

Assessment of the chemical quality of sediments in the maritime port of Réunion Concentrations in trace metals and natural geochemical backgrounds.

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CONTEXT AND OBJECTIVES

- The concentrations of certain heavy metals (Copper, Nickel, Chromium) in the sediments of the port of La Réunion are high, variable, and often exceed the regulatory thresholds for the management of dredged sediments.
- Several studies relating to the geochemical context of Réunion show naturally high metal contents due to the geology of the island.
- So, to what extent the observed exceedances of the dredged sediment management thresholds (N1 and N2) are due to the volcanic environment of the island or to anthropogenic inputs?

METHODS



- Port activities and different releases may generate heavy metal intakes were identified : careening area, stormwater discharges, refueling stations...
- To determine the natural part and the anthropogenic part of exceeding the dredged sediment management thresholds, the measurement results of the national monitoring network of seaports (the REPOM) were analyzed using two indices: *the enrichment factor and the geo-accumulation index*
- Correlations with the concentrations of contaminants of exclusively anthropogenic origin (TBT, DEHP, etc.) were sought.



RESULTS

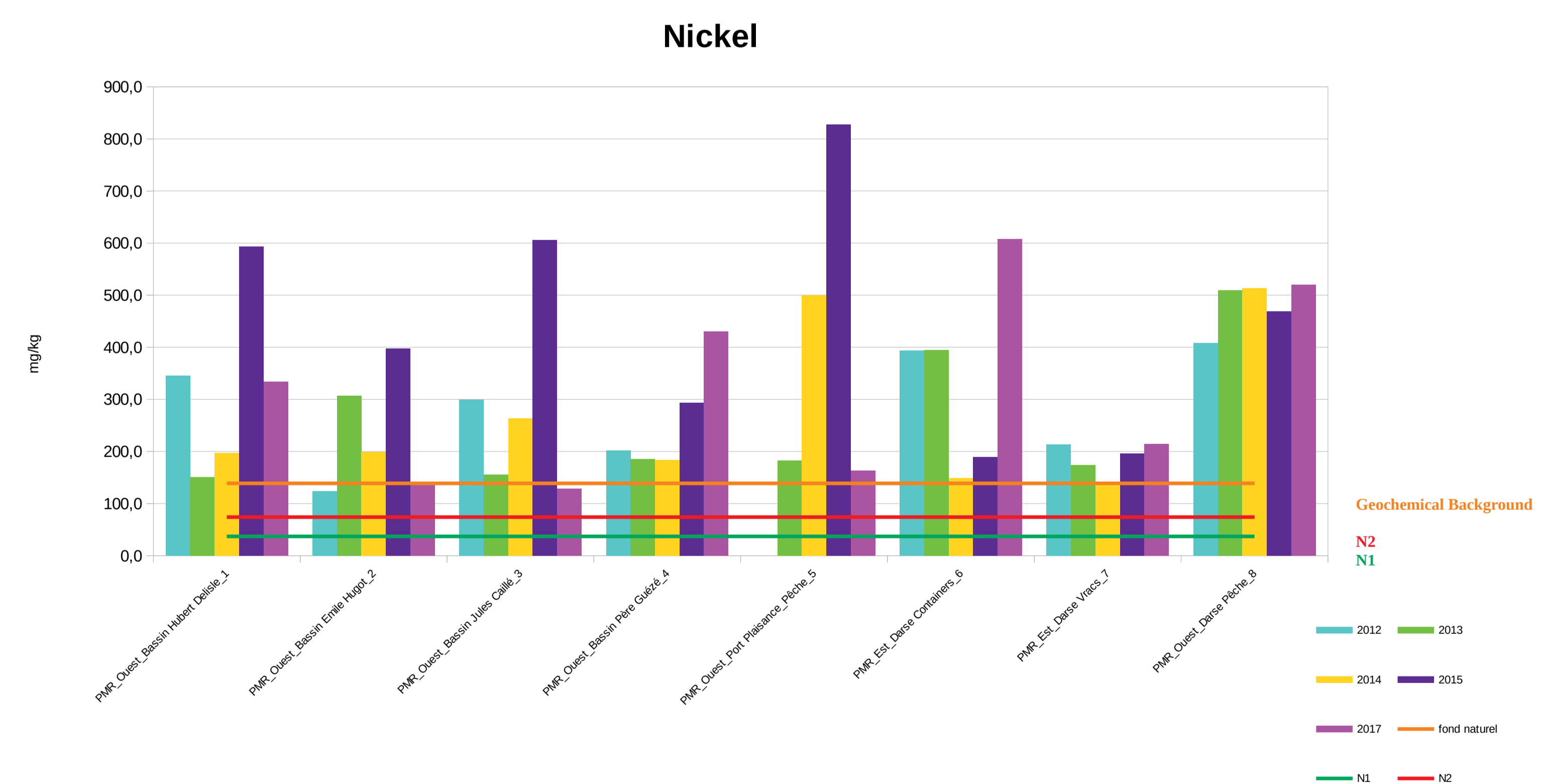
The data available on the chemical quality of sediments off the coast of Reunion Island (BRGM, 2008 and data from the Reunion Port) were used to define *indicative values of pedo-geochemical background noise*

And to compare it to *dredged sediment management thresholds N1 and N2*.

mg/kg	Cadmium	Mercur	Chrome	Cuivre	Nickel	Plomb	Zinc
Background (quartile 1)	0,07	0,02	215,10	15,55	138,80	1,75	219,17
N1	1,20	0,40	90,00	45,00	37,00	100,00	276,00
N2	2,40	0,80	180,00	90,00	74,00	200,00	552,00

- **Nickel, Chromium** : According to the various analyzes of the results, **the concentrations are mainly of natural origin** : the indicative levels of the geochemical background for these metals exceed the N2 levels, and they show no correlation with anthropogenic contaminants. **Some peaks in concentrations may however be due to anthropogenic inputs.**

- **Copper, Lead, Mercury, and Zinc** : the indicative levels of natural geochemicals are lower than level N1. However, enrichment factors and iGeo indexes show **significant anthropogenic inputs on the entire port area**, and the concentrations of these metals are positively correlated with certain anthropogenic contaminants.



DISCUSSION

- Regarding the quality of the dredged sediments, the high concentrations of nickel (*above the indicative level of the geochemical background*) and copper may be due to anthropogenic inputs.
- These high levels can lead to dredged sediment management difficulties.
- **An environmental diagnosis of the port area** could make it possible to identify the origin of the anthropogenic inputs observed in the different basins and to target the actions to be implemented.