OR/19/049 Core scan data

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File name: GGC01_Coreboxes_All.xlsx Index of core box numbers to depths, needed to use the images

Folders containing images:
- Optical images
- Radiographic images
- Radiographic images-coal

The core scan data are a series of measurements and images taken of the GGC01 borehole core using the Core Scanning Facility (CSF) at BGS Keyworth. The CSF contains four scanners which are listed below with links to the technical specifications:

- Geotek Multi Sensor Core Logger Standard (MSCL-S)
- Geotek rotating X-Ray, CT Scanner (MSCL-RXCT)
- Geotek Multi Sensor Core Logger XYZ
- Itrax Multi Core (ITRAX-MC)

The core scan data contained in this intermediate data release comprises the optical imaging collected from the MSCL-XYZ scanner and the 2D radiography collected using the MSCL-RXCT scanner.

In some coreboxes, particularly ones which were sampled at drill site, the core shifted inside the liner. As a result it is strongly advised that the radiography images are used alongside the optical images.

Scanner settings were consistent across the entire length of the core. However to optimise visualisation and interpretation the outputs have been manually scaled and as a result they may not be suitable for automated processing or machine learning techniques. The raw unscaled image data can be requested from ukgeosenquiries@bgs.ac.uk.

Naming and image conventions

When core arrives at the National Geological Repository (NGR) at BGS Keyworth it is accessioned. This process records the standard core metadata and assigns a core box number to each core stick. The core box number is a unique identifier and links the core box metadata to borehole datasets. The core scan images are named using the core box number. A spreadsheet *(GGC01_Coreboxes_All.xlsx)* has been provided to link the core box number to core depth.

Each image supplied corresponds to one core box of approximately 1 m length. Some core boxes

clearly show less than 1 m of core, some contain gaps where during drilling samples were taken and some show core runs slightly longer than 1 m.

The top of the image is the top of the core box, the base of the image is the base of the core box.

2D radiography

The 2D radiography data was collected using the Geotek MSCL-RXCT immediately after it was accessioned. Opaque core liners were not opened prior to radiography being taken. The MSCL-RXCT has a rotating source detector arrangement. This allows the core to remain undisturbed during scanning. Three angles were chosen for radiograph acquisition in GGC01.

- 0 Degrees – Source directly above core and detector below
- 45 Degrees – Source and detector at 45 degree angle to the core
- 90 Degrees – Source and detector either side of the core

The three angles give the user information on how fractures propagate through the core, as high angle fractures may not be clear on some orientations.

Density contrasts

Where there are large density contrasts between materials in the same core box it is not possible to properly image all material. For GGC01, a decision was made to set a source power and current to provide the maximum amount of information over the whole cored section. The result is that rocks with high and low densities are not optimally imaged. For the denser material this problem has been addressed by manually scaling the images to give more information.

Where there are high and low density rocks within the same core box, the scaling process can remove low density material from the image. This is a particular problem with coals and as a result they can appear as sections of core loss. For this reason users are strongly encouraged not to use the radiography images in isolation, but to view them with the optical images.

The scaled images are included as .tiff files in the *'Radiographic images'* folder, three images per core box labelled with the acquisition angle_A0, A45 or A90.

To ensure that the coal sections are properly represented, each box which contained over 15 cm of coal was rescanned with a different source power and current. These images are contained within the *'Radiographic images-coal'* folder.

Optical imaging

The optical images were collected at a resolution of 50 microns. Scanning took place immediately following the radiography scanning, after the opaque core liner had been opened and before discontinuity and sedimentary logging in order to reduce core disturbance. The images have been scaled to allow for interpretation and are included as one .tiff file per core box in the *'Optical images'* folder.

Future core scan datasets

The remaining core scan datasets (MSCL-S and XRF) will be included in a final data pack. The core scan images will be re-supplied with a length scale.

The information below formed the initial data release (Starcher et al. 2019[1]) and is included in this in intermediate data release for completeness.

References

1. ↑ STARCHER, V, SHORTER, K, BARRON, H, BURKIN, J, ELSOME, J, FELLGETT, M, KINGDON, A, BARNETT, M, MONAGHAN, A. 2019. *GGC01 cored, seismic monitoring borehole — initial data release*. Nottingham, UK, British Geological Survey, 14pp. (OR/19/021) http://nora.nerc.ac.uk/id/eprint/522744/

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