

## Hands-on GPS and Remote Sensing Training for High School Learners During IGARSS 2009 in Cape Town, South Africa

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### Abstract

Continuing the commitment of the Geoscience and Remote Sensing Society (GRSS) to education and outreach, the IEEE 2009 International Geoscience and Remote Sensing Symposium (IGARSS) conference in Cape Town South Africa provided an opportunity for over 400 local high school learners to engage in hands-on GPS training and remote sensing workshops. The average learner aged for the events was 17.7 years old. The learners were from socio-economically challenged populations from surrounding Cape Town areas. Online lectures, public tutorials, distinguished speakers and IGARSS tutorials have been pillars of an effective education strategy for the Geoscience and Remote Sensing Society. GRSS piloted a new dimension of educational outreach during the 2008 conference in Boston, Mass.[1 3 4]. The number of learners participating in the 2009 IGARSS more than doubled the number involved in previous IGARSS conferences.

Coordinating with the University of Cape Town in South Africa two organizations, Mafeteng Schools Environment Network (MSEN) and the Students' Health and Welfare Centres Organization (SHAWCO) assisted in identifying the student learners. MSEN emerged from a workshop the teachers decided to form. A network of teachers believed that rotating leadership would not only help motivate participation of other teachers, particularly those that are not supporting the Network projects, but also permit monitoring of progress made in each school. This enabled intensive discussion of local region called Ramokoatsi and their activities. SHAWCO, the Students' Health and Welfare Centres Organisation, is a dynamic, innovative and passionate student-run organization based at UCT. SHAWCO constantly strives to improve the quality of life for individuals in developing communities within the Cape Metropolitan area.

The hand-on GPS training, at IGASS 2009, utilized were Garmin 60 recreational units. The accuracy of measurement is within a tolerance of approximately 15 feet or 2 meters. GPS 60 has one megabyte (MB) of internal memory for storing points of interest, and it comes factory preloaded with a worldwide city point database. GPS 60 also offers special geocaching features, indoor and outdoor games, an alarm clock, sunrise/sunset and moon phase tables. The Garmin 60 is WAAS-enabled for precise location and navigation. During the hands-on GPS workshop, learners received instruction on types of GPS units, data collection, analysis and data integration with GIS and remote sensing use. After receiving instructions on how to operate the devices, learners were presented with theoretical challenges of navigating and land surveying. Groups of students then used the hand-held GPS to complete assigned tasks. Each GPS session was about one hour in length. The area utilized was the public outside venue on the campus of the University of Cape Town.

The teaching methodology utilized was a qualitative action research influenced by a constructivist approach. In addition, this approach has a track record from [2-4] past outreach efforts. The number of student groups varied for the 2009 groups but a total reached in the GPS session was approximately 250 students arranged in groups from 5 to 33 students. For IEEE 2009 outreach, we have 4 GPS trainers who have joint and individual educational exposure, experience and awareness about remotes sensing application and how global position satellites and geographical information systems are utilized by society and implications for polar region research.

In addition to the GPS and remote sensing workshops, students visited with vendor booths and met with scientist. They asked questions and received signatures from the vendors. Rewards were provided for all who complete the IGARSS scavenger hunt. Typical questions asked in the exhibit hall included: Why they enjoy their job? What subject are most important to study? What does a certain word or image mean? What is the importance of remote sensing? What is GIS? What is GPS? Most often students inquired about the importance of GIS and remote sensing to Africa and how their communities could be helped. Students reported that the most frequent response to the question was: Mapping and protection of the forest, crop growth, prediction of floods, and other weather disasters; and crime control.

Nina Jackson (NESDIS) and Ambrose Jearld (NEMF) of the National Oceanic and Atmospheric Administration conducted discussions and demonstrations of educational products for learners to help build understanding of the science of Earth's systems and the stewardship of our planet.

Additional outreach activities included a Remote Sensing Art Workshop and a Mathematics of Remote Sensing Team Contest. For the art contest, students provided a visual insight into how experiences at IGARSS'09 had impacted them. They were instructed to close their eyes and visualize some of the highlights from their IGARSS 2009 experience. They used the images, colors and data from exhibits, scientist and poster sessions, in their design of an IGARSS 2009 Mousepad. Student teams brought their collective wisdom to the solution of mathematics problems related to remote sensing and climate change during the team mathematics competition. Teams were challenged to solve 20 multiple choice mathematics questions. The questions were written by local teachers to ensure that the African voice was used in phrasing the questions.

Complete reporting of the results, including participant demographics and photos, will be made available in the full paper.

## Bibliography

- [1] Kunkee, David, "IGARSS'08 Remote Sensing Outreach Program: The Next Generation", IEEE Geoscience and Remote Sensing Society Newsletter December 2008 cumulative Issue # 149, ISSN 0274-6338 Page 9.
- [2] J. R. Jensen, "Chapter 1 Intro" in *Sensing of the Environment: An Earth Resource Perspective*, 2<sup>nd</sup> Edition, Upper Saddle River, NJ: Prentice Hall, 2007, pp. 592.
- [3] J. Kereke, E. Miller, GARSS'08 in Boston - Geoscience and Remote Sensing: The Next Generation, IEEE Geoscience and Remote Sensing Society Newsletter December 2008 cumulative Issue # 149, ISSN 0274-6338 Page 21-25.
- [4] D. Kunkee "IGARSS 2008 Brought in The Next Generation", IEEE Geoscience and Remote Sensing Society Newsletter September 2008 cumulative Issue # 148, ISSN 0274-6338 Page 9.
- [5] J. D. Kerski, J. D. The implementation and effectiveness of geographic technology and methods in secondary education. *Journal of Geography*, 102(3), 128--137.

[6] National Academy of Sciences. *Learning to think spatially: GIS as a support system in the K-12 curriculum*. Washington, DC: The National Academies Press, (2006), pp. 314

[7] United States Department of Labor. (2005). *Identifying and addressing workforce challenges in America's geospatial technology sector*. Retrieved November 7, 2008, from [http://www.doleta.gov/Brg/pdf/Geospatial Final Report\\_08212007.pdf](http://www.doleta.gov/Brg/pdf/Geospatial%20Final%20Report_08212007.pdf)