Characterization of the effects of grain size to mine water quality and Acid Rock Drainage (ARD) production in Kinetic Testing

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The quality of mine drainage from sulfide containing waste dumps is controlled by several factors and surface area (grain size) exposed to weathering conditions is important. However, the textural variation may control the main driving mechanisms for an acid generating or neutralizing reactions. Depending on their rates and intrinsic properties, leachate chemistry for a certain grain size can be characterized through different types of tests and analysis.

Kinetic test using humidity columns is performed on five different grain size ranges of waste rocks from the Recsk porphyry copper-skarn deposit in Hungary. Water leachate quality is analysed on a weekly basis for their pH, alkalinity, conductivity, anions, cations and dissolved metal concentrations. Results showed that finer grains produced near neutral to neutral pH and higher sulfate production rates unlike for coarser grains. This indicates that the rate of sulphide oxidation and neutralization may be only partly controlled by grain size as well as a number of interrelated factors.

Global variability of the ocean's biological pump from *in situ* measurements of the air-sea oxygen flux: A status report

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The ocean's biological pump is the process by which biological production exports carbon and oxygen from the ocean's euphotic zone. The geographic variability of the biological pump, along with ocean mixing and air-sea exchange, strongly influences the pCO_2 of the atmosphere and maintains the oxygen distribution below the surface ocean. We propose to determine the global variability of the biological pump by measuring the air-sea oxygen gradient using oxygen sensors on profiling floats. Oxygen mass balances at ocean time-series sites indicate the connection between net annual air-sea oxygen flux and biological carbon export and suggest a biological pump of 2 – 4 mol C m^{-2} yr^{-1} with little global open-ocean variability; however, there are only about five locations where there is sufficient data to do this calculation. Global Circulation Models and Satellite color measurements predict the biological pump varies by as much as a factor of four among the equatorial, subtropical and subarctic oceans. A better global coverage of the annual air-sea oxygen flux would provide critical calibration for the predictions based on satellite color. To accomplish this we calibrated the Aanderaa oxygen sensors in our laboratory and modified the Argo profiling instrument package so that the oxygen sensors continue recording when they surface (every five days). The oxygen sensors on our special floats are positioned well above the float body so they are in the air when the float surfaces providing a measure of the air-sea pO_2 gradient. We deployed ten of these floats in March 2013 in the Western North Pacific across the Kuroshio extension. Winkler oxygen measurements were made near the floats after deployment to calibrate them in situ. This abstract was written only two weeks after successfully deploying and calibrating the floats in situ. We will report the results of the first three months of measurements to assess how accurately it is possible to determine the air-sea oxygen flux using *in situ* oxygen measurements on Argo floats. We believe this is the next step in using oxygen mass balance to determine the global distribution of the marine biological carbon pump.

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