



ABSTRACTS and FIELD GUIDES

PANGEO Austria 2022

Abstracts and Field guides

Editoren: Gerd Rantitsch und Johann G. Raith

Montanuniversität Leoben, Department für Angewandte Geowissenschaften und Geophysik

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Department für Angewandte Geowissenschaften und Geophysik, Montanuniversität Leoben,
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Welcome to PANGEO Austria 2022!

The PANGEO Austria 2022 conference is to be held from 10–14 September 2022 at Montanuniversität Leoben. Under the heading “Beyond Earth Sciences Frontiers” this conference provides a platform for presenting actual research carried out at Austrian universities, organisations and companies.

PANGEO Austria has evolved into a forum where scientists from academia can meet with colleagues working in industry and public services. Participation of students presenting results of their Master and PhD projects is strongly encouraged and we hope the conference is not only a place for science transfer and knowledge exchange but also for networking.

The scope of the sessions and contributions give an excellent overview about the wide spectrum of research covered. It ranges from fundamental research in the different disciplines of earth sciences and geophysics to the various fields of applied research with sessions for example on Economic Geology, Geo-Energy, Technical Geology, Hydrogeology and Applied Mineralogy. Two special sessions are dedicated to the geological services in the federal states (Landesgeologie) and to Geology@School; the latter especially adapted for teachers.

Altogether, there are 130 oral and 75 poster presentations. The abstracts published in this volume of *Berichte der Geologischen Bundesanstalt* document these activities. The scientific programme is accompanied by the social programme and pre- and post-conference excursions. Excursion guidebooks are also published in this issue.

Our sincere thanks go to our sponsors and supporters, to the session convenors, and especially to the staff of the Department of Applied Geosciences and Geophysics who have made it possible to organise this conference. Montanuniversität Leoben is thanked for hosting this conference on its premises, and we thank Geologische Bundesanstalt for publication of this volume.

The organisation team wishes you a successful meeting!

Preface

On behalf of the Austrian Geological Society, I would like to welcome you to PANGEO Austria 2022 at Leoben. PANGEO Austria takes place every two years and is the Austrian showcase of geoscientific research and its applications. Originally planned for 2020, it had to be postponed by two years due to the pandemic. I would like to thank the organizers for all their double efforts and hard work.

PANGEO Austria is quite unique, as it brings together all areas of earth sciences at one conference. Accordingly, the Austrian Geological Society, the Austrian Paleontological Society, the Austrian Mineralogical Society, the Austrian Geophysical Society and the Austrian Association for Hydrogeology are co-organizers of this event. PANGEO has always understood itself as a networking platform, where academia and industry meet and where students, undergraduates and graduates in earth sciences can interact with potential employers. Oral and poster presentations will offer a wide spectrum of high-quality research covering applied, theoretical, and regional themes and will also look “Beyond Earth Science Frontiers”. The opening keynote address by Mike Simmons asks “Who needs geoscientists?” and his answer is a very positive one. Geoscientists will play an essential role in supporting our society during energy transition and transformation. However, we need to give this message to society at large and cast a wide net. PANGEO also offers a Geology@School workshop for teachers. Taking geosciences to school is essential to educate society, and to (re)gain public acceptance and support for our activities.

I wish you all an exciting conference, interesting excursions, lively discussions, and successful networking with real people in a non-virtual environment!

Peter Krois, President of the Austrian Geological Society

Preliminary study of copper(II) ions removal from wastewater using solid residue obtained by co-pyrolysis of lignite and high density polyethylene mixture

Kojic, Ivan¹; Dojcinovic, Iljana²; Stojanovic, Ksenija³

1 University of Belgrade, Innovation Center of the Faculty of Chemistry, Studentski trg 12–16, RS-11000, Belgrade, Serbia; 2 University of Belgrade, Center of Chemistry – Institute of Chemistry, Technology and Metallurgy, Njegoševa 12, RS-11000 Belgrade, Serbia; 3 University of Belgrade, Faculty of Chemistry, Studentski trg 12–16, RS-11000 Belgrade, Serbia.

In the last decade, much attention has been given to thermal treatment (co-pyrolysis) of coal/plastic blends. The hydrocarbon plastic materials, (e.g. polyethylene and polypropylene), which production rapidly increases, should be recycled. They can be the source of hydrogen during the pyrolysis of hydrogen-depleted natural products such as coal and biomass, resulting in a balance of carbon and hydrogen contents and giving the opportunity to certain advantages of the co-pyrolysis process. The composition and quality of liquid and gaseous co-pyrolysis products were evaluated, whereas possible utilization of solid co-pyrolysis product was less investigated. In this study the solid residue obtained by the co-pyrolysis of low quality, mineral-rich lignite taken from the Kostolac Basin, Serbia (45.36 % of ash; 33.42 % of total organic carbon; net calorific value of 9.5 MJ/kg) and high density polyethylene, HDPE (mass ratio, 1:1) at 500 °C was tested as a sorbent for Cu²⁺ ions, considering that as a coaly-based material, simultaneously enriched in clays, it may have good adsorption properties. Sorption experiments were performed using 0.5 g of solid co-pyrolysis lignite/HDPE product, as sorbent which was treated with 5 cm³ of model solutions containing ~200 times higher concentration of Cu²⁺ ions (242.60 mg/dm³), in relationship to its maximal allowed content in surface water of bad quality. Model solutions were prepared using corresponding nitrates dissolved in distilled water. Two model solutions were prepared. The first model solution contained individual Cu²⁺ ions, whereas the second one contained a mixture of Cu²⁺, Pb²⁺, Co²⁺ and Cd²⁺ ions. Concentration of each ion in the latter was also ~200 times higher than its maximal allowed content in surface water of bad quality. The experiments were carried out in cuvettes by ultrasonication (30 minutes) under ambient conditions, followed by centrifugation (3,000 rpm, 10 minutes) to separate liquid (supernatant) and solid phases. Treatment with distilled water was used as a blank. Concentrations of heavy metal ions in initial model solutions and supernatants obtained after sorption experiments were measured using inductively coupled plasma – optical emission spectrometry. The obtained results indicated very efficient sorption of Cu²⁺ ions from its individual model solution, attaining 99.96 %. The efficiency of Cu²⁺ ions sorption was also high (99.95 %) from model solution, which contained mixture of metal ions. It is important to mention that sorption of other metal ions from model solution mixture was also effective (99.99 %, 80.70 % and 71.04 % for Pb²⁺, Cd²⁺ and Co²⁺, respectively). The solid residue obtained by the co-pyrolysis of lignite and HDPE showed better efficiency for Cu²⁺ removal from model waste water than polymer enhanced ultrafiltration, ferric/limestone treatment, sorption by paddy straw, papaya leaf powder and secondary strontium residue, as well as treatment by sand-chemically carbonized rubber wood sawdust column, although our model solution had higher concentration of Cu²⁺ ions (242.60 mg/dm³) than those used in comparing experiments (up to 160 mg/dm³). Furthermore, sorption capacity for Cu²⁺ ion remained high in the presence of other heavy metal ions. Therefore, the preliminary results showed promising sorption properties of solid residue obtained by the co-pyrolysis of lignite and HDPE against Cu²⁺, but also possibly for other heavy metals, particularly, Pb²⁺ ions.