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Mineralogical characterization of sediments from the Wagner Basin, Northern Gulf of California

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The Wagner Basin is located in the northern part of the Gulf of California (Mexico), and attains a maximum depth of 217 m. Intense seepage of hydrothermal fluids has been detected along the Wagner Fault, at the east margin of the basin. A complete sampling of surface sediments was done during the WAG-2 cruise of R/V El Puma, in August 2010. Sediment samples were obtained using an USNEL box corer and a Smith-McIntyre grab, from depths between 59 and 217 m below sea level (m bsl). Sediments are hemipelagic muds of green to grey colour, mostly of 5y/3/2 in the Munsell colour chart. Temperature of sediments, measured on board just after to obtain the sediments, was between 14.1º and 24.4º C. The gain size attains up to 600 μm, averaging around 60-160 μm. Th deepest samples show a wider range of grain size, whereas near the continent sediments show a lower degree of roundness and coarser grain size.

The quantitative mineralogical composition of sediments was obtained by powder x ray diffraction, using the Rietveld method. X-ray diffraction data were collected with a Panalytical X'Pert PRO MPD X-ray diffractometer located at the Serveis Cientificotècnics de la Universitat de Barcelona.

Quartz and illite are the most abundant minerals, ranging from 19 to 63 wt. % (mean 39.6 wt. %) and from 17 to 38 wt. % (mean 23.2 wt. %), respectively. Calcite is the most abundant carbonate mineral and attains up to 25 wt. % (mean 16.4 wt. %), and dolomite content is below 7 wt. %. Other common minerals are albite and K-feldspar, both between 6 and 10 wt. %, and to a lesser degree, andesine and kaolinite, below 1 wt. %. Smectite clays were detected only in the deepest samples (> 200 m bsl). Barite and pyrite occur in minor amounts, mostly near the inferred trace of the Wagner Fault, and cannot be detected by powder x ray diffraction.

Several of these minerals show a good correlation with depth. Quartz and feldspars decrease with the depth, whereas illite increases. Carbonate minerals are more abundant in the deepest sediments. A good inverse correlation occurs between quartz and illite.

Sediments come mainly from the Colorado River, although an eolian supply cannot be dismissed.