Geophysical Research Abstracts
Vol. 20, EGU2018-4222, 2018
EGU General Assembly 2018
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Monsoon-related rainfall recorded by mineral-rich flood layers in Vietnamese maar sediment

Jan Schimmelmann (1), Hu´ng Nguy˜n-Văn (2), Duong Nguy˜n-Thùy (2), Arndt Schimmelmann (3), Antti Ojala (4), Bernd Zolitschka (1), and Nguyṭ Nguy˜n-Ánh (2)

(1) Institute of Geography, University Bremen, Bremen, Germany, (2) Faculty of Geology, EOS Geoscience Research Group, VNU University of Science, Hà Nị, Vịt Nam, (3) Department of Earth and Atmospheric Sciences, Indiana University, Bloomington, Indiana, USA, (4) Geological Survey of Finland, Espoo, Finland

In the absence of a long written history and instrumental records of strong monsoon flooding in Vietnam, sedimentary geoarchives are invaluable to reconstruct flood events of the past. Vietnam's volcanic Central Highlands near Pleiku feature numerous craters (maars) ranging in age from 2.4 to as recent as 0.2 Ma that offer sedimentary archives of flood-related mineral transport. In three field campaigns between March 2016 and November 2017, we collected numerous gravity and piston cores, including a 3.5 m long record from the 21 m deep Bin H` maar lake near Pleiku (14°N, 108°E) that is visibly laminated in its top portion. Prior to 1983, Bin H`'s catchment area was limited to the small maar crater and allowed erosion and transport of minerals only from the rim and shallow areas within the lake, a process directly related to heavy rainfall. A multi-proxy approach including high-resolution mineral magnetics, porosity, diatom abundance and radiometric dating is applied to constrain and establish the value of mineral-rich event layers as vestiges of paleoflooding. In addition, we scrutinize the Bin H` sedimentary record of the past 35 years in terms of changes in land use and the establishment of overflow channels that temporarily exposed Bin H` to uncontrolled flood water overflow from an adjacent large reservoir. Historic photographs and a sequence of satellite images document changes in land use and aid in the interpretation of laminae in Bin H` sediment. Both history and water quality of Bin H` are of great interest for the City of Pleiku that receives much of its freshwater from the maar lake.