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An application to correct for cracks in core photographs

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Colour data from deep-sea cores has become an important tool in past climate reconstructions and stratigraphy to characterise changes in lithology. This is because image scanning is a fast, inexpensive and non-destructive method to retrieve high-resolution records. Cracks in the sediment, however, may significantly alter the colour data. Here we present new algorithms to correct the colour data for cracks. As an example, we will discuss the application of this method using a core from the Ocean Drilling Program.

In images, cracks may be recognised as dark areas, especially when images are illuminated to gain quantitatively comparable results. We use the differences in brightness to separate between cracks and non-cracked sediment. The adjustment of threshold values for crack recognition is not straightforward and has to be done and checked manually.

We analyse images in a way that we calculate mean values, median values and standard deviations of Red, Green, Blue (RGB) and grayscale data. To correct for dark/cracked areas within images, we exclude from analysis:
1) all data darker than a user-defined threshold value (which leaves 'uncracked' data from pixels brighter than the threshold)
2) only pixel-rows which are darker than the threshold for a user defined percentage (e.g. 80%). This way only horizontal cracks are accounted for. In this case a correction for the potentially new amount of analysed pixel rows is made.
We also compute a combination of the previous points: both pixel rows and individual datapoints darker than the defined threshold value are excluded from calculations, a correction for the potentially new amount of analysed pixel rows is made. Further, we compute colour data from the original image for comparison.

We have applied this technique to ODP core C26 of Site 926 (Ceara Rise) in the equatorial Atlantic and compared results from these image correction techniques. Further, we discuss the influence of image resolution, and compare high-resolution colour scans to original ODP images provided by ODP in the initial reports of expeditions.

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