A Decade of Progress

The era of digital aerial cameras (DAC) began in the year 2000 with presentation at the ISPRS congress in Amsterdam of prototypes from Z/I Imaging (today Intergraph and since mid-2010 a wholly owned subsidiary of Hexagon AB) and LH (today Leica Geosystems and since 2005 part of Hexagon AB). The first commercial DAC became operational in 2001. This passive remote-sensing technology rapidly evolved into sensors which advanced from capture capability of around 20 mega pixels per frame a decade ago to 200 mega pixels today. And the end is by no means yet in sight. At least a dozen hands are needed to count the various types of DAC system available for surveying from manned aircraft or unmanned airborne vehicle.

The benefits of digital aerial over film cameras include better radiometric resolution, and elimination of film processing and scanning costs. The digital format of image content allows for highly automated workflow, enabling generation of photo¬grammatric products such as digital elevation models (DEM) and ortho-mosaics with little delay between capture and end-user application. This might allow rapid response after disaster. Camera systems may be equipped with fixed or interchangeable lenses. The latter enhances flexibility, as optimum project-specific field of view (FoV) and flying height may be chosen. However, aircraft vibration means the interior orientation parameters of the camera may fluctuate during flight, degrading geometrical accuracy, a problem resolvable only by rigorous self-calibration using known geometry in object space and sophisticated software.

DAC architecture consists either of linear CCD arrays or area CCD chips placed in the focal plane. Linear-array or push-broom scanners employ a single lens head. Capturing of colour (RGB) and the near-infra band is done by placing three or more linear arrays in the focal plane, upon each of which are projected different bands of the electromagnetic spectrum using beam-splitters. The area CCD array solution results in a frame camera consisting of several (multi-head) cones. In my overview published in GIM International April 2008 I categorised the various DACs under linear- and area-array solutions: one of many possible groupings. In my subsequent overview on page 35 of this issue, I emphasise three new digital camera system developments stemming from China, USA and Israel. Beijing Siwei has constructed a large-format system configured from four Hasselblad cameras with removable lenses. US-based Pictometry and competitors have developed an oblique camera system comprising five cameras rigidly mounted together in one casing. Israel-based VisionMap recently marketed a panorama camera with across-flight-line FoV of over 100 degrees. In tandem with my current overview comes a new product survey, see the GIM website.