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Bacterial abundance, growth and community composition in oligotrophic, metal-rich running waters of Southern New Caledonia

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The basic bacterial ecology and diversity was investigated in five running water systems of Southern New Caledonia (including a former Cr/Co mine). These running waters were characterized by potential P-limitation and high concentrations of Ni, Fe, Mn, Cr and Co. The low concentrations of dissolved organic carbon, bacterial and viral abundance, bacterial production and growth efficiency support the characterization of the running waters as oligotroph to ultraoligotroph. Despite these similarities, there were strong differences (<50% similarity) in bacterial community composition between some habitats based on 16S rRNA gene and denaturing gradient gel electrophoresis (DGGE) fingerprints (e.g. the Cr/Co mine). The high coverage of sequenced DGGE bands found for *Betaproteobacteria* is typical for freshwater systems, however, we found also a strong representation of *Gammaproteobacteria*. Indeed the three bands found at all stations were related to *Limnohabitans* (*Comamonadaceae*) and *Alteromonadaceae*. Strong differences were also found between the free-living and the attached bacterial fraction with *Gammaproteobacteria* dominating in two systems. A higher representation of *Gammaproteobacteria* seems typical for metal-rich freshwater habitats. Consistent with fresh water habitats, majority of phylotypes detected in the sediment was affiliated to proteobacteria. Also, none of the sequences showed a 100% identity with data bases, and 10 of the 22 and 2 of the 23 sequences had similarities higher than 97% in the freshwater and sediment. This could indicate specific adaptations of the community composition either due to the high metal concentrations or due to the geographical isolation of the New Caledonia.