Effects of future climate change on air quality over East Asia

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Air pollutant concentrations such as troposheric ozone and aerosols are affected by meteorological variables including temperature, mixing depth, precipitation, and so on. Future climate is expected to be different from the present and so are those meteorological variables due to human perturbation to the atmospheric levels of the long-lived greenhouse gases and aerosols. East Asia is one of important source regions of both anthropogenic and natural greenhouse gases and air pollutant precursors. Therefore, significant environmental changes are expected in the future. We here use an offline coupling of a 3-D chemical transport model (GEOS-Chem) and a climate model (CAM3) to examine the effects of future climate change on air pollutatnt concentrations over East Asia. We conduct several model simulations with the IPCC SRES emission scenarions. Simulated air pollutant concentrations over East Asia in the future are found to be sensitively perturbed relative to the present depending on the different emission scenarios. Important meteorological factors affecting air pollutant concentrations include temperature, cloud covers, and precipitation over the continent. Changes in synoptic meteorological patterns induce different transport pathways of air pollutatns. Future climate changes may in general exacerbate air quality degradation that requires more stringent emission reductions over East Asia.

Column experiments for biosorption by immobilized carrier beads using *Bacillus* sp. and polysulfone to remove Pb from aqueous solution

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Biosorption of Pb from aqueous solution has been investigated in column experiments. Sorption column experiments were used the immobilized carrier beads with dead biomass and polysulfone. *Bacillus* sp. was isolated from soil contaminated with oil and heavy metals at a military site in Repubilic of Korea. Dead biomass prepared by freeze-drying and autoclaving at 121 ℃ was mixed with 10 % polysulfone in DMF (*N, N*-dimethyl formamide) solution to produce the immobilized carrier beads which were spherical and porous beads (1 mm in diameter).

The column was designed with an internal diameter 2.5 cm and 100 cm height. Experiments were carried out in glass column filled with 5 % of dead biomass in carrier beads which were investigated to Pb removal efficiency in batch experiments. The initial concentration of Pb in the synthetic aqueous solution was titrated as 10 mg/L. Pb solution was pumped through peristaltic pump connected to the bottom of the column at a flow rate of 2.2 ml/min. From the top of the column, water samples were collected at regular time intavals (1, 2, 3, 4, 5, 6, 7, 8, 12, 15, 18, 24, 30, 36, 42, 48, 54, 60, 66, 78 pore volume). Samples were analyzed on ICP-OES for residual Pb concentrations in solution.

From the results of the column experiments, the Pb removal efficiency of immobilized carrier beads was kept over 98 % until the Pb solution was injected quantity of 30 pore volume. The amount of Pb adsorbed per unit weight of beads was 12.78 mg/g. A small quantity of immobilized beads could remove a lot of Pb in aqueous solution, therefore immobilized beads have a great passibility to clean up the heavy metal contaminated groundwater at the field.