

The ACSM-ASPRS Conference

I - The ACSM-ASPRS Technical Programme

• Terra

At the very beginning of the ASPRS programme, three speakers from NASA summarized the results from the first two years of operation of the Terra satellite. First Vincent Simonsen presented an almost bewildering number of applications using MODIS images. They included the mapping of sea surface and land temperatures on a global scale; continuous land cover and vegetation mapping with the changes of season; a rapid response data system giving daily global coverage of fires; etc. With 45 different MODIS products being generated on a daily, weekly or monthly basis the data processing involved is quite mind boggling. The second NASA speaker was David Diner, who described the results obtained with MISR, the Multi-angle Imaging Spectro-Radiometer (MISR) mounted on Terra. This collects global images of the sunlit side of the Earth at nine widely spaced angles simultaneously. When combined with stereoscopic techniques, these allow the construction of 3D models of cloud formations. Finally, the third NASA speaker, Anne Kahle, gave a sample of the results obtained from the ASTER stereo-imager built in Japan. Numerous examples were cited and illustrated, including geological applications, volcano and glacier monitoring, hydrology applications, etc. From the very positive, indeed enthusiastic, response from several users in the audience, it does seem that the ASTER stereo-data is invaluable. Yet it appears to be grossly under-used, notwithstanding the fact that it is almost being given away.

• Future NASA Missions

At the very end of the ASPRS part of the Conference, there was also the opportunity to hear about some of the forthcoming missions being planned or implemented by NASA. Claire Parkinson gave a really excellent account of the preparations for the new Aqua mission. Since the satellite was launched only two or three days after the Conference had ended and a special short report has been included in this issue of GeoInformatics, there is no need to say anything more here.

Her presentation was followed by a most interesting lecture by James Irons on the Landsat Data Continuity Mission (LDCM). Landsat has now been continuously in operation for 30 years producing well calibrated data of a useful ground resolution over the whole of this period. Indeed both Landsat-5

and -7 are still operational. But the management of the project has been subject to policy changes and a lack of continuity. Originally, between 1972 and 1979, it was managed and operated by NASA. Then it was operated by NOAA for the five years till 1984. After which, there was a period of "commercial" operation by EOSAT/Space Imaging. Most recently (since 1999) Landsat-7 has been operated and managed jointly by USGS and NASA as a global imaging and mapping project. Now for the new LDCM mission, USGS and NASA are to try a new approach - taking the form of a private and public partnership - while still ensuring the continuity of the Landsat data. The two government agencies will undertake to purchase 250 scenes per day. (N.B. The present Landsat-7 capacity is 500 scenes per day). It is then up to the successful commercial contractor to undertake the commercial collection, sale and exploitation of Landsat quality data beyond this base level. Having received various industrial proposals, USGS and NASA have selected those submitted by Resource21 (mostly Boeing) and Digital Globe (formerly EarthWatch) for further technical development and the generation of a suitable business plan - with NASA providing \$5 million funding for this initial stage. A preliminary design review and the evaluation of the business case for the new approach will take place at the end of 2002. The finally selected contractor for the LDCM project

With the FIG Congress taking place in Washington this year, the two major American professional and scientific societies - the ACSM and the ASPRS - decided to forgo their own annual conferences. Instead they chose to organize a joint technical programme that still formed a substantial part of the overall FIG Congress. Thus even if, this year, we did not have the usual ten or twelve parallel sessions of the full ASPRS annual conference, we still had to choose between six or seven simultaneous lecture sessions within the ACSM-ASPRS segment of the Congress programme. So, once again, only a small sample of presentations could be attended - especially if one was to go and inspect the comprehensive technology exhibition that was also held over the first three days of the Congress. However, as at last year's ASPRS Conference, your reporter was fortunate to be able to participate in a number of highly interesting, indeed outstanding, sessions on photogrammetry and remote sensing. These included several sessions devoted to the latest spaceborne and airborne imagers.

By Prof. Gordon Petrie

will then be appointed in mid-2003. The first data would be delivered to the government agencies in 2005.

• Mapping from IKONOS & QuickBird Images

The sessions on photogrammetric and mapping applications that I attended were focused largely on the results obtained from tests of IKONOS and QuickBird space imagery. Dr. Philip Cheng of PCI gave the results of geometric accuracy tests (carried out in collaboration with Dr. Thierry Toutin of CCRS) of both types of image over test areas around Toronto (Canada) and El Paso (Texas). The results obtained using Toutin's model were in the order of just over one pixel for IKONOS and a little more for QuickBird. Whereas the accuracies achieved with comparative tests carried out using rational polynomial functions were considerably poorer, especially away from the GCPs when totally independent check points were used in the tests. Brett Thomassie of Digital Globe concentrated more on the mapping applications side, showing numerous examples of recent images acquired by QuickBird for all sorts of different applications. Then Karsten Jacobsen of the University of Hannover spoke about the generation of orthoimages from IKONOS Carterra Geo imagery without the use of orientation information or rational functions. A minimum of four GCPs with different elevation values is required for the implementation of

A Report on the Washington Meeting

his method. Orthoimages with an accuracy of 2 to 3m are possible, based solely on the available metadata.

• Airborne Imagers

As might be expected, both Roger Pacey of LH Systems and Alistair Stuart of Z/I Imaging gave reports on the development of the ADS40 pushbroom scanner and the DMC digital camera respectively. Not unexpectedly, it is taking very much longer to get these new all-digital imagers fully developed and operational than was originally planned. But progress is steady, if slow. However, what did come as a real surprise was the report on the development of a new high-resolution electro-optical framing camera given by Brian Gorin of BAE Systems (formerly Fairchild). This is based on the use of a 9.2 x 9.2k (= 85 Megapixels) areal array having a pixel size of 8.75 x 8.75µm in the sensor. This contrasts with the use of four separate 7 x 4k areal arrays on the Z/I Imaging DMC camera. This new all-digital camera allows a very high framing rate (2 frames per second) and differential image motion compensation (IMC) for use with oblique imaging. Various forms of the camera with different lenses have been tested from both high and low altitudes. A DGPS/INS unit can be added for mapping applications. By all accounts, the cost of this new areal array sensor is pretty astronomical (high), but it really does push the outer limits of current digital camera technology a long way forward. Hopefully, as so often happens with digital imaging technology, the cost of the areal array sensors will drop before too long.

• Airborne Laser Mapping

As one would expect, there were a number of sessions devoted to lidar mapping. Given the inevitable clashes resulting from the simultaneous parallel lecture sessions, I could only attend a couple of these sessions. But I was particularly impressed by the presentation given by Ron Roch of LH Systems (formerly Azimuth) on recent advances in laser mapping technologies. These include (i) a steady decrease in the spacing between measured points using a higher pulse rate while still maintaining accuracy; (ii) the use of ever higher operating altitudes; and (iii) the exploitation of the multiple returns from the lidar pulse. On the applications side, Cheryl Hallam described the generation of surface models from airborne lidar data for the ice-free dry valleys of the McMurdo area in the Antarctic. While Juerg Luethy described in detail a project concerned with lidar mapping in the Swiss

Alps carried out by the American TerraPoint company (from Texas) and the Swissphoto group using TerraPoint's own lidar technology and data processing capabilities. On the processing side, Ricardo Passini of BAE Systems-ADR also discussed the filtering of lidar data to form digital terrain models. A disappointment was the cancellation, at the last moment, of the special session on NASA's latest developments in the lidar field, including the LVIS and SLICER projects. I felt especially sorry for the moderator, Martin Flood, who was left to apologize to the big audience for the late cancellation of the session. But this was one of the very few negative points in what overall was an excellent ASPRS programme. Sorry that time and space do not allow more of the lecture programme to be reviewed!

II - Technology Exhibition

It was a really good exhibition with over 120 separate booths and stands. These ranged from the large stands of Leica Geosystems, Trimble, Sokkia, Topcon, Z/I Imaging, Ashtech, ESRI, Intergraph, Boeing Autometric, BAE Systems and Eastman Kodak selling hardware and systems down to tiny companies selling stakes and ranging poles. Between these two extremes, there were lots of small- to medium-sized companies selling software for CAD, digital photogrammetry, remote sensing and GIS, together with a relatively small number of companies providing mapping and surveying services - small, having regard to the enormous size of the North American service sector! The various commercial companies - Space Imaging, Digital Globe, ImageSat International and Orbimage - supplying space images were all represented, showing lots of eye-catching images. Furthermore the commercial trade press was well represented by GeoInformatics (of course!), GIM, Professional Surveyor, GPS World, GeoWorld, EOM, Points of Direction, Geomatics World, Hydro International, Geospatial World, Imaging Notes, GIS Development, etc. I came back from the Congress with heavily overweight luggage and enough reading material to last me for weeks, if not months!

In the non-commercial sector, the big U.S. government surveying and mapping organizations were all there in force, including USGS, NOAA, NIMA, BLM and several different NASA labs. Besides which, quite a number of North American universities had stands describing their teaching and research programmes. The two large U.S.

professional organisations - the ACSM and the ASPRS - associated with the Congress both had large stands with big stocks of books, conference reports, manuals and other publications. If anything, the time available (2½ days) was simply inadequate to do the technology exhibition anything like justice, especially if one was to pay any attention to the lecture programme (which I did!). There was so much to see that I personally could easily have spent three or four days in the exhibition without attending a single lecture. Certainly almost all the stands seemed to be busy: hopefully the exhibitors were happy!

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