# Hydrocarbon Source Appraisal in $PM_{2.5}$ in Rio de Janeiro

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The work aimed at characterizing hydrocarbons present in atmospheric particulate matter (2.5 µm) in urban and rural areas. For this HV sampling of $PM_{2.5}$ over 24h occurred weekly along 12 months. Determination included 45 PAHs, n-alkanes, UCM, hopanes and steranes. Amongst the 16 USEPA PAH *m/z* 252 and 276 predominated, however in urban centers alkylated homologues were as well important (Fig 1). The presence of mature hopanes (Fig 2) and homologue n-alkane series confirm the petrogenic component derived from vehicular emission of unburned fuel. The ratio B(a)Py/(B(a)Py+B(e)Py near 0.5 indicates moderate fotodegradation of B(a)Py independently of the season. Acephenanthrylene, Bz(c)phenanthrene, diBz(a,j)chrysene, pentaphene, Bz(a)chrysene, picene and indene(7,1,2,3-cd)chrysene were also found and used for source appraisal.

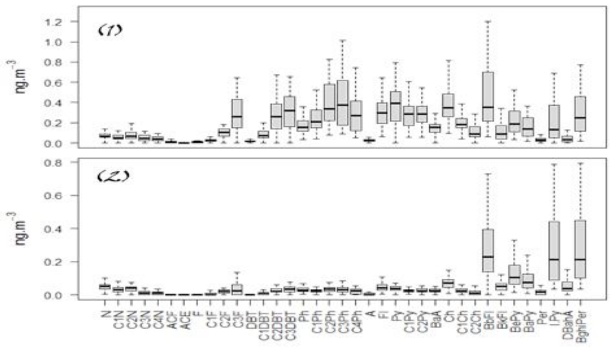


Figure 1. (1) City center; (2) rural area

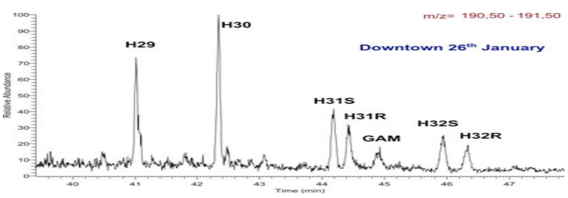


Figure 2. Mature hopanes and Gamacerene

# A physicochemical approach to the early generation of continental crust by melting of oceanic crust

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The phase relations of three rocks (basalt, Archaean greywacke, and quartz diorite) each with different $H_2O$ contents were studied by thermodynamic calculations for the P-T range 0.5-4.5 GPa and 550-1300°C using the computer program PERPLE_X [1] and the haplogranitic melt model by Holland & Powell [2]. The obtained P-T pseudosections were contoured by the following parameters: volume, K/(Na+Ca), Na/Ca and Si/Al of melt, and density of the total rock and restite. The melt and restite formed in the three studied rocks could be reasonably well characterized with these parameters and the obtained phase relations. For instance, melts representing TTGs are generated in the basaltic protolith in the pressure range 1.2-2.0 GPa between temperatures of 600-1000°C. The restite shows densities above 3.3 g/cm$^3$ at pressures in excess of 1.3 GPa when more then 5 vol.% of melt has formed in a low-$H_2O$ basaltic composition and at >1.0 GPa and with >20 vol.% melt (T > 850°C) in a more hydrated basalt. TTG melts can also form in the two other studied rocks at a slightly elevated pressure range compared to the basaltic compositions. However restite densities exceed 3.3 g/cm$^3$ only in the stability field of coesite.

The obtained calculation results suggest the following geotectonic scenario which is capable to form considerable volumes of continental crust in Archaen times. The formation of relatively thick plates of oceanic crust, the hydration of their surface and final collision leads first to thickened oceanic crust and the generation of a granitic protocrust by partial melting in the hydrated realm of the underthrust oceanic plate during the collisional process. Subsequently, the protocrust is, in fact, further thickened by this process, but TTG melts are predominantly formed in the underthrust oceanic plate at a later stage. The restites in this partially melted regime reach densities above those of the mantle to be delaminated. The suggested crust-forming process could have occurred until late Proterozoic times.

[1] Connolly, J.A.D. (2005) Earth Planet. Sci. Lett. 236, 524-541.[2] Holland, T.J.B. & Powell, R. (2001) J. Petrol. 42, 673-683.


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