

## A portable system for acquisition of low-distortion sediment core images using computer vision and deep learning for post-processing

\*Stephen Obrochta<sup>1</sup>, Szilárd Zsolt Fazekas<sup>2</sup>, Morén Jan<sup>3</sup>

1. Akita University Graduate School of International Resource Science, 2. Akita University Engineering Department, 3. Okinawa Institute of Science and Technology

While imaging the split surface of sediment cores is standard procedure across a range of geoscience fields, obtaining high-resolution, continuous images with very little distortion has traditionally required expensive and fragile line-scanning systems that may be difficult or impossible to transport into the field. Thus many researchers take photographs of entire core sections, which may result in distortion, particularly at the upper and lower edges. To overcome this issue, we constructed an inexpensive, rigid, manually-actuated camera sliding frame to take a series of overlapping images of a split sediment core. We then developed a set of open source tools for seamlessly stitching together the photographs using computer vision techniques. The resulting composite image contains less distortion than a single photograph of the entire core section. The method allows for detection of and correction for variable camera tilt and rotation between adjacent pairs of images. We trained a deep neural network to post-process the image to automate the tedious task of segmenting the sediment core from the background, while also detecting the location of the accompanying scale bar and cracks or other areas of coring-induced disturbance. A color reflectance record is then generated from the isolated core image, ignoring variations from e.g., cracks and voids.