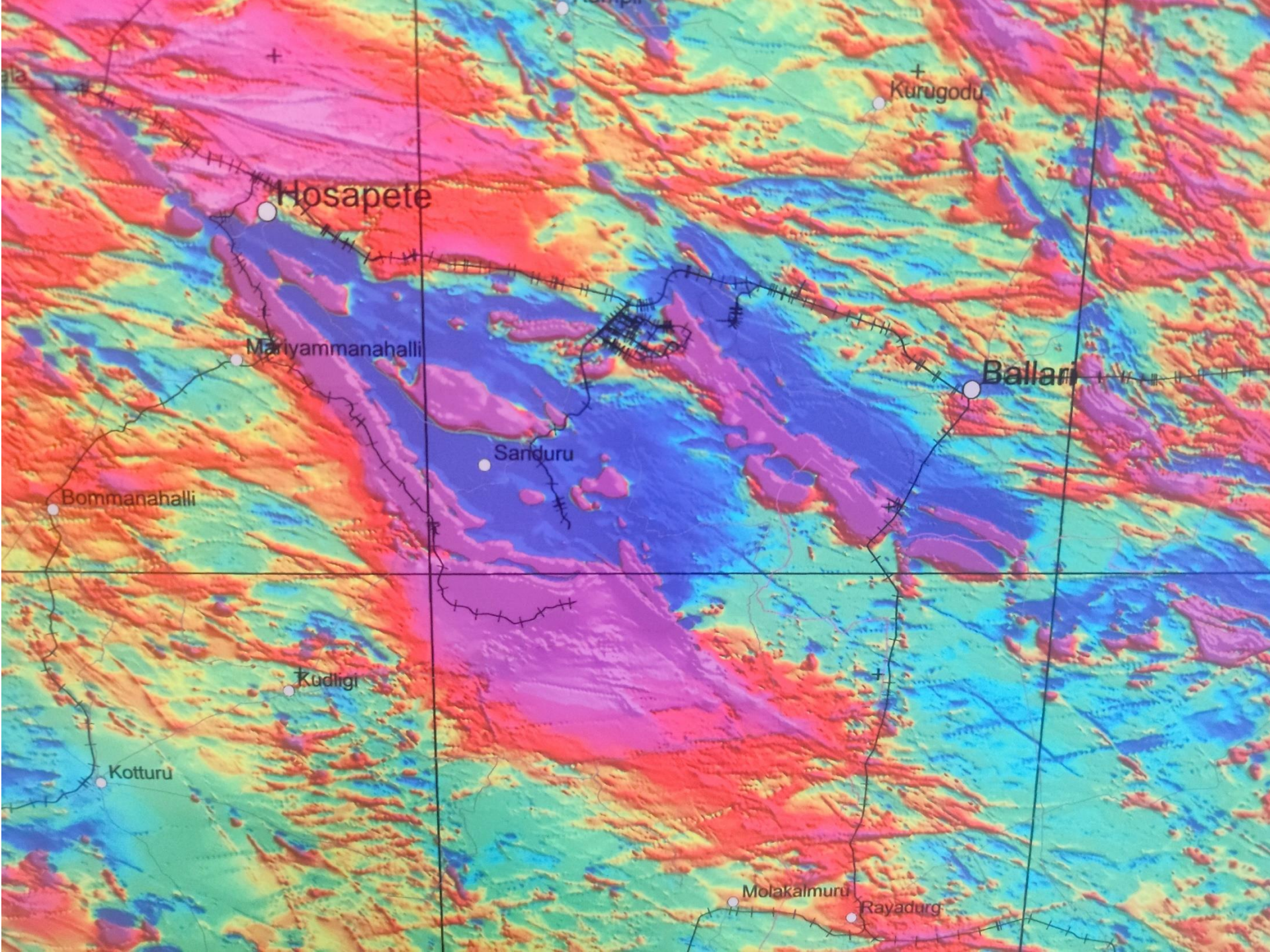
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Hosapete

Kurugodu

Mariyamanahalli

Ballari

Sanduru

Bommanahalli

Kudligi

Kotturu

Molakalmuru

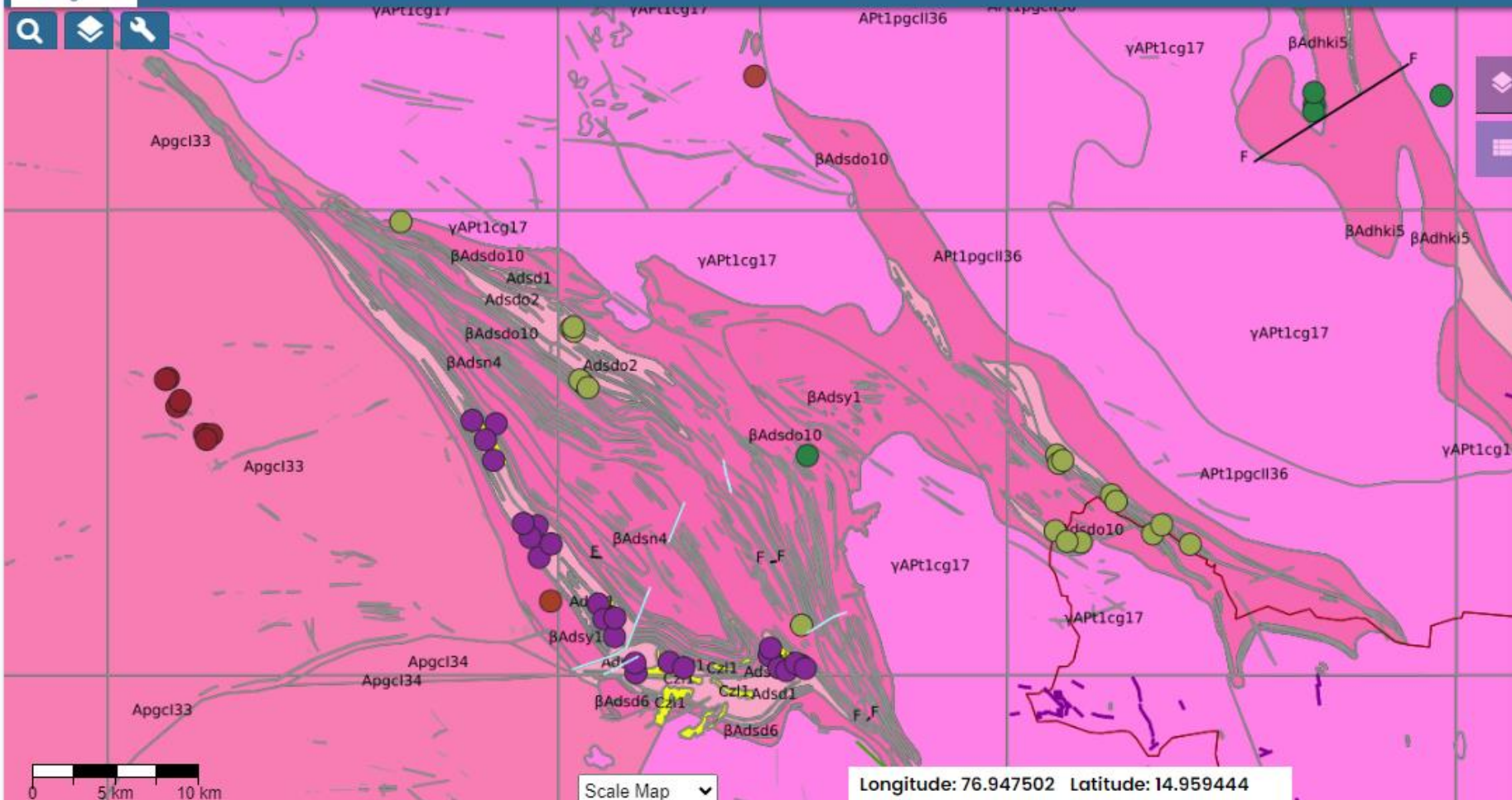
Rayadurg



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National Geoscience Data Repository





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