Question: What is the correlation between pixel size of the current mapping cameras in use and the mapping accuracy achievable for a given pixel size? e.g. for data collected at a 30 cm GSD what would be the best mapping horizontal accuracy achievable?

Dr. Abdullah: Unlike film-based imagery, digital imagery produced by the new aerial sensors is not referred to by its scale as the scale of digital imagery is difficult to characterize and is not standardized. Digital sensors with different lenses and sizes of the Charge Coupled Device (CCD) can produce imagery from different altitudes with different image scales, but with the same ground pixel resolution. In addition, the small size of the CCD array of the digital sensors results in very small scale as compared to the film of the film-based cameras. This latter fact has made it difficult to relate the image scale to map scale through a reasonable enlargement ratio as is the case with film-based photography. As an example, the physical dimension of the individual CCD on the ADS40 push broom sensor is 6.5 um; therefore for imagery collected with a Ground Sampling Distance (GSD) of 0.30 m, the image scale is equal to (6.5/0.30x1000000) or 1:46,154. Such small scale can not be compared to the scale of the equivalent film imagery or 1:14,400 which is suitable to produce maps with a scale of 1:2,400 or 1”=200’. Here, the conventional wisdom in relating the negative scale to map scale, which has been practiced for the last few decades is lost, perhaps forever. Traditionally in aerial mapping, the film is enlarged 6 times to produce the suitable map or ortho photo products. This enlargement ratio is too small to be used with the imagery of the new digital sensors if we equate the CCD array to the film of the film-based aerial camera. Imagery from the ADS40 sensor as it is used today has an enlargement ratio of 19!"  

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Users of digital cameras are experiencing improved map quality and accuracies that exceed those given in Table 2. In other words, imagery from a good digital sensor with a GSD of 0.15 m may be suitable for map scale larger than 1:1,200, and in the future we may need a new standard for the digital camera products that reflects the improved quality and stability of these digital sensors.

Please send your question to Mapping_Matters@asprs.org and indicate whether you want your name to be blocked from publishing. Answers for all questions that are not published in PE&RS can be found online at www.asprs.org/Mapping Matters.

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