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Research Article

Geochemical characterisation of Palk Bay seabed sediments: An appraisal on source-sink dynamics and provenance

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Palk Bay is located between the southeast coast of India and Sri Lanka. The seabed sediment in Palk Bay has varied origins and influences, both from oceanic currents and from riverine input from the hinterland. The proxy of the geochemical study of seabed sediment in the Palk Bay is considered to constrain the intensity of weathering on hinterland source rocks and their transportation from the source. The weathering index calculations carried out on the Palk Bay sediments imply a higher Chemical Alteration Index (CIA) (Average = 73), indicating moderate to intense source-area weathering. A high Average Composition Variability Index (ICV) (Average = 1.32) exhibited by the Palk Bay seabed sediments indicates them to be derived from a nearby source by the first cycle of denudation. According to Ce *vs.* La/Yb and Hf *vs.* La/Th plots, these sediments fall within the felsic domain. The high K_2O/Na_2O ratios (Average = 1.09) and LREE/HREE ratios (Average = 15.72) shown by these samples, in addition to the exhibition of normalised REE patterns with LREE enrichment and negative Eu anomaly, evidently imply that these sediments were primarily derived from Charnockites of Madurai Block and were transported by the ephemeral streams such as Vellar, Koluvan, Pambar, Kottakkarai and Uppar flowing through the Madurai Block of Southern Granulite Terrain.

[**Keywords**: CIA, Geochemistry, ICV, India, Madurai Block, Palk Bay]

Introduction

Palk Bay is a partially closed, shallow water body lying between the Indian subcontinent and Sri Lanka, which acts as an interface between the Bay of Bengal and the Indian Ocean. During the southwest monsoon, the oceanic current from the Indian Ocean flows from the Gulf of Mannar into Palk Bay across Adam's bridge shoal, which reverses and flows from the Bay of Bengal into the Gulf of Mannar during the northeast monsoon. Limited longshore currents carrying sediment enter Palk Bay in either direction and deposit it on the seafloor. Several rivers including the Vellar, Koluvan, Pambar, Kottakkarai, and Uppar discharge substantial sediment loads directly into Palk Bay. Consequently, the seabed sediments in the bay reflect a dual origin, shaped by both open-ocean hydrodynamic exchange and terrigenous input from the surrounding hinterland. Understanding where these sediments originate and how they accumulate requires a detailed provenance assessment. Compounding this complexity, Palk Bay functions as a highly turbid, marginal marine system where the interplay between river discharges and coastal processes determine sediment transport, sorting, and deposition.

Geochemical investigations of sediments in the Palk Bay are therefore essential to understand its unique sedimentary environment and multiple sediment sources. Bulk-sediment geochemical analysis serves as a powerful proxy, offering key insights into source-area composition, chemical weathering intensity, and sediment maturity[1,2,3]. However, tracing detrital provenance is rarely straightforward, as the primary signal is often modified by complex interactions between weathering history, climate, and diagenetic processes[4]. In these contexts, trace elements and Rare Earth Elements (REE) that resist erosion and weathering during transportation and deposition can help preserve the provenance signature[5]. The immobility of REEs makes their patterns particularly useful for studying depositional processes, identifying provenance, and understanding paleoenvironmental changes[6-8]. Furthermore, geochemistry is a powerful approach for discerning the provenance of clastic deposits[9,10]. Research on the continental shelf off the east coast of India has been more comprehensive, including studies near Visakhapatnam and the Godavari River[11]. However, Palk Bay presents a unique sedimentary environment characterised by high turbidity and lower salinity, similar to the Bay of Bengal[12]. Despite its high sediment load, Palk Bay is less productive than the Arabian Sea and remains one of the least studied marine environments in the northern Indian Ocean[13]. There are few studies on the increasing siltation from heavy sediment influx which may eventually transform the Palk Bay into a lagoon[14]. Vasudevan *et al.*[15] analysed the clay minerals in Palk Bay sediments, drawing conclusions on the depositional and energy conditions of marine sediments. Unlike the deeper regions of the Bay of Bengal, which have received more attention[16], the geochemistry of Palk Bay sediments remains relatively understudied. Studies on the intensity of weathering, the provenance, and depositional environment of Palk Bay sediments remain unaddressed.

A comprehensive understanding of these geochemical signatures is essential for establishing a robust source-to-sink framework in this complex coastal setting. Beyond local provenance, this study provides critical data for coastal evolution models and sediment transport simulations in high-turbidity marginal marine environments. Such systems are vital for paleoenvironmental reconstruction, as the geochemical signatures of their sediments act as high-resolution archives of continental weathering intensity and monsoonal variations. Beyond its geological significance, this geochemical characterisation provides an essential foundation for marine resource assessment and sustainable coastal management especially in shallow zones vulnerable to rapid siltation. Yet, despite Palk Bay's clear ecological and environmental importance, integrated studies examining both chemical weathering trends and sediment provenance remain sparse. Establishing a comprehensive source-to-sink framework for this intricate coastal setting is vital for resolving how terrigenous signals are preserved in marginal marine sinks. To address these critical gaps, this study systematically evaluates the seabed sediments of Palk Bay with the following objectives:

1. To quantify the intensity of chemical weathering across hinterland source areas using established geochemical proxies and indices.

2. To constrain the lithological provenance and delineate the source-to-sink transport pathways.

This paper provides the first detailed account of the geochemical characterisation of Palk Bay seabed sediments, contributing to a broader understanding of sediment dynamics in high-turbidity coastal systems.

Geological setting

The Palk Bay, located between India's southern coast and Sri Lanka's Jafna Peninsula, is separated from the Gulf of Mannar by the Mandapam foreland, Rameswaram Island and Adam's Bridge. It connects to the Bay of Bengal via the Palk Strait[17]. The coastal region of Palk Bay from Ammapatnam to Rameswaram is described as an accretionary prism[18]. Together with the Palk Strait, it forms the Sethusamudram, a shallow basin averaging 5 meters in depth and spanning 17,000 km^2[ref. 13]. Palk Bay becomes turbid during the southwest and northeast monsoons due to sediment resuspension[19]. However, it remains generally calm due to protection from the Palk Strait and Adam's Bridge[20]. Wave data and sediment transport models indicate that an average of 98,000 m^3 of sediments enter Palk Bay from the north[21]. The sediments in Palk Bay are influenced by contributions from small rivers draining from both the Sri Lankan and Indian coasts, as well as longshore currents transporting sediments from the Bay of Bengal and the Gulf of Mannar[20]. However, Palk Bay waters exhibit characteristics similar to those of the Bay of Bengal, such as lower salinity and higher turbidity[12].

Materials and Methods

Collection and preparation of samples

The bathymetry data covering 110 line kilometres was collected using Raytheon 50 kHz and 200 kHz echosounders. The data was gathered at 5 km intervals along 37 coast-perpendicular transects (NE-SW) and 5 coast-parallel transects (NW-SE). The findings indicate that the contours of the seabed conformable with the present-day coastline exhibit a southeastward slope (Fig. 1). Surface sediment samples were collected at water depths ranging from 3 meters to 14 meters during various cruises mounted onboard R.V. Samudra Kaustubh by the Geological Survey of India. To ensure homogeneity and reliability in the chemical analysis, the coning-and-quartering methodology was applied to the samples. The samples were then dried at 60 °C in an oven to remove moisture content.

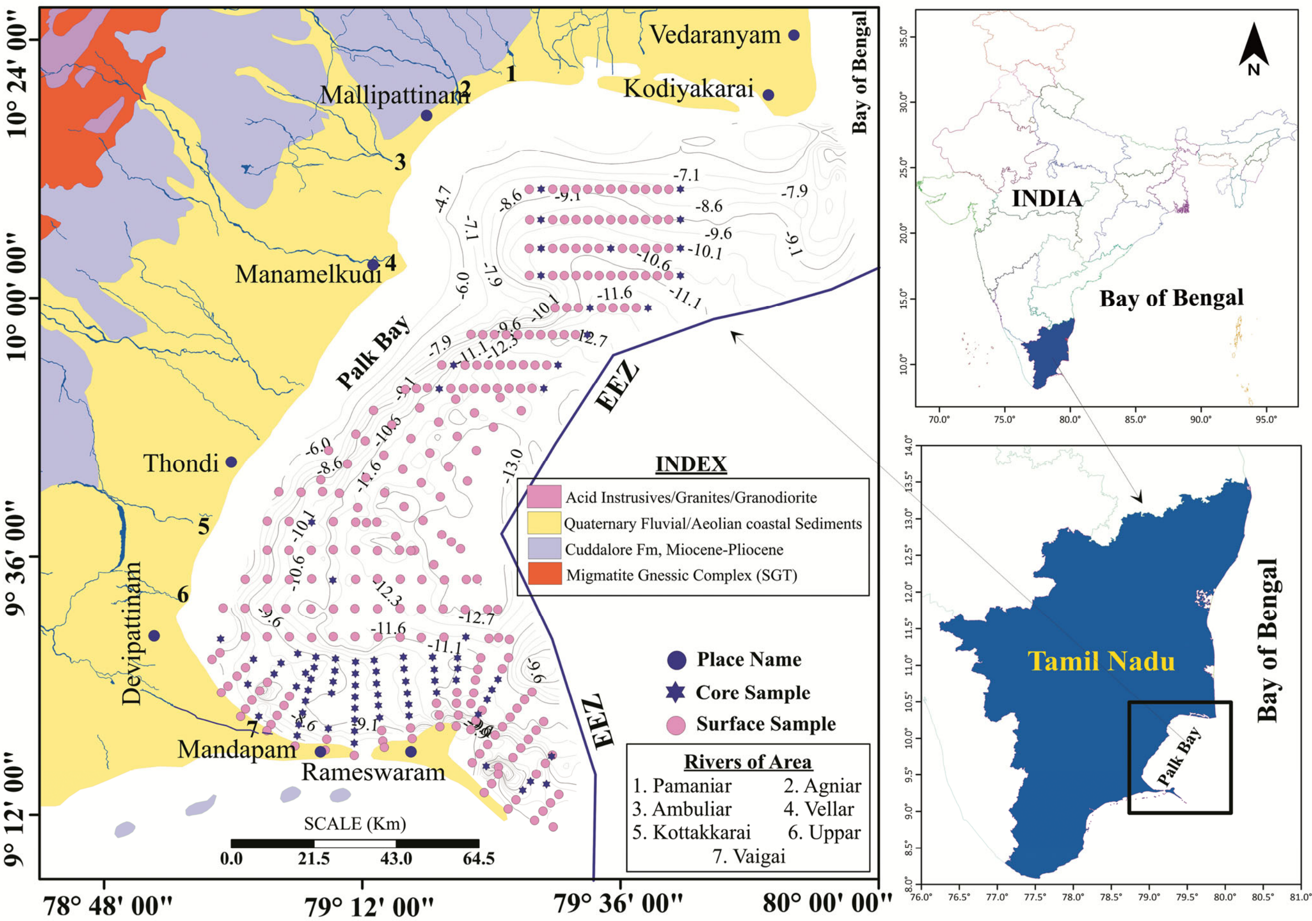

Fig. 1 — Bathymetry map of the Palk Bay study area including sampling stations. Contours illustrate the SE-dipping seabed morphology conformable with the modern coastline

Geochemical analysis

132 sediment samples were desalinated using distilled water, then dried and powdered in an agate mortar. These powdered samples (0.10 g each) were treated with aqua regia in polypropylene bottles, followed by hydrofluoric acid (HF) to remove silicates. The solutions were left to stand overnight at room temperature, then heated in a water bath. After cooling, boric acid was added to the hydrofluoric acid solutions, and the mixtures were diluted with distilled water. Major oxide concentrations were measured using a Varian AA240FS Atomic Absorption Spectrometer (AAS) at the Chemical Laboratory of Geological Survey of India (GSI), Mangalore, India, with an analytical precision better than 5 %.

The concentrations of Rare Earth Elements (REE) in representative sediment samples were analysed using an Agilent 7800 ICP-MS at the Chemical Laboratory of GSI, Vishakhapatnam, India. Analytical precision, based on the analysis of GSD-8 (a certified reference material), was better than 2 %. Approximately 10 mg of powdered heavy mineral samples were digested using a mixture of HF, HCl, and HNO_3 acids. The resulting solutions were diluted to 100 ml with 2 % HNO_3 and analysed[22]. To monitor instrument drift, 10 ppb solutions of Be, In, and Cs were used as internal standards.

Results

Major oxides and trace elements

The geochemical data reveal systematic variations in elemental concentrations and spatial distribution patterns across the study area. Major oxide (SiO_2, Al_2O_3, CaO, Fe_2O_3, MgO, Na_2O, K_2O, TiO_2, and MnO) and trace elemental (Ba, Cr, Pb, Zn, Sr, Ni, Co, Cu, and Cd) concentrations in all the samples were analysed (Table S1). Table 1 summarises the statistical results, *i.e.*, the minimum, maximum and average values of major oxides and trace elements in the surface sediments of the Palk Bay, and their

Table 1 — Major oxide composition (wt.%), calculated ratios, CIA, and ICV in comparison with the UCC values after Taylor & McLennan[6] and McLennan *et al*.[3] for the sediments from the Palk Bay

Major oxide	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	Na_2O	K_2O	CaO	MgO	MnO	Cu	Pb	Zn	Ni	Co	Cd	Cr	Sr	Ba	CIA	ICV	SiO_2/Al_2O_3	K_2O/Al_2O_3	K_2O/Na_2O	MgO/Al_2O_3	SiO_2/TiO_2	Fe_2O_3/K_2O
	wt %									ppm																
Minimum	29.5	2.1	0.7	0.1	0.3	0.4	0.4	0.6	0	5	5	4	7	6	4	38	16.5	55	38.6	0.8	2.27	0.07	0.29	0.08	44.3	1.35
Maximum	86.5	18	10.3	1.2	5.9	2.7	26.2	8.5	0.1	156	235	131	105	157	27	1221	350	1426	87.9	2	33.3	0.34	3.87	1.06	1729	6.17
Average	52.8	9.2	5	0.3	1.6	1.2	5.6	3.6	0	36.5	79.7	68	53	35	10	449	58	752	73	1.32	7.16	0.14	1.09	0.39	344	4.09
UCC	66	15.2	4.5	0.15	3.9	3.4	4.2	2.2	0.1	25	17	71	44	17	0	85	350	550	58	1.2	34.1	4.34	0.22	0.14	132	1.3

*CIA (%) = $[Al_2O_3/(Al_2O_3 + CaO^* + Na_2O + K_2O)] \times 100$ (ref. 26); ICV = $(Fe_2O_3 + K_2O + Na_2O + CaO + MgO + TiO_2)/Al_2O_3$ (ref. 32)

comparison with the Upper Continental Crust (UCC)[3,6]. SiO_2 is the dominant oxide, with a concentration ranging from 29.5 to 86.5 wt% and an average of 52.8 wt%. The concentration of Al_2O_3 varied from 2.1 to 18.0 wt% with an average of 9.2 wt%, whereas the concentration of Fe_2O_3 ranged from 0.7 to 10.3 wt% with an average of 5.0 wt%. Na_2O, MgO, and K_2O indicated an average concentration of 1.6 wt%, 3.6 wt% and 1.2 wt%, respectively. TiO_2 and MnO indicated a concentration of less than 1 wt%. The average CaO concentration (5.6 wt%) in the samples is high. Among the trace elements, Ba and Cr exhibit higher concentrations, ranging from 55 ppm to 1426 ppm (Average = 752 ppm) and 38 ppm to 1221 ppm (Average = 449 ppm), respectively. The average concentration of Cu (36.5 ppm), Pb (79.7 ppm), Zn (68 ppm), Ni (53 ppm), Co (35 ppm), Cd (10 ppm) and Sr (58 ppm) is recorded. Overall, the order of concentration of major oxides followed a trend as $SiO_2 > Al_2O_3 > CaO > Fe_2O_3 > MgO > Na_2O > K_2O > TiO_2 > MnO$, whereas, in the case of trace elements, the order of concentration is observed as Ba > Cr > Pb > Zn > Sr > Ni > Co > Cu > Cd. Compared with the average UCC, the average values of Al_2O_3, Na_2O, K_2O, MnO, SiO_2, Zn, and Sr are lower, while those of Fe_2O_3, TiO_2, CaO, MgO, Cu, Pb, Ni, Co, Cd, Cr, and Ba are higher.

An analysis of the spatial distribution of both major oxides and trace elements revealed both correlative and disparate patterns (Figs. 2 & 3). SiO_2 show higher values in the sandy sediments near the coast (Fig. 2a), while Al_2O_3 (Fig. 2b), Fe_2O_3 (Fig. 2c), TiO_2 (Fig. 2d), K_2O (Fig. 2f), and MgO (Fig. 2h) show high concentrations in the silt sediments. CaO (Fig. 2g) and Pb (Fig. 3b) read higher concentration in the southern part of the area as compared to the northern part, while Cu (Fig. 3a) and Sr (Fig. 3h) exhibit higher concentration in the northern part of the area as compared to the southern part. Other elements do not show any correlation in their distribution.

Elemental ratios and weathering indices

In the sediments, values of ICV (Initial Calibration Verification) vary between 0.8 and 2.0 (Average = 1.32); while the Chemical Alteration Index (CIA) ranges between 38.6 and 87.9 (Average = 73) (Table 1). Low SiO_2/Al_2O_3 (ranging from 2.27 to 33.3 with an average of 7.16) and K_2O/Al_2O_3 (ranging from 0.07 to 0.34 with an average of 0.14) ratio values as compared to the UCC (Upper Continental Crust) indicate low textural maturity. The average K_2O/Na_2O (ranging from 0.29 to 3.87 with an average of 1.09), MgO/ Al_2O_3 (from 0.08 to 1.06 with an average of 0.39), SiO_2/TiO_2 (from 44.3 to 1729 with an average of 344), and Fe_2O_3/ K_2O (from 1.35 to 6.17 with an average of 4.09) ratios are higher as compared to the UCC (Table 1). Using Herron's[23] major element-based provenance predicting diagram indicate the source of are lith-arenite, sublitharenite, Fe-Sandstone and Fe-shale litho units (Fig. 4).

Rare Earth Elements (REE)

Concentration of Rare Earth Elements (REE) in comparison with UCC concentration[6,24] is shown in Table S2. Table 2 implies that Cerium (Ce) is the most abundant REE, which is followed by La, Nd, Pr, Gd, Sm, Dy, Yb, Er, Eu, Ho, Tb, Tm, and Lu in order of abundance over UCC values. In the samples, ∑REE concentrations range between 61.9 and 385 ppm (Average = 158 ppm). Comparatively, light REEs (LREEs) (Average = 158 ppm) contribute much more to REE content than heavy REEs (HREEs) (10.4 ppm). The chondrite normalised REE distribution also shows an increased concentration of LREEs than HREEs with prominent negative Eu anomalies (Fig. 5). The average Eu/Eu* ratio is 15.6, while the average Ce/Ce* ratio is 0.92.

Discussion

Weathering of the source area

In sedimentary geochemistry, indices such as the Chemical Index of Alteration (CIA) and the Index of

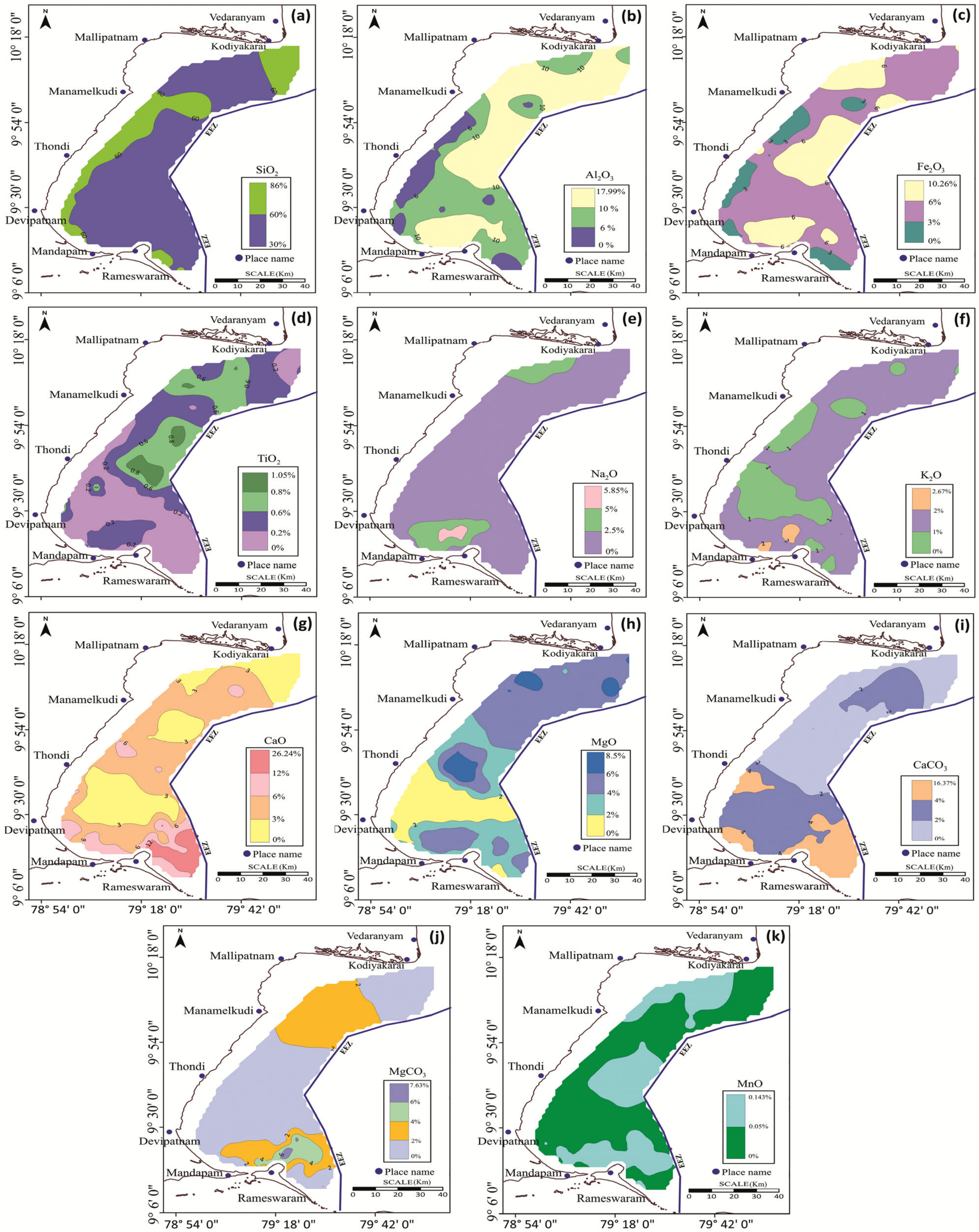

Fig. 2 — Spatial distribution of major oxides (wt%) in Palk Bay seabed sediments

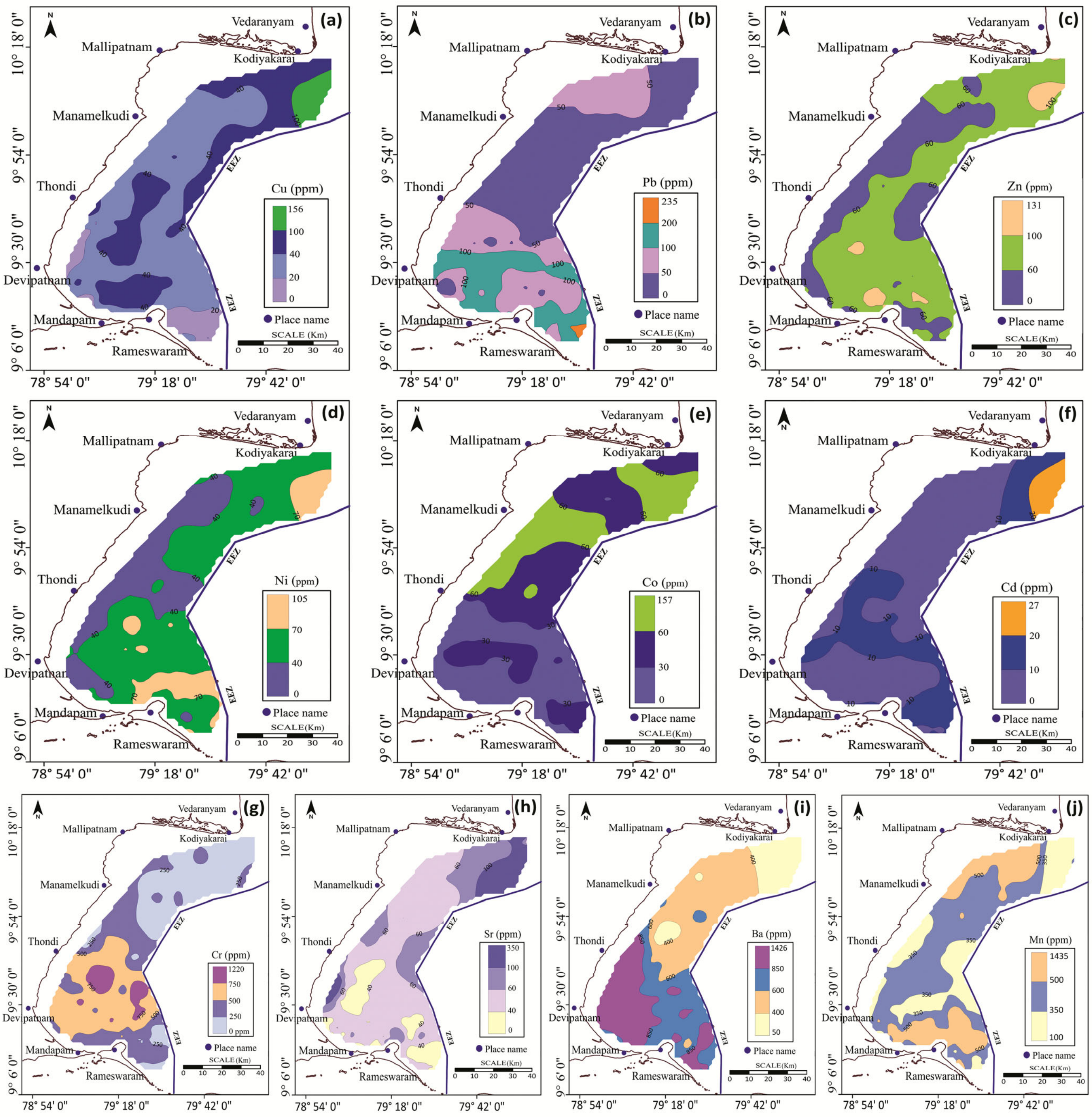

Fig. 3 — Spatial distribution of trace elements (ppm) showing geochemical dispersion patterns in the seabed sediments of Palk Bay

Compositional Variability (ICV) are powerful tools for gauging the extent of weathering in source regions. CIA values tracks progressive leaching of mobile alkali and alkaline earth cations (Ca, Na, K) relative to immobile cations in sediments during weathering processes[25,26]. In the study area, CIA values consistently surpass 50 (Average = 73), indicating a moderate to significant degree of chemical weathering in the source area[27,28]. CIA metrics exceeding 70 typically signal pronounced chemical alteration driven by sustained tropical rainfall and humid conditions that accelerate silicate dissolution.

To trace this weathering pathway graphically, the sample compositions were plotted on the A–CN–K ternary plot (Al_2O_3 - CaO^* + Na_2O - K_2O) (Fig. 6).

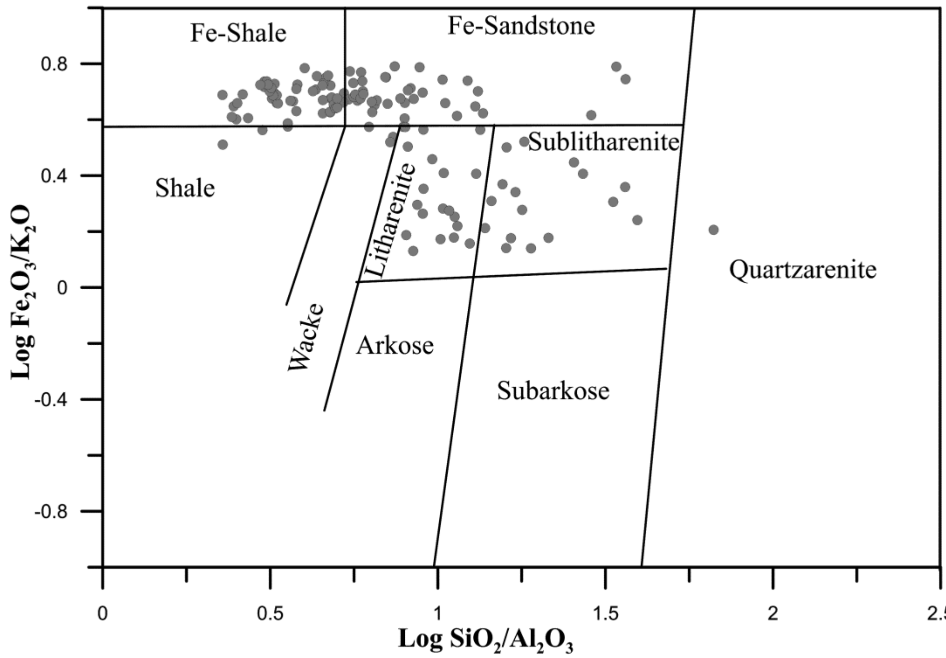

Fig. 4 — Herron's (1988)[(ref. 23)] geochemical discriminant plot for provenance prediction. The data points predominantly cluster in the lith-arenite and Fe-shale fields, reflecting the siliciclastic nature of the basin

Table 2 — Analytical results of REE and other trace element content (ppm) in the Palk Bay seabed sediment

Elements	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	ΣREE	LREE	HREE	LREE/ HREE	Eu/Eu*	Ce/Ce*
Minimum	14	28	2.57	10.1	1.71	0.49	2	0.21	1.24	0.22	0.65	0.11	0.66	0.1	61.9	58.7	3.24	3.98	5.58	0.67
Maximum	74	126	15.8	62.1	11.5	2.62	17	2.63	22.1	5.61	18.8	3.38	21.2	3.42	385	308	77.3	21.99	54.1	1.31
Average	35	66	7.39	28.5	4.9	1.26	5	0.65	3.81	0.75	2.21	0.4	2.22	0.39	158	148	10.4	15.72	15.6	0.92
UCC	**30**	**64**	**7.1**	**26**	**4.5**	**0.88**	**4**	**0.64**	**3.5**	**0.8**	**2.3**	**0.33**	**2.2**	**0.32**	**-**	**-**	**-**	**-**	**-**	**-**

The plot of geochemical characteristics of sediments in the investigation area lies above the feldspar weathering trendline, showing a shift towards the A-pole, which corresponds to alumina, indicating a high degree of potassium depletion relative to calcium and sodium. This vector highlights preferential leaching of mobile sodium and calcium alongside relative potassium depletion. Such trajectories are characteristic of detritus derived from felsic parent materials, predominantly granitic rocks, that underwent steady-state weathering under stable, long-term climatic conditions[29,30, 31].

Complementing these alteration indices, Index of Compositional Variability (ICV) evaluates mineralogical maturity by comparing non-alkali earth oxides against total alumina content. High ICV values (> 0.84; Table 1) often indicate the presence of first-cycle minerals like feldspars, suggesting limited alteration and transportation from the source to deposition. Baseline thresholds above 0.84 denote immature, first-cycle sediment enriched in labile minerals like feldspars and amphiboles, pointing to limited transport distances or rapid physical weathering[32,33]. The seabed samples yield mean ICV values greater than 0.84, confirming that despite significant chemical weathering, the sediment retains a substantial primary mineral component consistent with proximate, local hinterland sources. Crucially, co-evaluating these metrics via a CIA–ICV bivariate plot (Fig. 7) reveals a tight cluster devoid of major compositional dispersion. This coherent distribution confirms a steady weathering regime at the source and rules out significant secondary diagenetic modification, ensuring that the geochemical signature reliably reflects source-rock characteristics.

Provenance of the sediments

The Ce versus La/Yb and Hf versus La/Th plots show the sediments fall in the felsic domain (Fig. 8). Further, high CIA values and substantial ICV

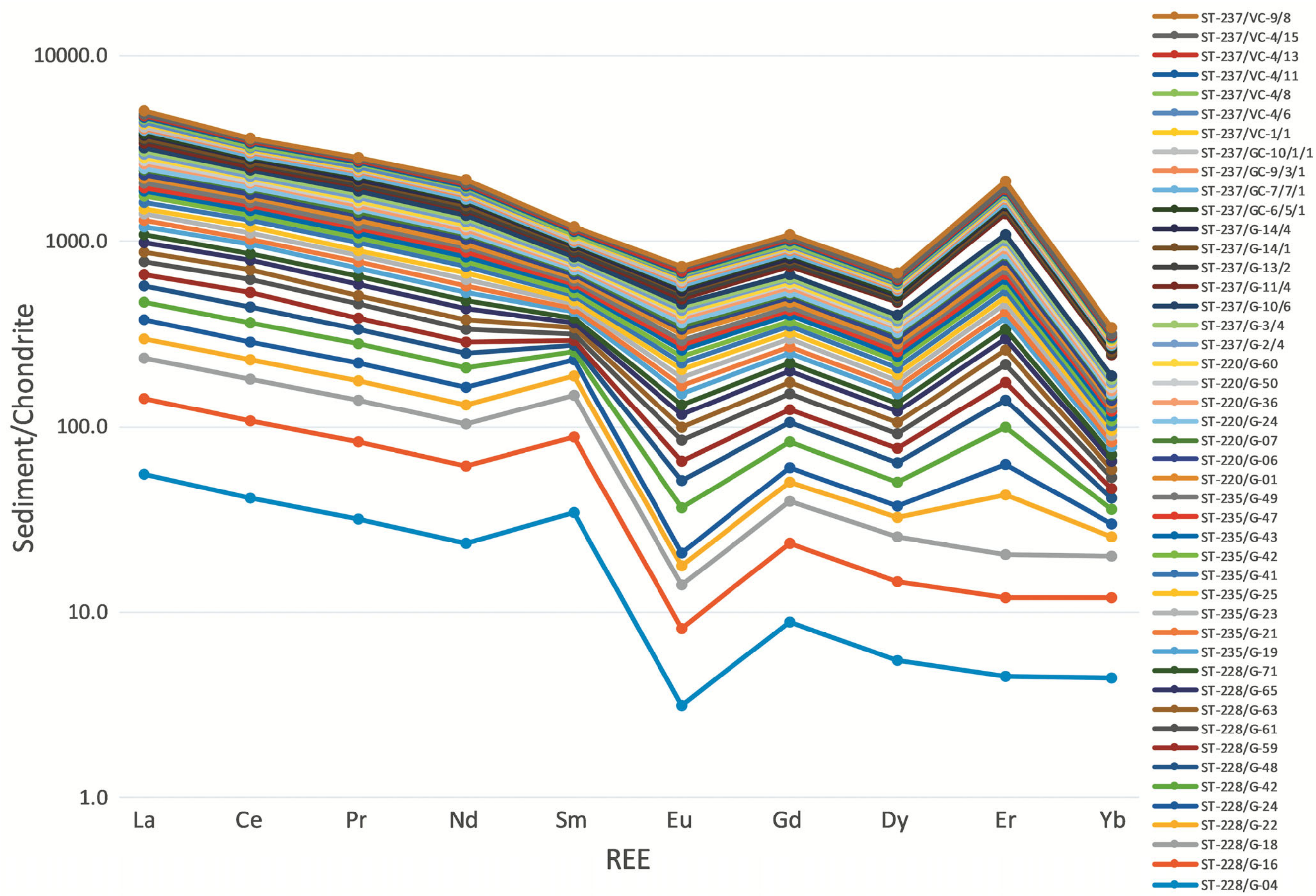

Fig. 5 — REE distribution patterns normalised to Chondrite values (McDonough & Sun, 1995[ref. 45]). Note: A consistent LREE enrichment and the negative Europium (Eu) anomaly exhibited by all bulk sediment samples

readings underscore the geochemical stability of the sediments, revealing a primary source dominated by felsic rocks under sustained weathering conditions. These findings align with previous studies that interpret similar CIA-ICV patterns as indicative of a largely unaltered, felsic-dominated source region in active weathering environments[25,27,29]. This weathering model points to the fact that the granitic terrain of the Madurai Block is a probable source, whose geomorphological stability ensures the regular deposition of chemically stable sediments in the Palk Bay region. Cullers *et al*.[34] reported that the LREE/HREE ratio is high in felsic igneous rocks in comparison to mafic igneous rocks.

In the present study, the LREE/HREE ratios of sediment samples are high (average = 15.72), indicating a felsic source rocks. Normalised REE patterns also reveal LREE enrichment with an Eu-negative anomaly in most studied sediments (Fig. 5), and it has been shown that granites and granodiorites are depleted in Eu due to its inclusion in the plagioclase feldspar lattice and subsequent removal from the melt before crystallisation. Taylor & Mclennan[6] demonstrated that granitic and granodioritic rocks commonly exhibit Eu depletion due to Eu's affinity for plagioclase feldspar, which is removed from the melt before crystallisation.

Ghosal *et al*.[35] further attribute the negative Eu anomaly in beach sediments along the Odisha coast to the felsic rocks of the Eastern Ghat Mobile Belt. Similarly, the Chhatrapur monazite placers of Odisha, studied by Mohanty *et al*.[36], reveal comparable Eu anomalies, underscoring a felsic origin for these offshore sediments. The collective evidence from multiple studies strongly suggests that the negative Eu anomaly observed in the studied offshore sediments reveals its provenance from felsic source rocks.

The clay mineralogical composition and REE geochemistry of shelf sediments in the study area indicate a provenance from the weathering of

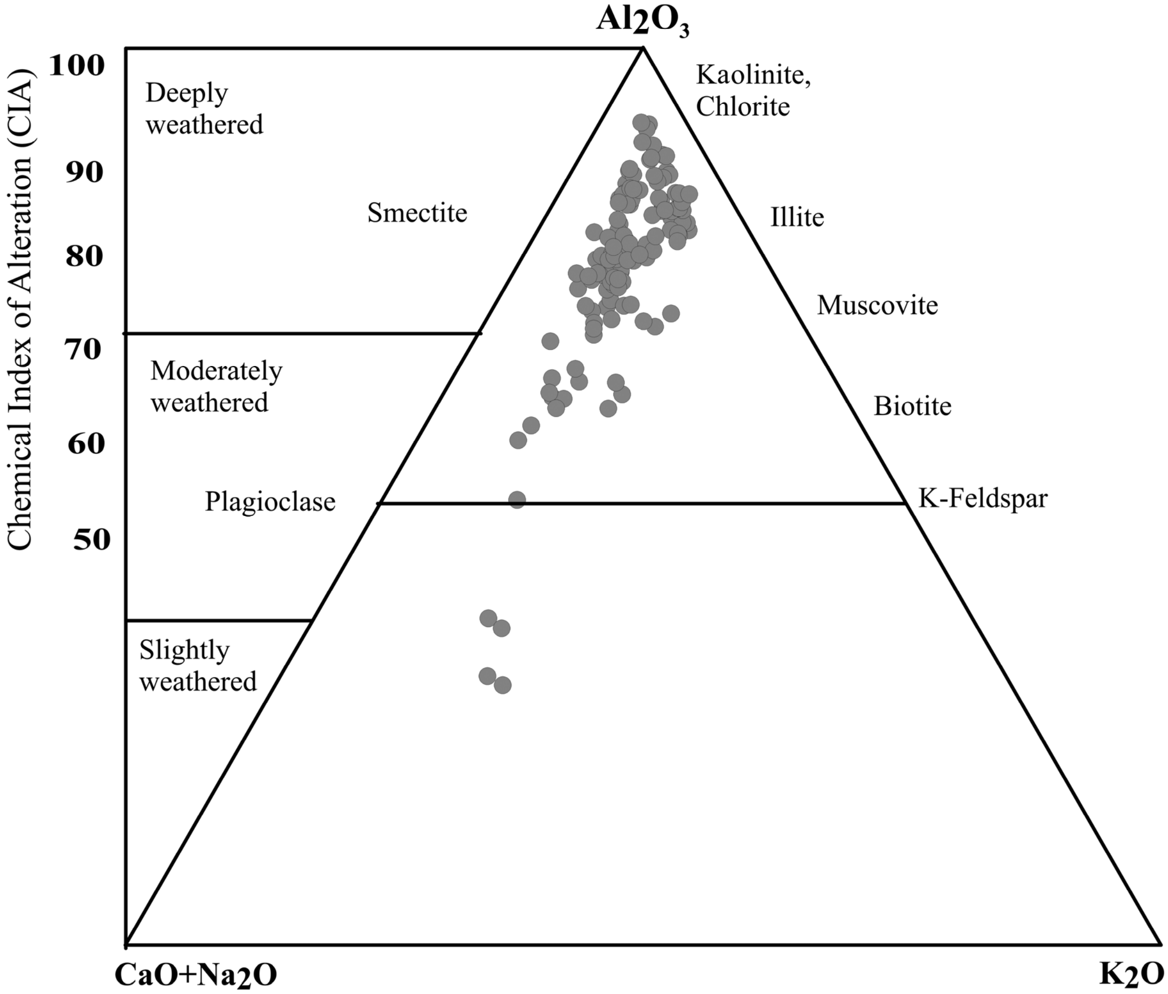

Fig. 6 — A-CN-K ternary diagram (Al_2O_3 – CaO* + Na_2O – K_2O) showing the weathering pathway of Palk Bay sediments. The shift of the sample distribution from the feldspar join toward the A-apex specifies significant potassium depletion

Precambrian gneissic rocks in southern India, specifically the Madurai Block[37,38]. The lithology of this block includes magmatic protoliths chiefly alkali granites, charnockites, enderbites, and younger intrusive units characterised by orthopyroxene and K-feldspar-bearing assemblages, as well as intermediate enderbitic variants[39-41]. Particularly charnockites and enderbites of the Madurai Block might have acted as a major sediment source in the hinterland.

The study area encompasses a diverse mosaic of landforms, including sand dunes, ridges, mudflats, shoals, and sand spits. These coastal sinks receive terrigenous detritus primarily via ephemeral drainage networks, including the Pamaniar, Agniar, Ambuliar, Vellar, Kottakkarai, Uppar, and Vaigai rivers. High K_2O/Na_2O ratios across the seabed sediments closely match the geochemical signatures of charnockite massifs exposed across southern India[42].

Chondrite-normalized rare earth element (REE) spectra further constrain these source linkages. The sediments exhibit pronounced light REE (LREE) enrichment relative to heavy REEs (HREE), coupled with well-defined negative Eu anomalies. These signatures mirror the geochemical profiles of felsic basement rocks within the Madurai Block specifically granites and khondalites which characteristically feature elevated LREE abundances, flat HREE patterns, and negative Eu anomalies[43,44]. This strong alignment in REE fractionation and Eu depletion, combined with the alignment of regional drainage systems, confirms that the seabed detritus is predominantly derived from felsic charnockites and

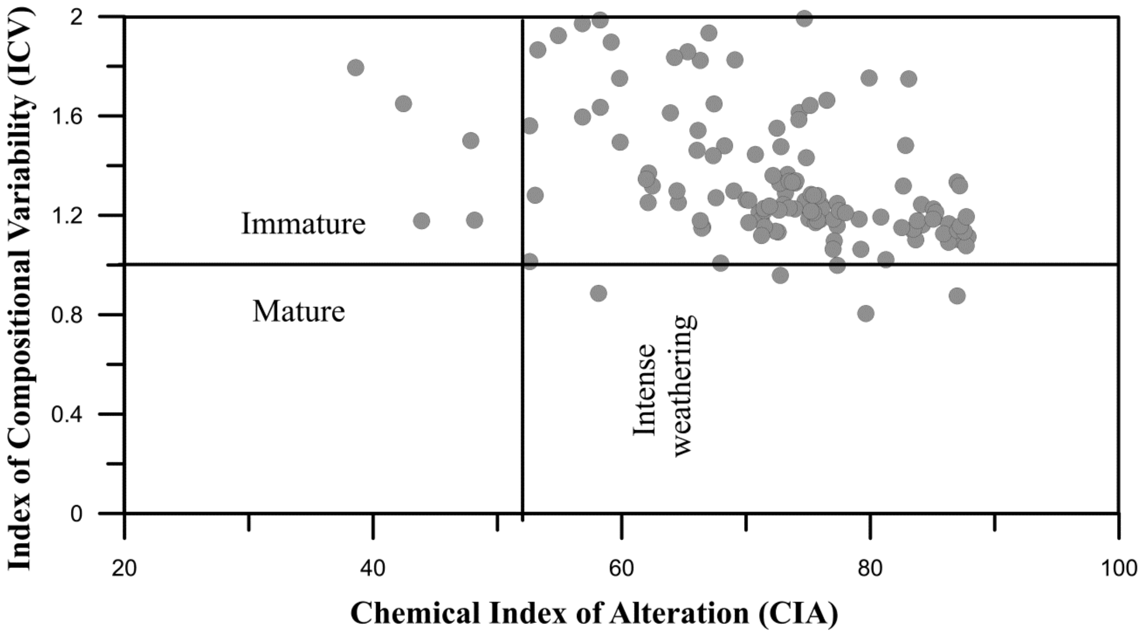

Fig. 7 — Bivariate plot of ICV *vs.* CIA showing the compositional maturity of Palk Bay seabed sediments and their derivation from source rocks subjected to varying degree of weathering

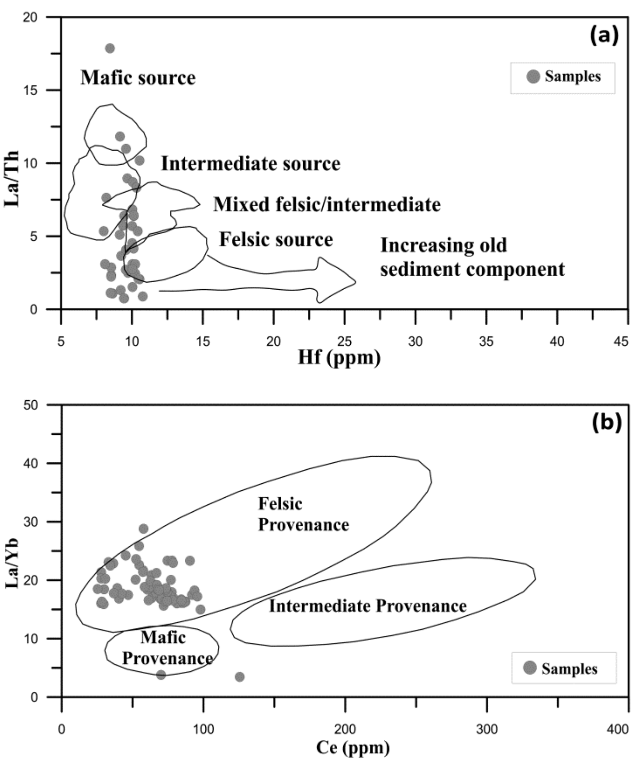

Fig. 8 — Bivariate discriminant plots: (a) La/Th *vs.* Hf (Floyd & Leveridge, 1987 (ref. 46)); and (b) Ce *vs.* La/Yb (Rao *et al.*, 2011(ref. 47)), collectively indicating a felsic source for the sediments while excluding specificant mafic or ultramafic input

high-grade metamorphics of the Madurai Block, transported seaward via fluvial networks.

Conclusion

The integration of multiple geochemical and spatial datasets provides a robust framework for deciphering sediment origin and transport dynamics across Palk Bay. This vector confirms prolonged, steady-state chemical weathering of a stable felsic hinterland prior to deposition. The key findings include:

1. High CIA paired with and elevated ICV values (> 0.84) reflect moderate to significant weathering under a humid, tropical weathering regime. On the A–CN–K ternary space, sample trajectories project above the plagioclase–K-feldspar tie line toward the alumina apex, recording systematic alkali leaching and relative potassium depletion. This is typical of weathered granitic rocks, reinforcing the stability and consistent weathering of the source rocks over time.

2. Elevated K_2O/Na_2O ratios (average 3.88) point to a felsic parentage, with granitic rocks of the Southern Granulite Terrain (SGT) and the Madurai Block. This is further confirmed by discrimination systematics such as La/Th *vs*. Hf and Ce *vs*. La/Yb plots, which align with typical felsic compositions. Furthermore, high LREE/HREE ratios (averaging 15.72) and pronounced negative Eu anomalies record significant plagioclase fractionation during source-rock genesis, consistent with the regional charnockitic and granitic basement rocks that supply the coastal drainage basin.

3. Geochemical studies confirm the contribution of Precambrian gneissic and charnockitic rocks, specifically from the Madurai Block, to the debouching of sediment into Palk Bay. These rocks, featuring orthopyroxene and K-feldspar assemblages on weathering, might have yielded the felsic-rich sediments, which, on transportation by local river systems, were predominantly deposited in the seabed of Palk Bay.

Supplementary Data

Supplementary data associated with this article is available in the electronic form at https://nopr.niscpr.res.in/jinfo/ijms/IJMS_54(10)522-534_SupplData.pdf

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Conflict of Interest

The authors declare that they have no conflict of interest.

Author Contributions

KA: Sampling, analysis and drafting the manuscript; GN: Sample collection and analysis; KP: Manuscript writing; and SV: Compilation of datasets, preparation of maps and figures for the manuscript.

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