Trace elements for different minerals from Yllymakh massif

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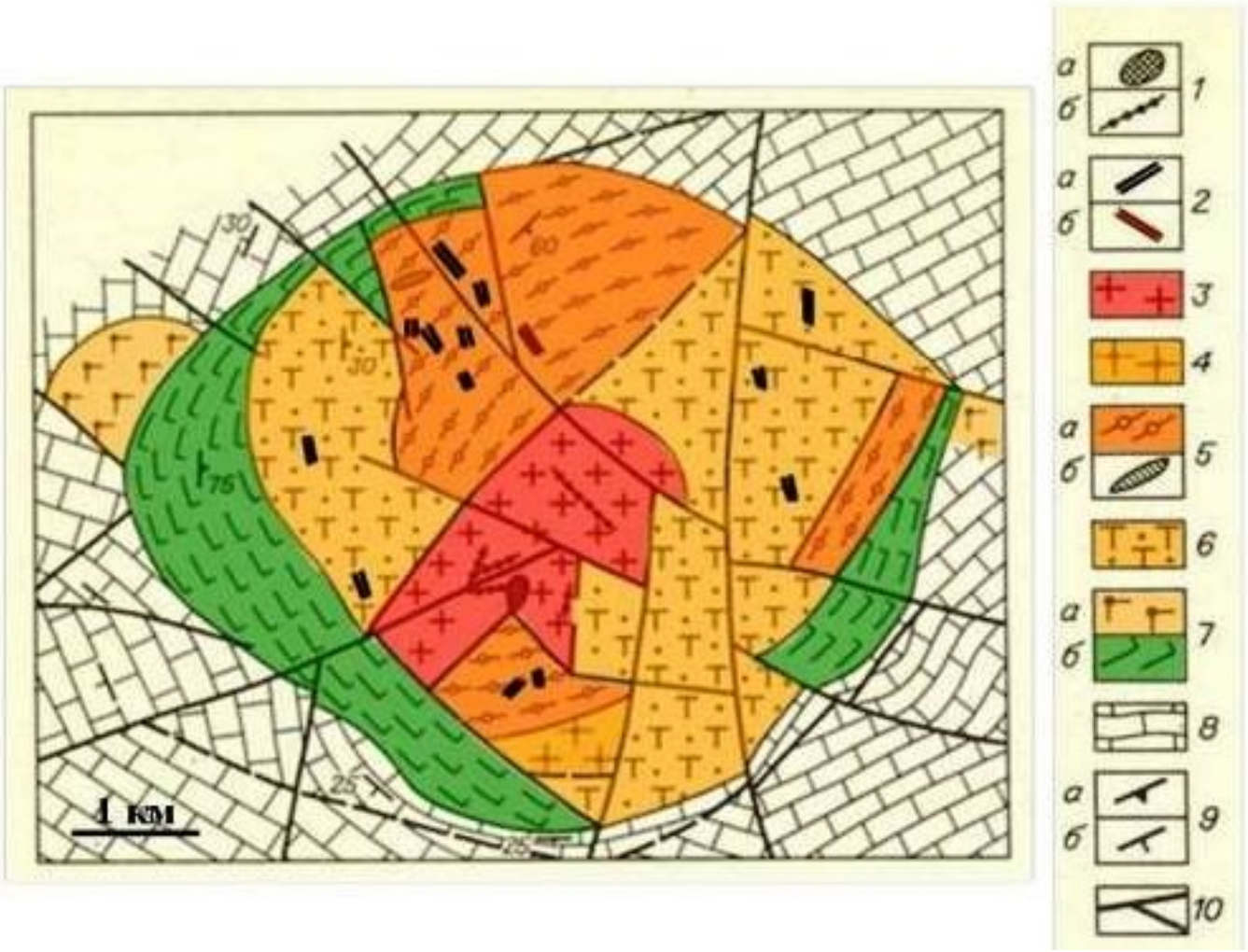
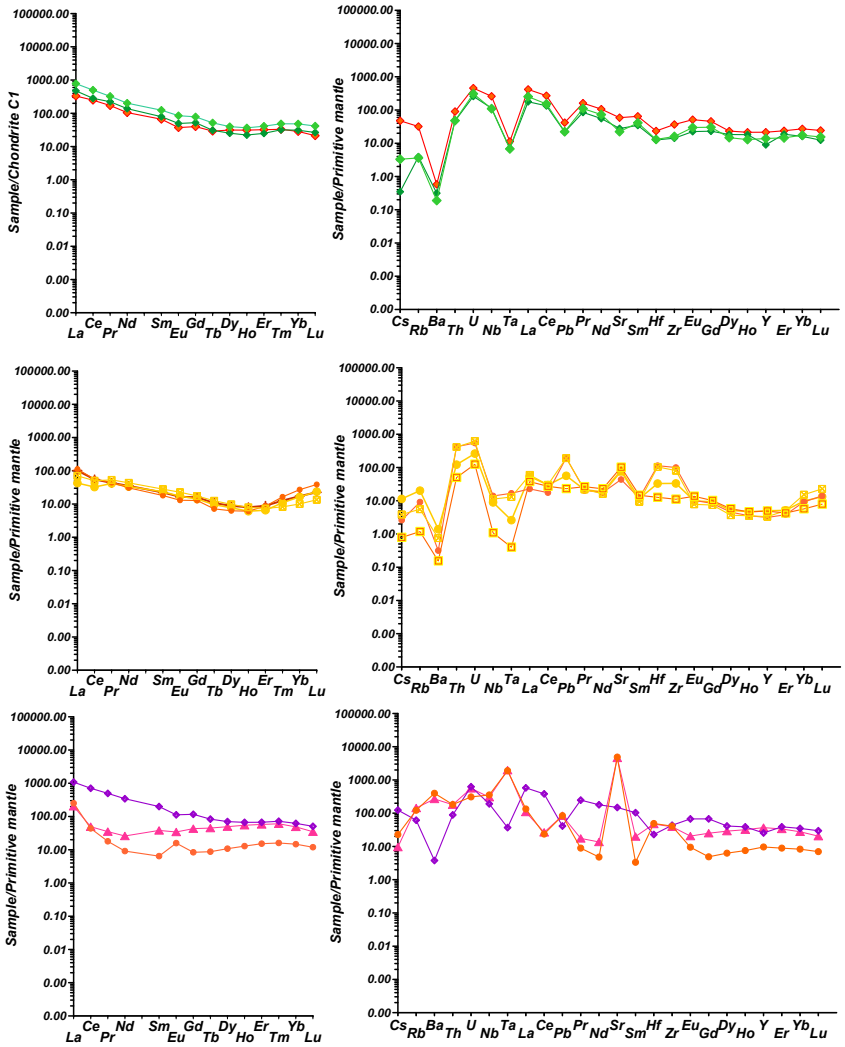
The Yllymakh massif is one of the Mesozoic ring intrusions of Central Aldan, Yakutia. Geological relations between rocks in this massif are enough complicated to call it multiphase. Therefore, the idea about one or different magma sources is still the topic of modern discussions. According to the previous works, there are a lot of different rocks in the Yllymakh massif. And our petrological investigation [Vasyukova et al, 2020] accepted three groups of rock that differ a lot from each other. They have not great differences in mineral composition (aegirine in all rocks, feldspars in syenites). But some critical points in their geochemical features and ages. Foid syenites containing nepheline and pseudoleucite belong to the first group. They are 140±1.9Ma old. Second group includes alkali syenites (131±2.4Ma old). And the third group of rocks are alkaline granites mostly consist of alkali pyroxene and quartz (125±1.9Ma old).



Scheme of the geological structure of the Yllymakh volcano-intrusivestructure (according to Yu. A. Bilibin, 1947, with changes and additions by G. K. Shnai and M. P. Orlova, 1977).
Rocks of the massif: 1-quartz bodies: a-stockwork, b - veins; 2-dikes: a-selvsbergite,b-tinguaite; 3-alkaline (aegirine) granosienites; 4-pulasquites; 5-nephelineand pseudoleucite-nepheline syenites: a - massive coarse-grained, b-pegmatoid;6-pseudoleucite phonolites, trachytes, and their tuffs; 7-a-monzonites, b-shonkinites, and malignites. Host rocks: 8 - marbled dolomites and early limestones precambrian. 9 - elements of occurrence: a-trachytoidness and fluidality, b-shaleformation; 10-tectonic disturbances.

- All studied rocks are divided into three groups according to the silica content and contents of the most of other elements. Points marking the composition of syenites from different groups form multidirectional trends. The alkali granite's characteristics make an independent cluster. The REE-plots also vary. Rocks of the first group has U-shape plot and wide variations in absolute contents. Rocks of the second group have high contents of REE and gentle slope. The granites from the third group have also U-shape plot but the lowest contents.
- In this work we use the LA-ICP MS to determine the contents of RE elements in minerals. There were two minerals, that have chosen – apatite and pyroxene. Usually, apatite is the main concentrator of noncoherent elements that control the form of REE-spectra and the level of REE-contents in rocks. But in the Yllymakh massif, all apatite have a similar spectra form of normalized contents. The plots of normalized REE contents have a sharp negative slope and are characterized by very insignificant Eu anomalies. Such graphs are typical for the apatite of alkaline complexes. At the same time, the REE-plots of pyroxenes are quite equal to the form of REE-plots of the corresponding rock. Pyroxenes from foid syenites and alkali granites have U-shape plot and pyroxenes from feldspar syenites have a regular negative gentle slope plot. The only difference is that the REE content in the granite pyroxenes is as high as in the syenites.
- The results of the research suggest that the formation of the rock spectrum of the Yllymakh massif occurred by reactivation of geochemically similar sources in a different time in addition to others. The contents of REE in rocks were controlled by REE-contents in pyroxene and its ratio with other rock-forming minerals. Supported by RFBR grant 19-05-00788

Yllym 1.



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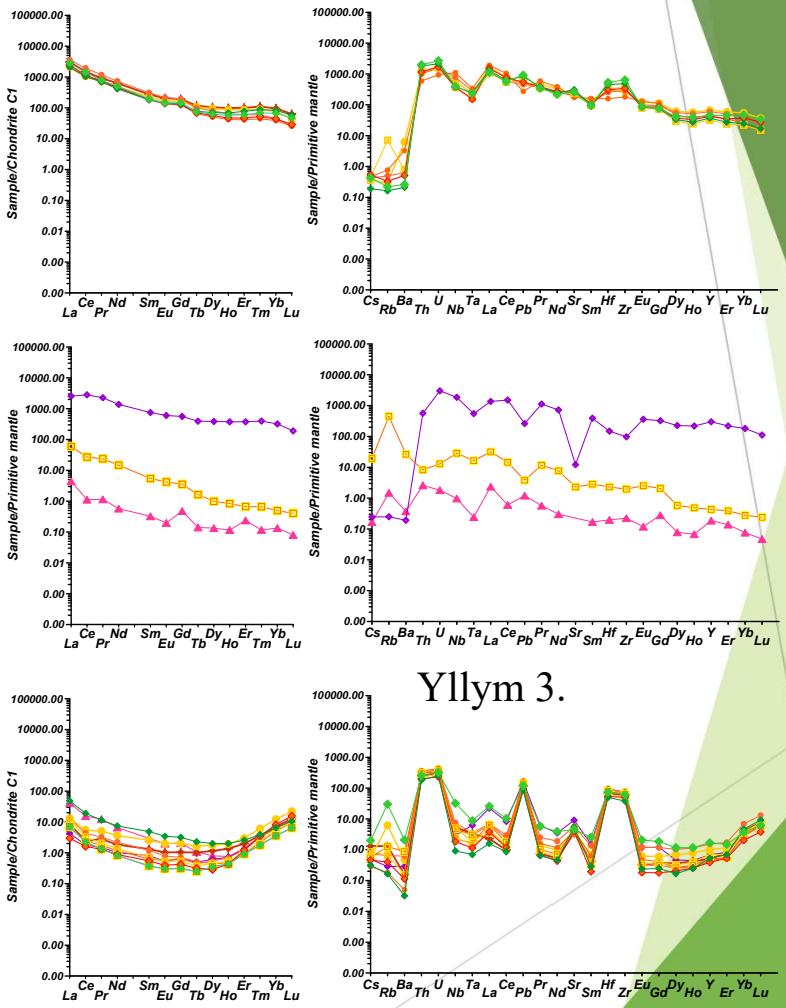

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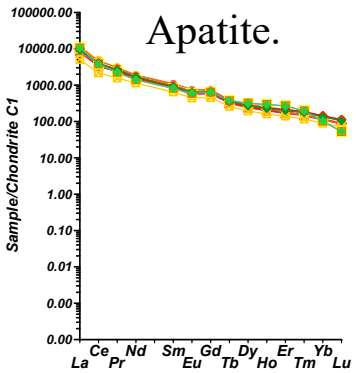

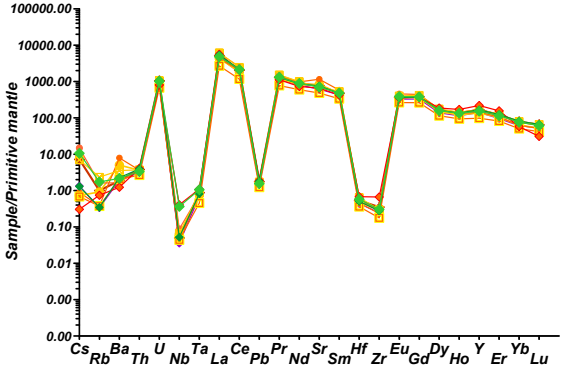

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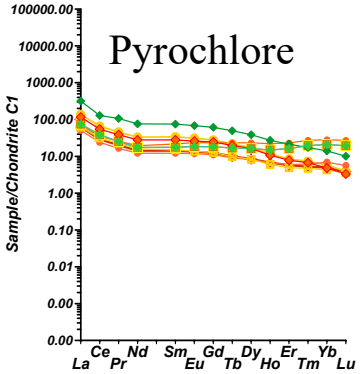

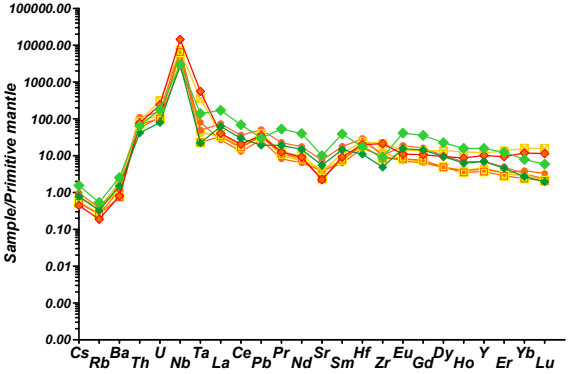

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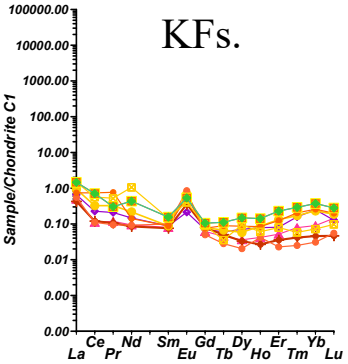

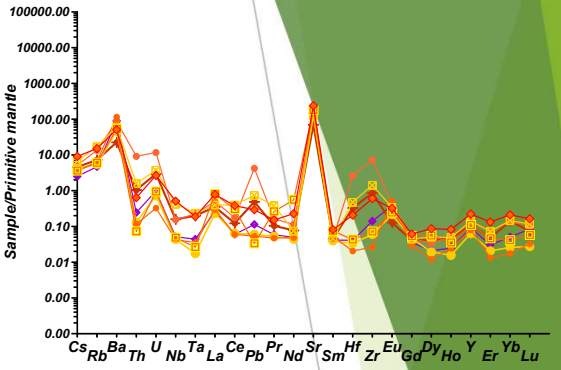

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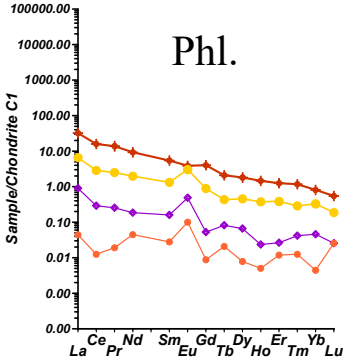

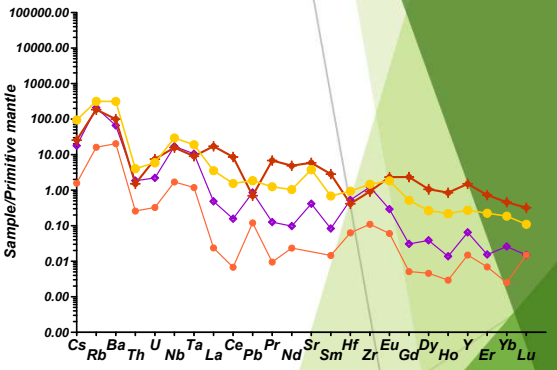

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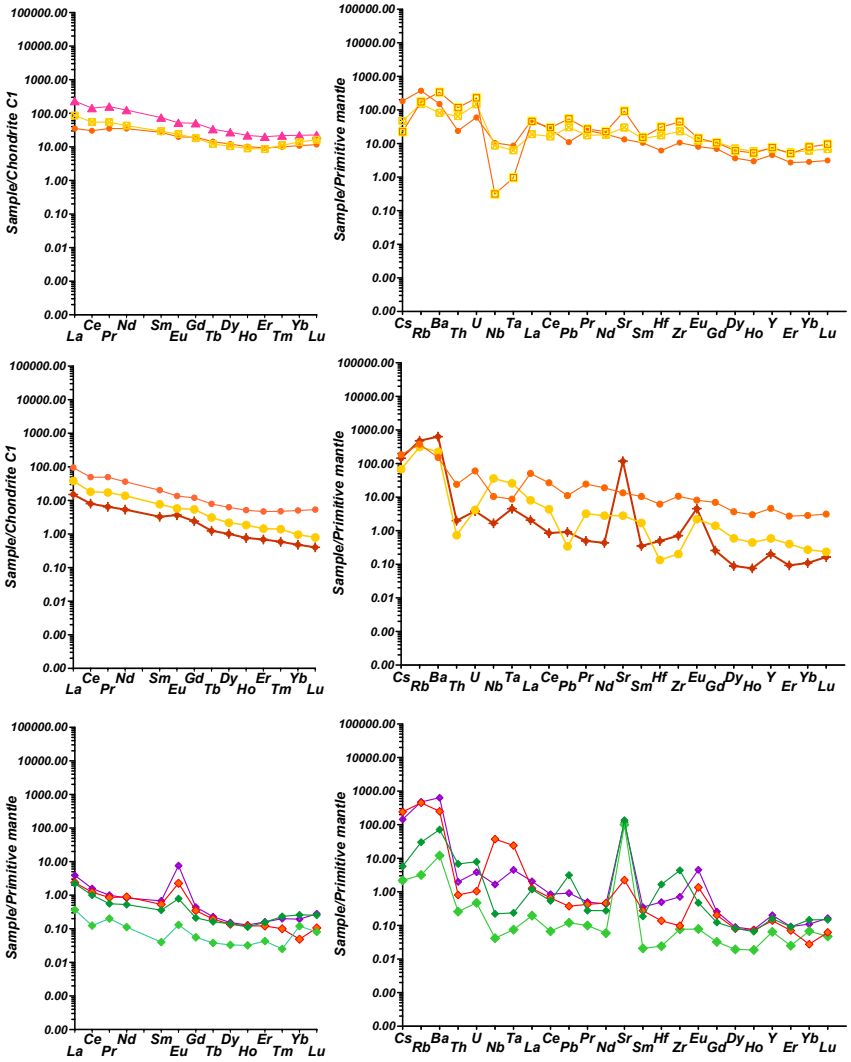

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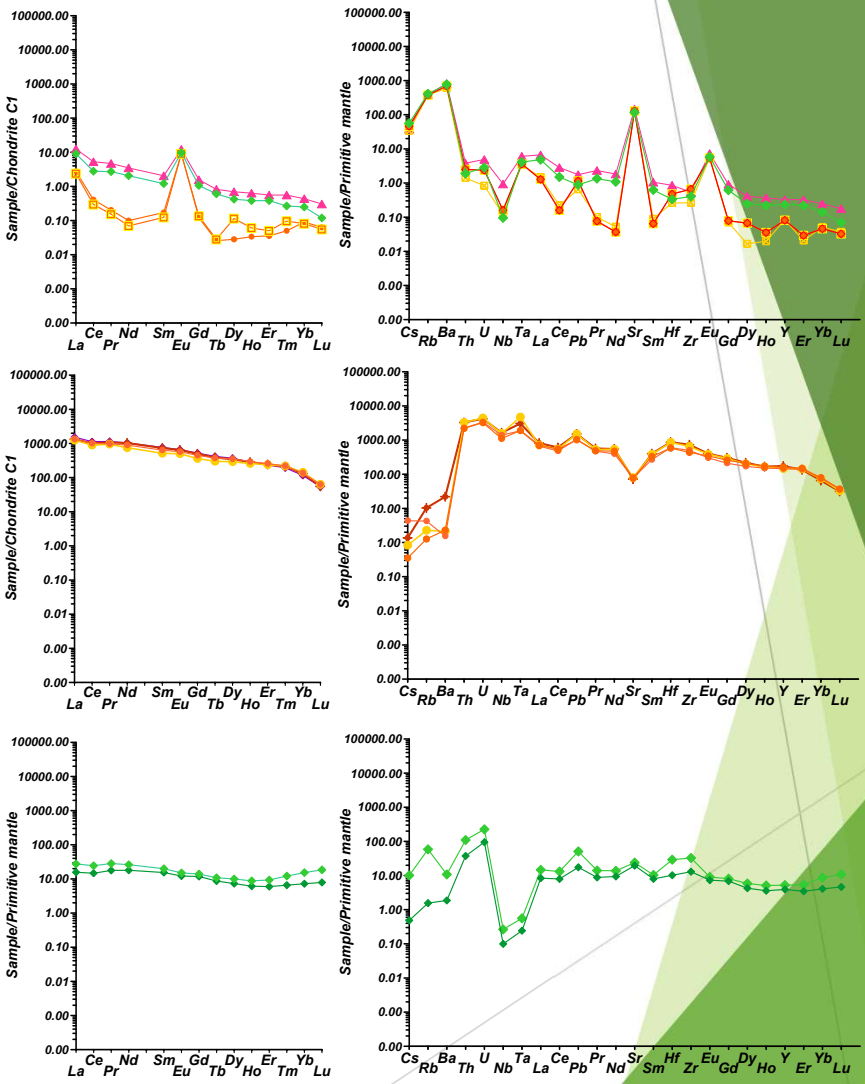

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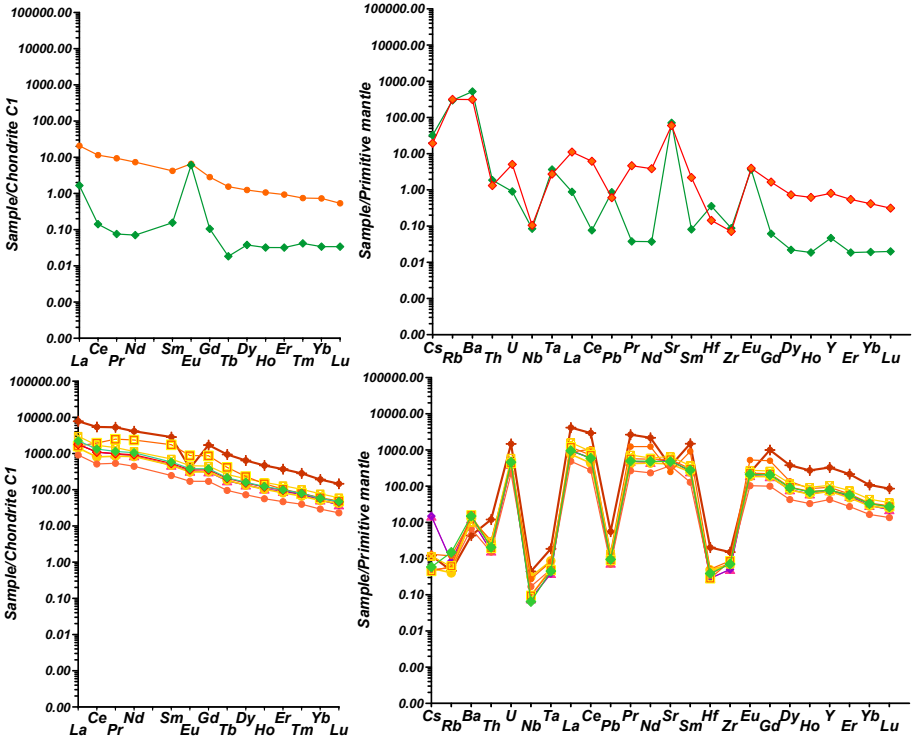

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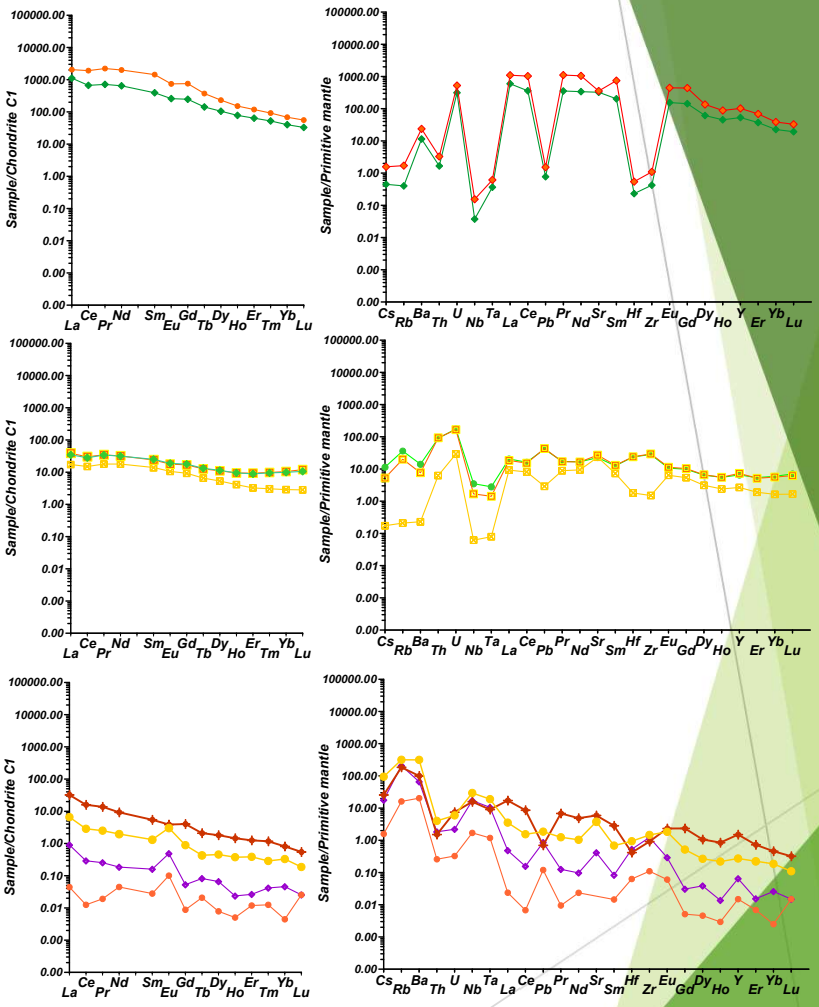

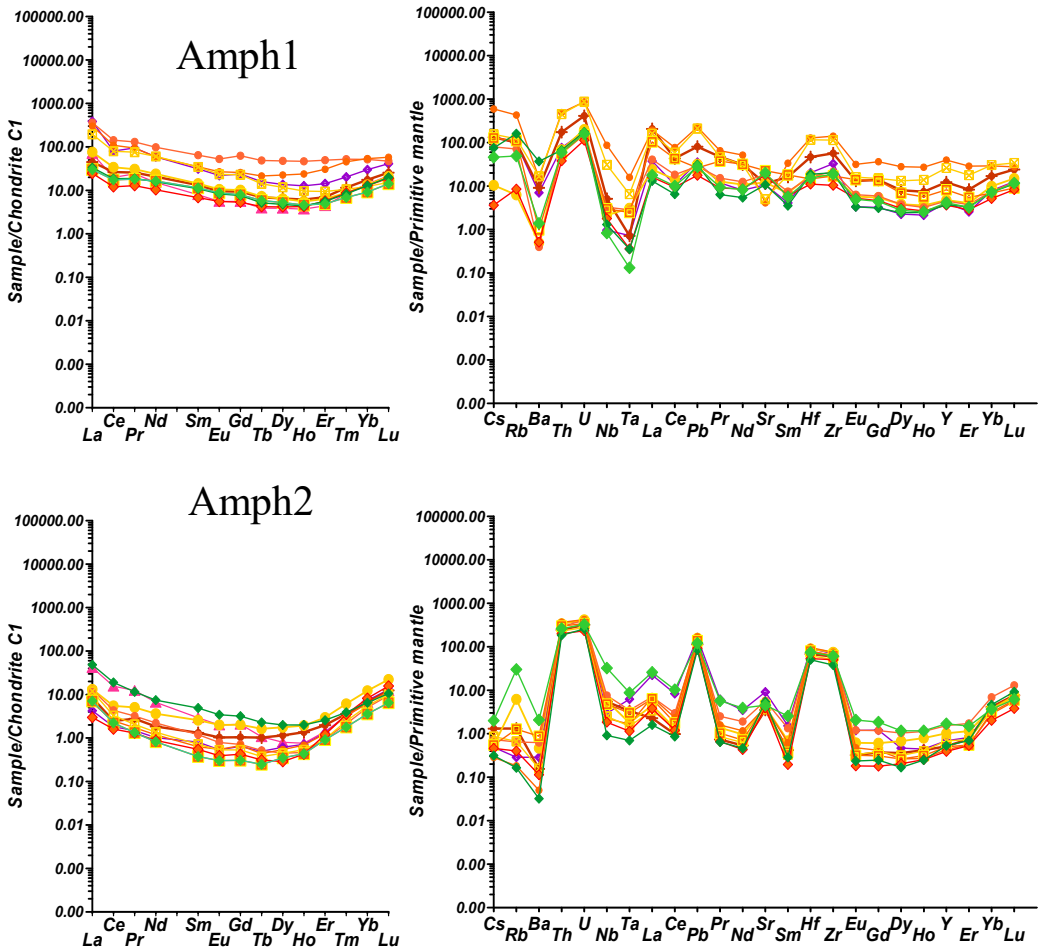
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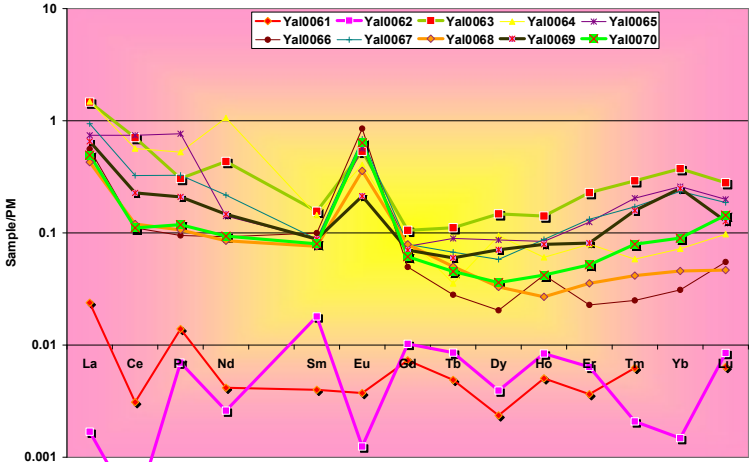
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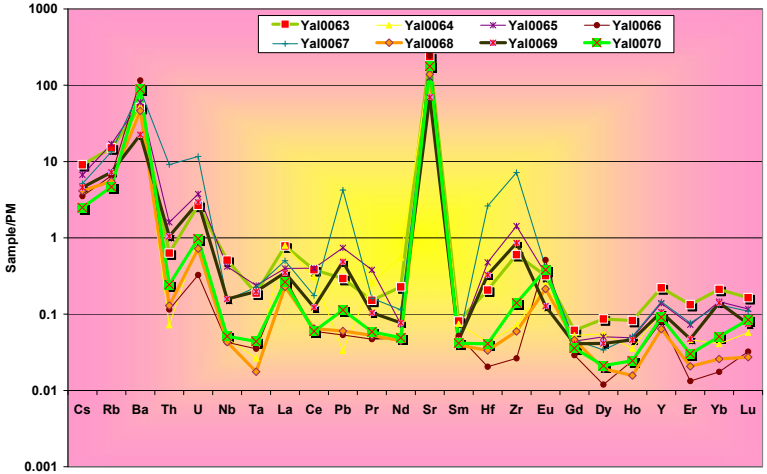
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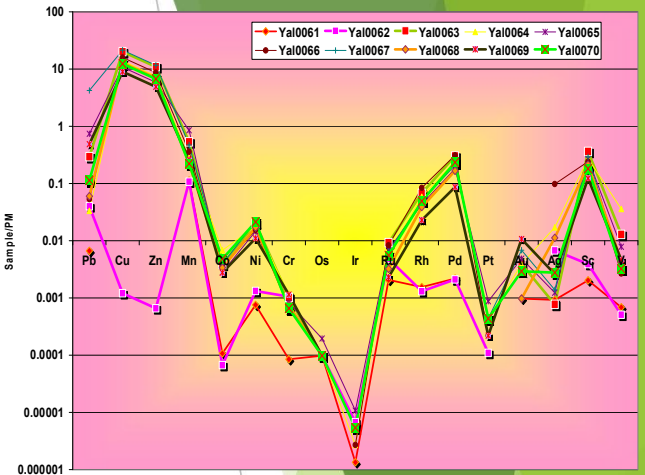
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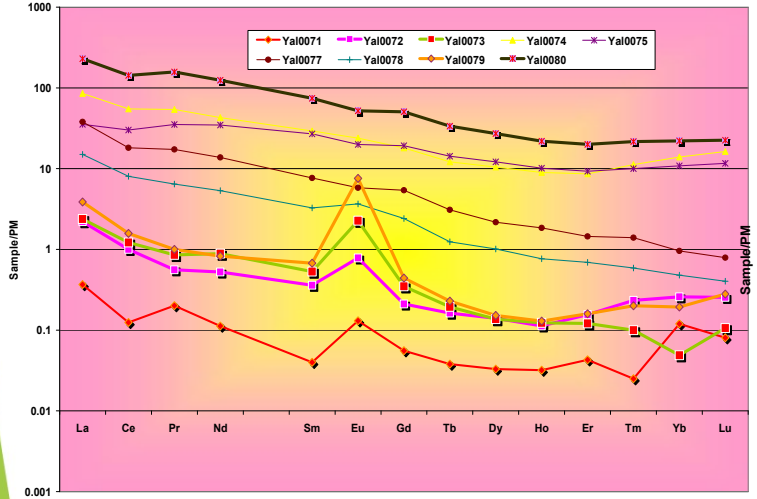
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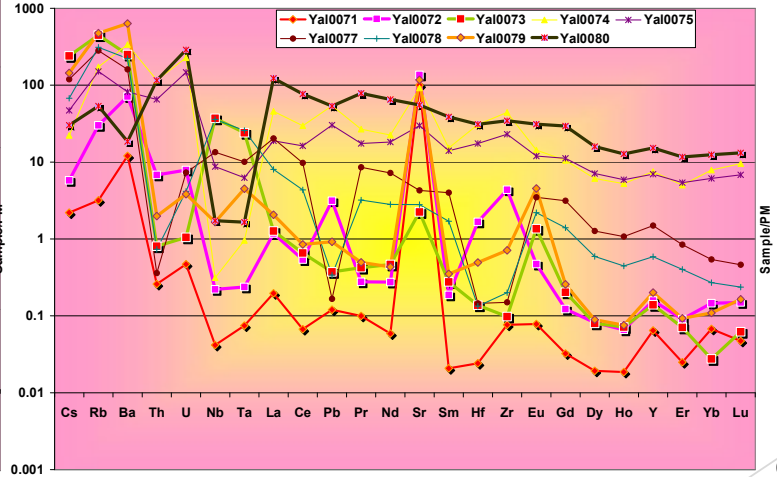
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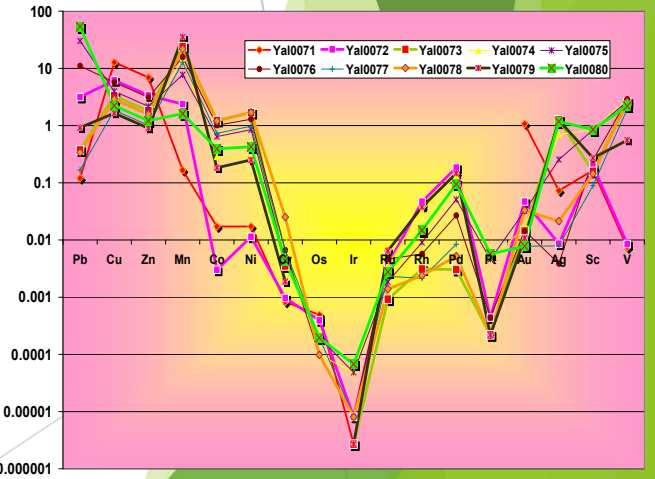
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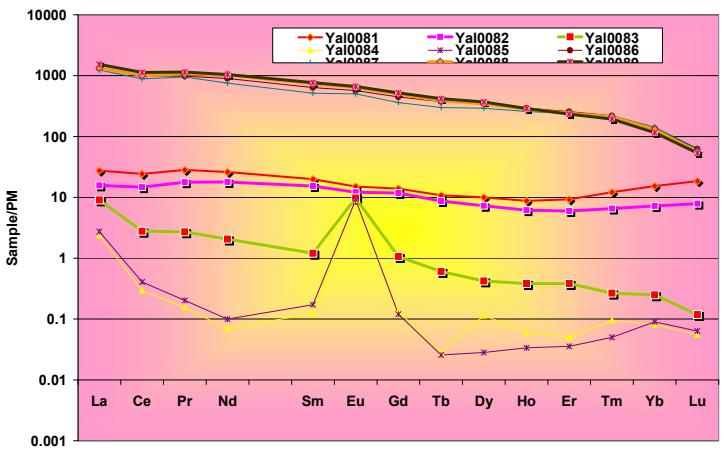
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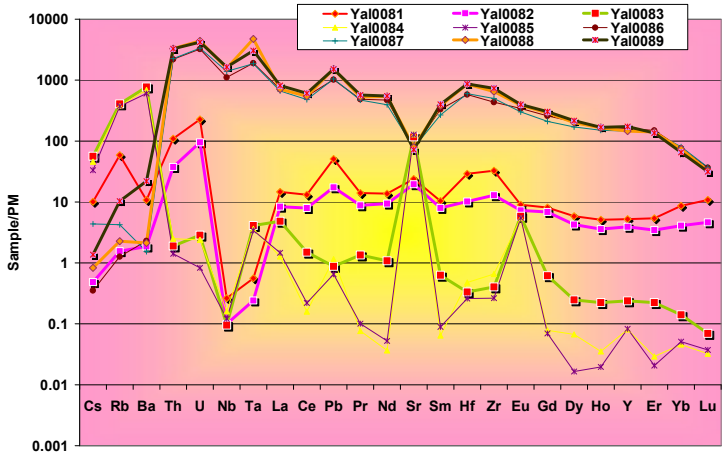
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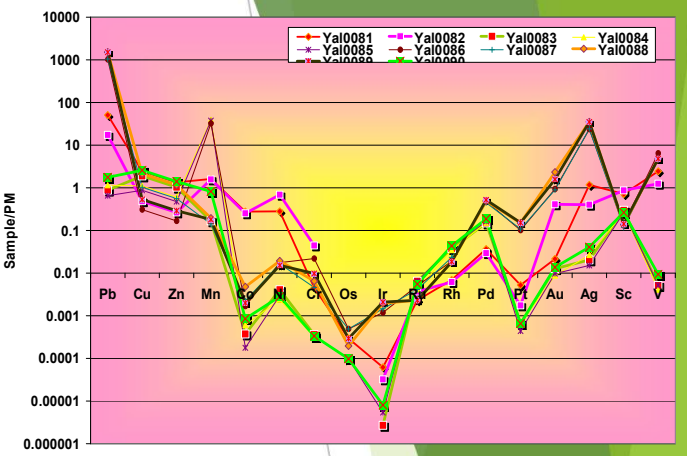
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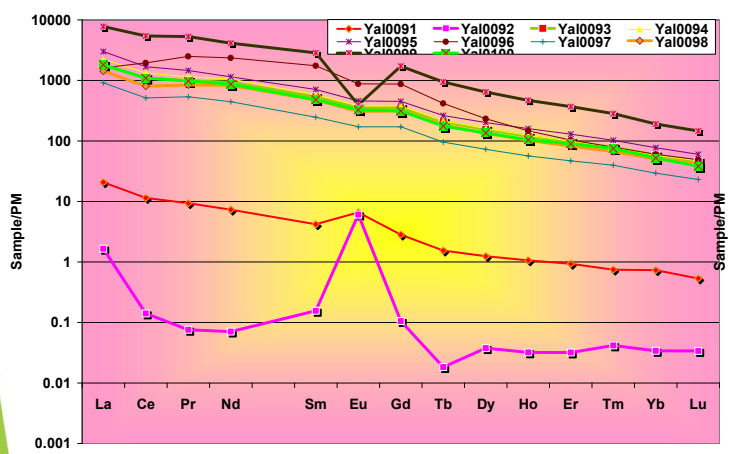
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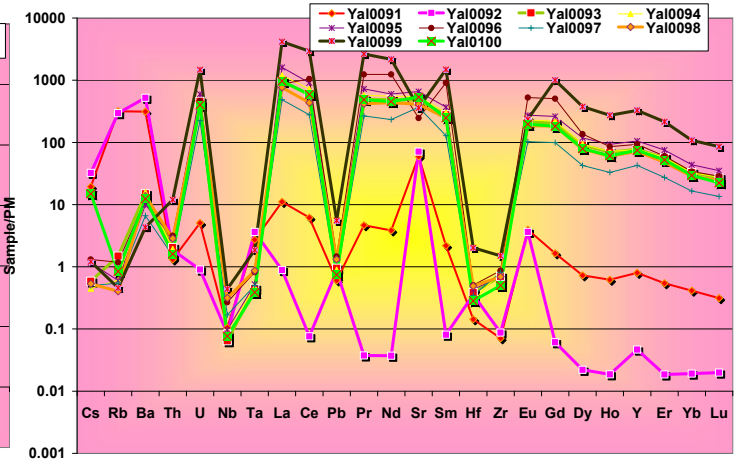
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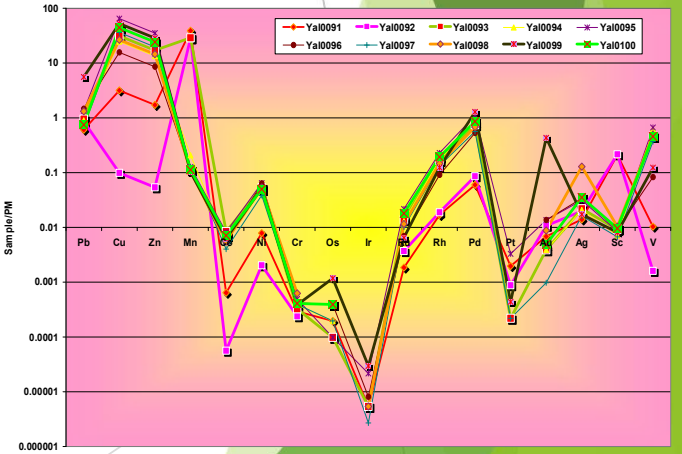
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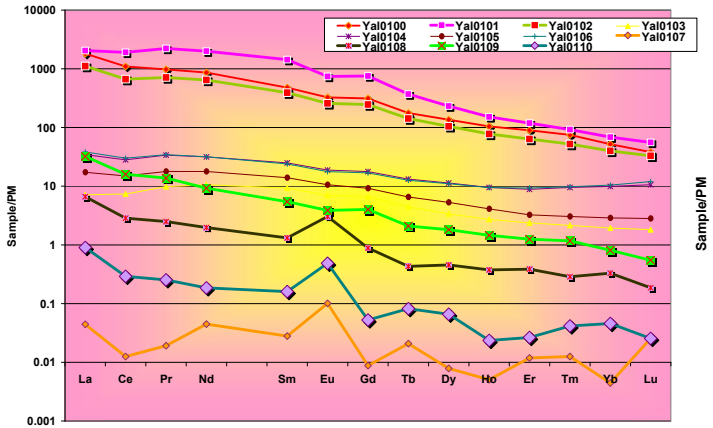
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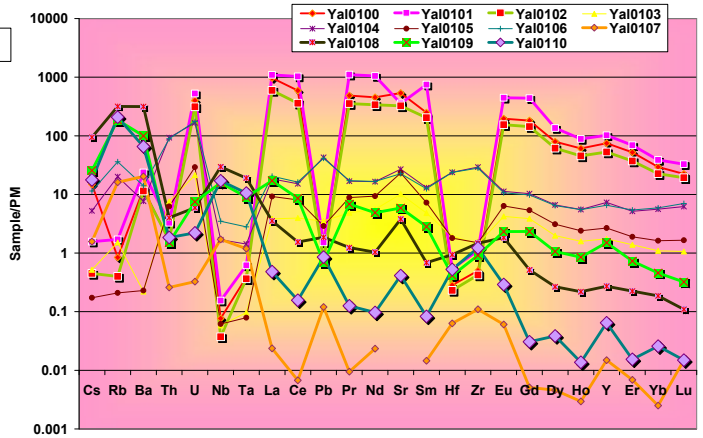
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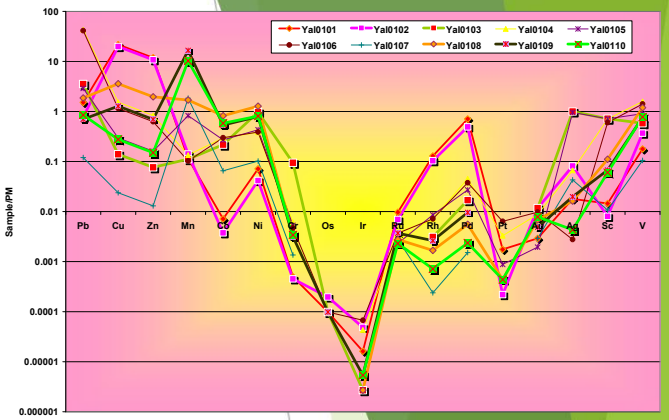
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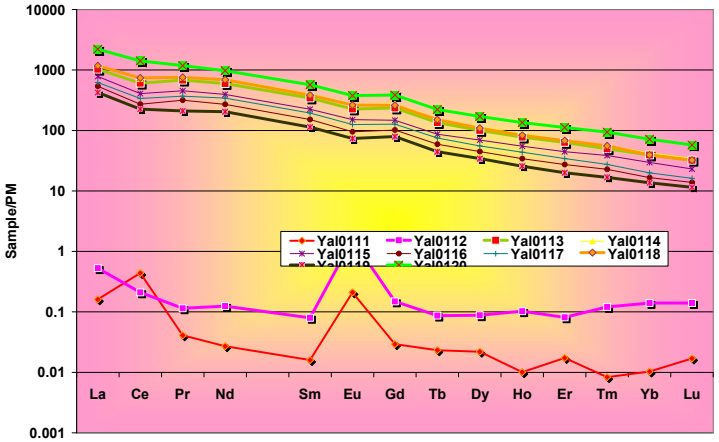
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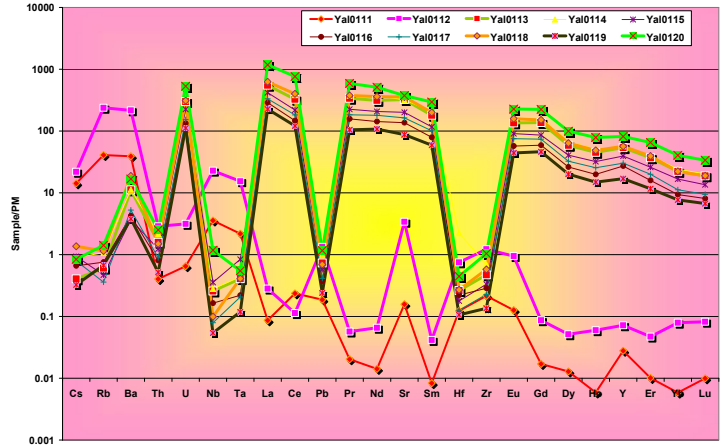
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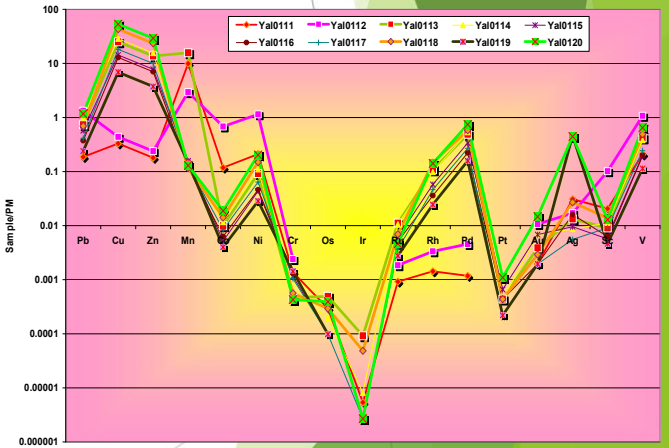
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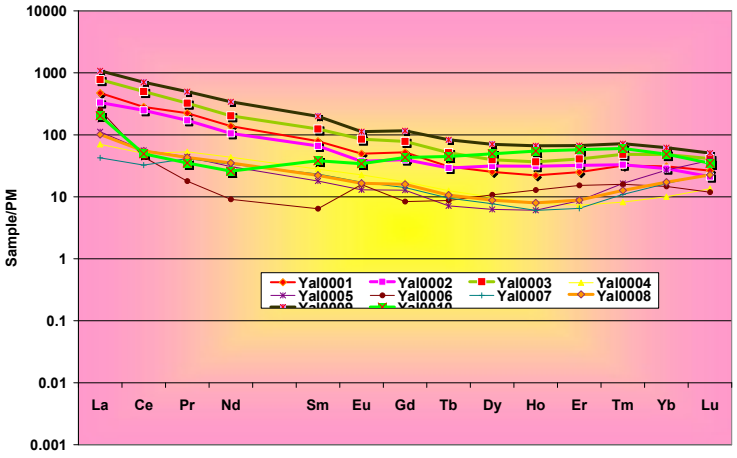
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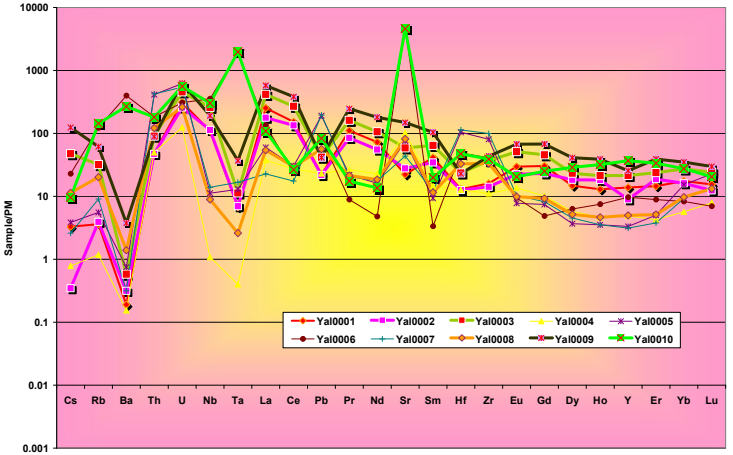
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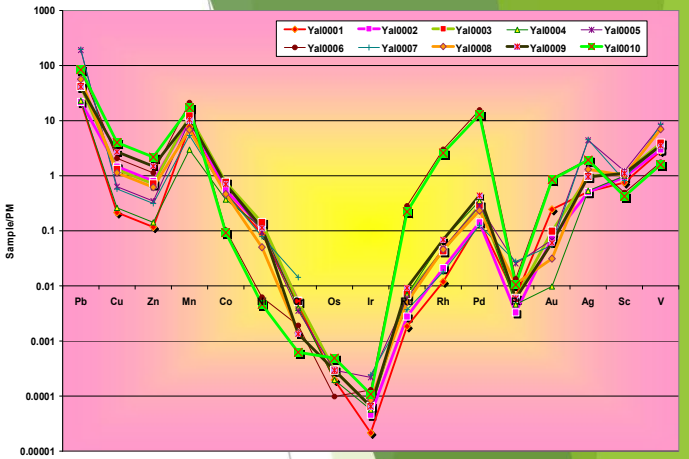
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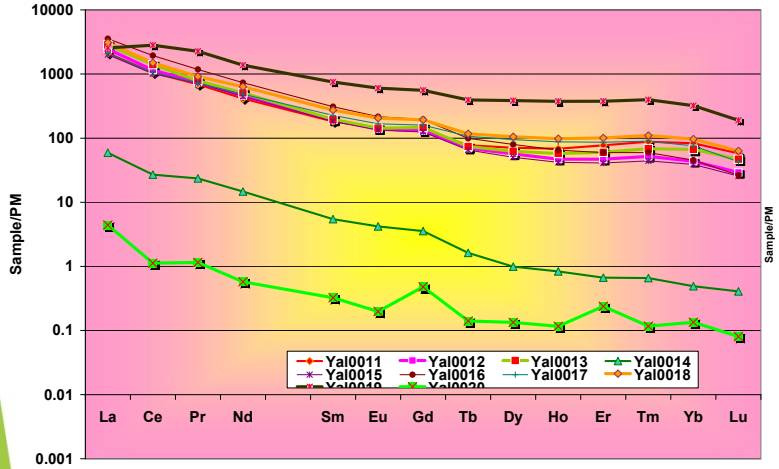
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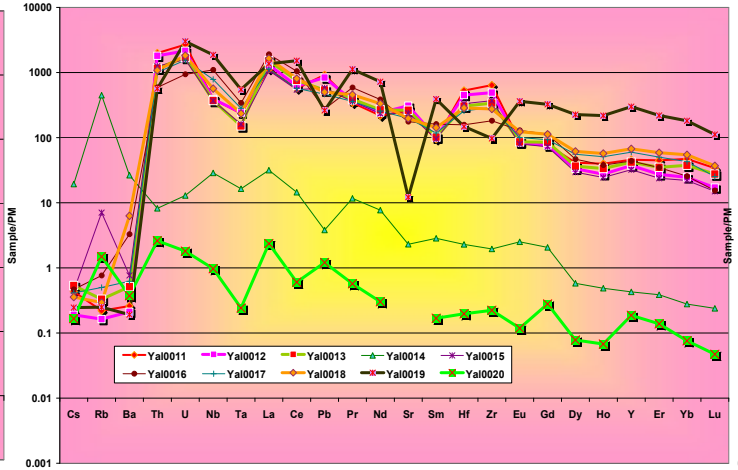
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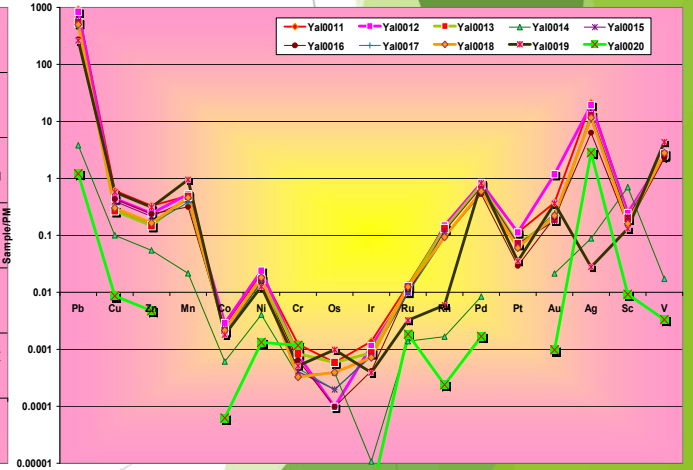
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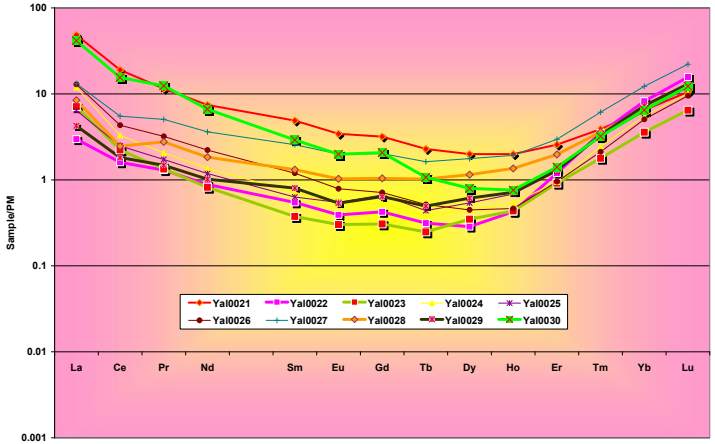
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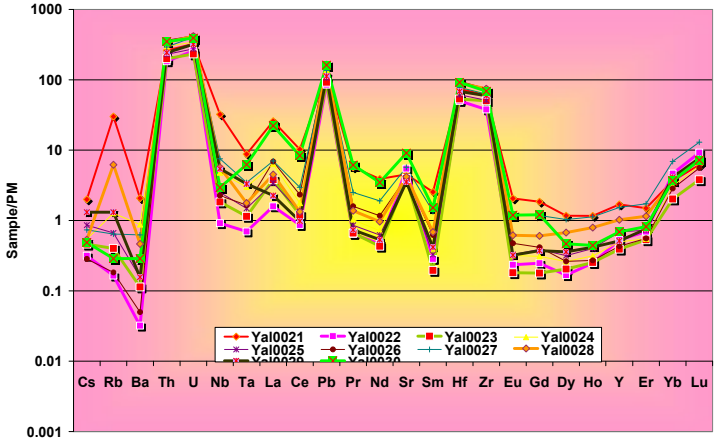
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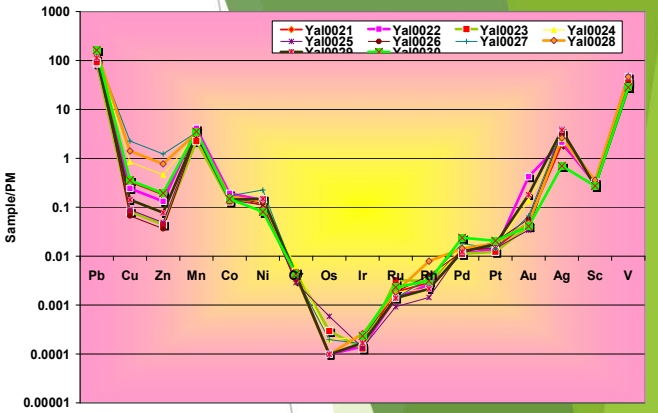
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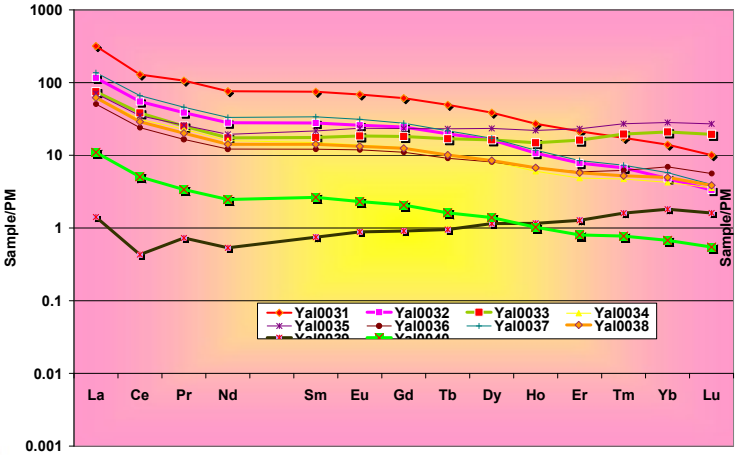
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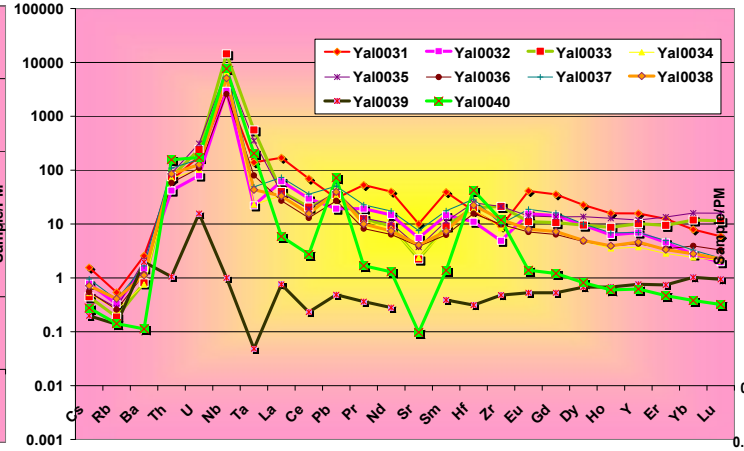
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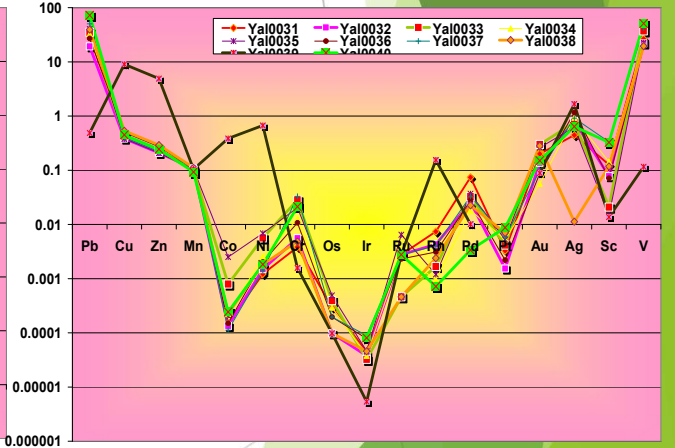
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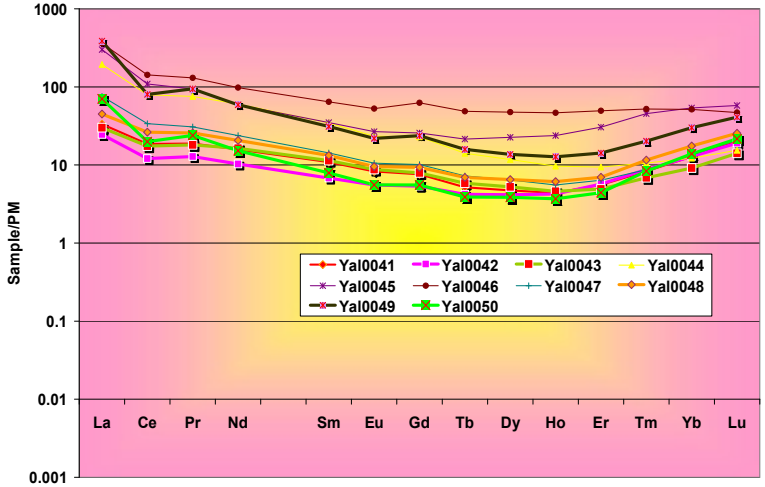
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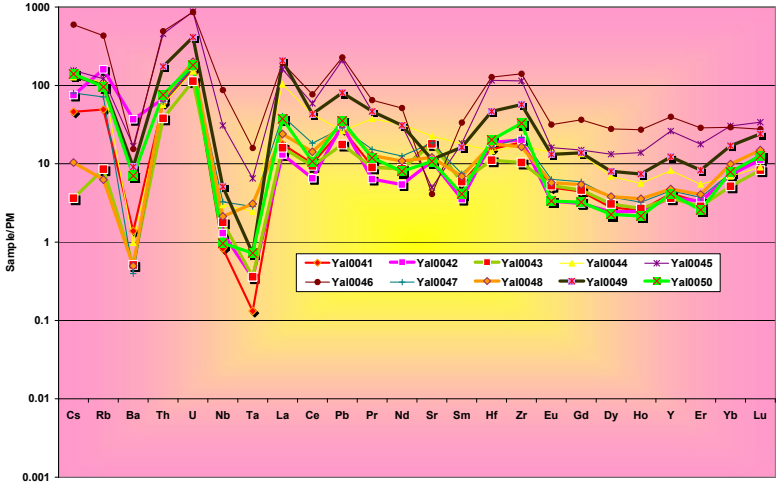
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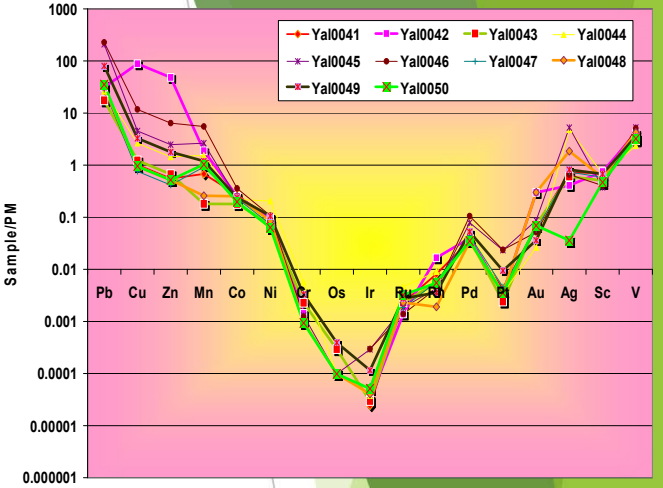
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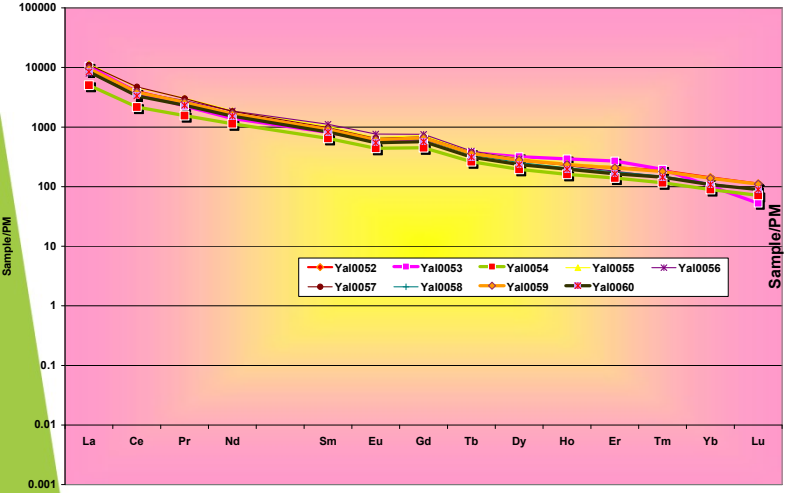
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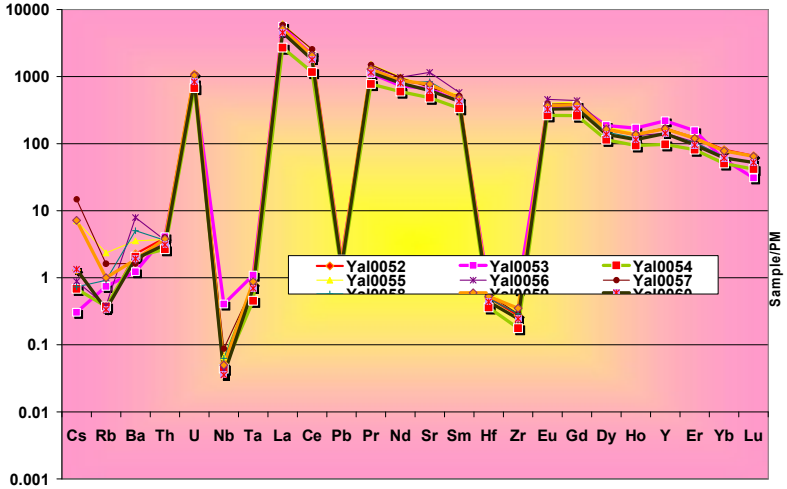
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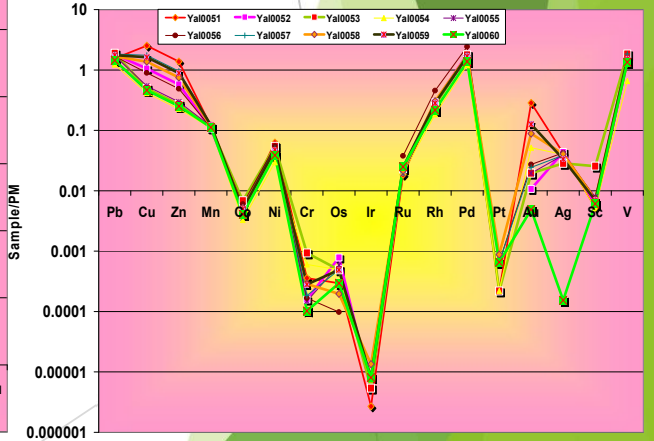
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Thank you!!!