

Crystal Imaging Systems

G50 fabric analyser

technique

The computer-controlled microscope has rotating polarising filters above and below the stage. The LED illumination system is polyaxial with a vertical axis and eight inclined axes. The high resolution four megapixel camera transfers images to the controlling notebook computer at 15 frames per second via Gigabit Ethernet.

The image area is 10x10mm and the pixel resolution can be set between 50 and 5µm. The computer controls the acquisition of axial images at stepped rotations of the polarisers. The resultant stack of images is analysed, pixel by pixel, to determine the optical retardation and the c-axis orientation of the sectioned material.

The system works for standard sections of ice, quartz and apatite.

history

The G50 analyser is the fifth generation instrument to be designed and constructed over a twenty-five year development period. Earlier instruments were primarily for glaciological use. With advances in cameras, computing power and memory, the capabilities of instruments have steadily improved.

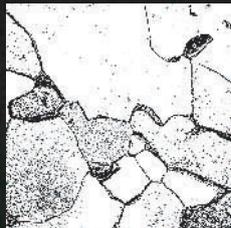
The current G50 model is suitable not only for glaciology but is also being used for geological work - particularly with quartz.

10 mm

ice



crossed polars



grain boundaries



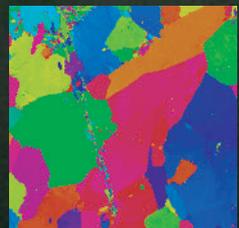
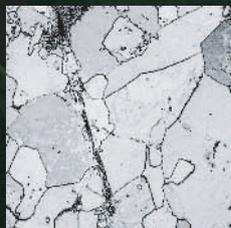
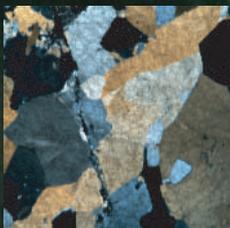
retardation



orientation

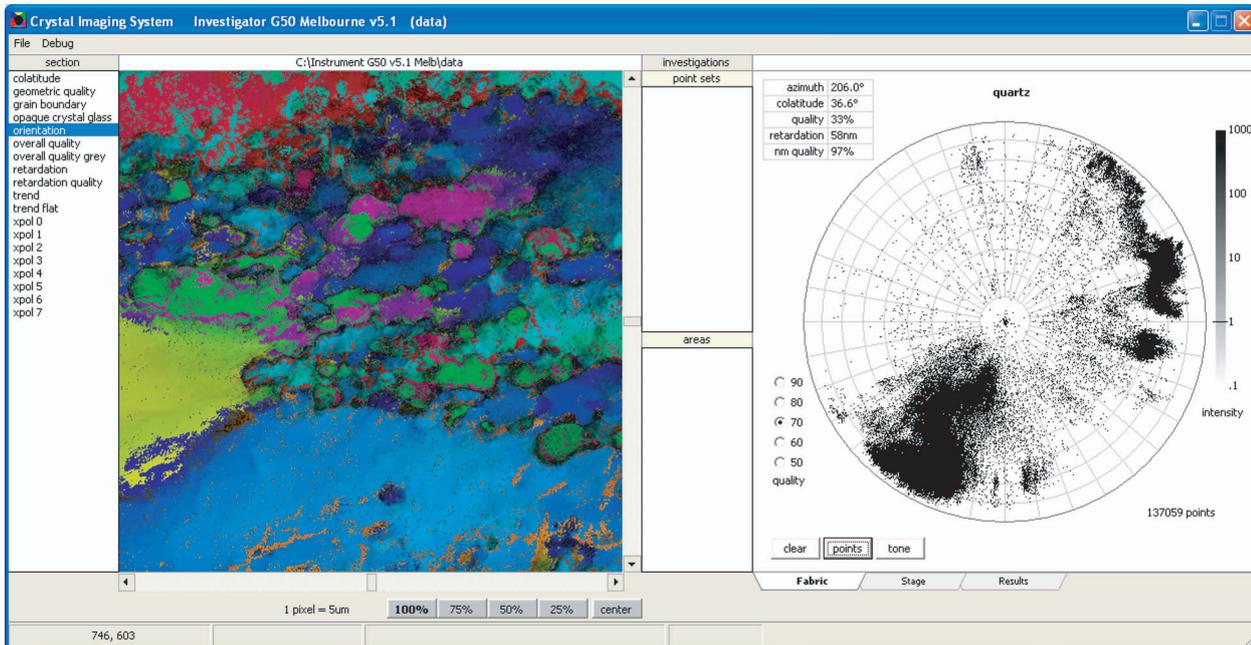


quartz



analysis

Because the data reside at the pixel level, image analysis techniques can be applied for post processing of the data. The *Investigator* software program facilitates the production of c-axis fabric data and equal-area plots. Simply by passing the mouse over a section image, the user can view the data associated with a pixel and immediately see the plotted orientation of the pixel. This rapid viewing and assessment of the section data makes for efficient use of research time.



technical information

standard equipment	portable G50 instrument, 4 megapixel 15fps large sensor camera, motorised stage, notebook computer, <i>Instrument</i> software, <i>Investigator</i> software, aluminium field & transit case.
optics	50mm f1.2 objective lens, 75mm f1.8 imaging lens, polariser filters, quarter wave plate, RGB LED illumination vertical axis, white LED illumination inclined axes
optional optics	Zeiss 20x microscope objective
camera	Prosilica GE 2040 machine vision camera, 2048x2048 monochrome, Gigabit Ethernet
stage	100x100mm computer controlled
field of view	10x10mm with 50mm objective lens, 1.8x1.8mm 20x microscope objective lens
acquisition time	50s for 200x200 output pixels, 4min for 1000x1000 output pixels
section thickness	standard 0.2 to 1mm for ice, standard 20 to 100um for quartz
field & transit case	Zarges aluminium case Type 40678
shipping weight	25kg approx (does not include notebook computer shipped separately)
customs ECN	Export Commodity Classification 9011.80.00

outcomes

Examples of previous versions of the fabric analyser and early results can be found in:

Wilson CJL, Russell-Head DS, Sim HM (2003) The application of an automated fabric analyser system to the textural evolution of folded ice layers in shear zones. *Annals of Glaciology* 37: 7-17

Wilson CJL, Russell-Head DS, Kunze K, Viola G (2007) The analysis of quartz c-axis fabrics using a modified optical microscope. *Journal of Microscopy* 227: 30-41