

From garnierite toward pyrite: A journey at the molecular level that depicts the crystal- chemistry of nickel in New Caledonia

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In the present work, Ni K-edge EXAFS data have been used to depict the crystal-chemistry of nickel in New Caledonia, the fifth nickel producer in the world thanks to its large Ni laterite ore deposits related to the long-term weathering of peridotites under tropical conditions. This journey at the molecular level starts in the peridotites (the source of nickel) with data that help to better understand the formation of the hydrous Mg/Ni silicate deposits (i.e. known as *garnierite*) of New Caledonia. It follows in the lateritic regoliths with data that emphasize the vertical change of nickel speciation from Ni-bearing phyllosilicates in the ultramafic bedrock toward Ni-bearing goethite in the upper lateritic horizons (Dublet et al., 2012; 2014; 2015). Finally, it ends in the sediments of mangrove located downstream lateritic regoliths with data that show the vertical change of nickel speciation from Ni-bearing goethite and phyllosilicates in the oxic surface horizons toward Ni-bearing pyrite in the anoxic deep horizons (Noël et al., 2014; 2015). Beyond the single case of New Caledonia, the results of this journey bring information that could be useful for better evaluating the global environmental impact of Ni laterite ores mining, which account for 60 to 70% of the world's Ni resources (Butt and Cluzel, 2013).

Butt and Cluzel (2013) *Elements*, **9**, 123-128. Dublet et al. (2015) *GCA*, **160**, 1-15. Dublet et al. (2014) *Am. Min.*, **99**, 225-234. Dublet et al. (2012) *GCA*, **95**, 119-133. Noël et al. (2015) *GCA*, **169**, 82-98. Noël et al. (2014) *GCA*, **136**, 211-228.