

INTEGRATION

The newsletter for Geo-spatial and Range Sciences

This newsletter is produced by the GIS Training and Research Center at Idaho State University, Campus Box 8130, Pocatello, Idaho 83209-8130

This is the first issue of "Integration", the newsletter for Geo-spatial and Range Sciences. You are receiving a free subscription because of your past participation in ISU GIS Center's "Geo-spatial and Range Sciences" conference. As much as we are sure that you will enjoy reading this letter if you prefer not to receive it, simply contact us and ask to be removed from our mailing list. Our e-mail address is giscenter@isu.edu and our regular mailing address is given above.

So, sit back and enjoy "Integration".

What are the Geo-spatial sciences?

Also called the geotechnologies, geo-spatial science includes the fields of Geographic Information Systems (GIS), Global Positioning System (GPS), and Remote Sensing (RS).

That was a mouthful. In fact, to those new to the geotechnologies the above description may not be very helpful at all. Let's take it one step at a time beginning with GIS.

GIS is an acronym that means geographic information systems. You can think of it as smart maps. The digital versions of familiar maps like roads and rivers backed up by a database describing the roads and rivers. This system makes GIS a very powerful management and analysis tool.

GPS is a fairly common geotechnology. To many of us it is the handheld cell phone sized hardware that tells us where we are and helps us from getting lost when we go hunting and hiking in Idaho's great outdoors. But GPS is also a system, part of which is the handheld receiver I just mentioned. Another part of the system is a constellation of 24 active satellites that communicate with our receivers (its more of a one way lecture really) and help our receivers figure out where we are.

Not all GPS receivers are created equal though. For research purposes we need to invest in high-accuracy receivers to complement the state of the art satellite imagery we need for our rangeland research. This imagery is known as remote sensing data (the third part of the geo-spatial sciences).

Remote sensing satellites "image" the earth's surface by recording reflected light energy. To enable these images to be analyzed, the satellites break down and store the energy signals in discrete bands. Breaking down the signals occurs in much the same way as a prism works. Incoming "white" light is changed into red, green, and blue components. The intensity or brightness of the red, green, and blue components is measured and recorded for each band (red, green, and blue). While a prism breaks down visible light, satellite sensors go one step further and break light into longer invisible parts as well, such as the infrared band.

The process of sensing reflected light, breaking it down, measuring its intensity, and recording it is done millions of times within each image. Essentially once for each pixel. Some satellite imagery has very small pixels. Using these data we have the best chance of capturing an accurate picture of rangeland condition, but only if the accuracy of our GPS receiver is such that we are certain to place our field data inside the correct pixel!



What is Range Science?

To appreciate what range science is I think we first need to define what rangelands are. After all, this is effectively the science of rangelands right?

Rangeland is one of the most abundant types of land, covering 47% of the Earth's surface. This land supports a great deal of wildlife, provides us with timber, water and other natural resources, and is used as foraging land for domesticated animals. According to the University of Wyoming's Range Science program, "rangelands are complex ecosystems known for their unpredictable weather, varying topography, and a wide array of soils, wildlife habitat, and forage for domestic and wild herbivores." The extreme weather patterns, poor soil and drainage and rough topography of rangelands mean that they are commonly used as a source of forage for domesticated animals, rather than for growing crops. Rangeland usually includes grasslands, savannas, tundras, and open woodland. (from <http://environmentalprograms.net/guidance/range-science/>).

Range science then is the study of rangelands to promote the careful and sustainable management of rangeland resources.

You cannot manage what you do not measure...

The Geo-spatial sciences provide an excellent technology to measure rangelands and range condition at a variety of scales. At Idaho State University's GIS Training and Research Center, scientists has been working for several years to develop reliable techniques to accurately measure rangelands. Individual studies include several invasive plant detection projects and several wildfire projects. Many of these have been funded by NASA through the support of Senator Larry Craig and the Idaho delegation. Without their support most of our research would not have been possible.

Scientists at ISU have most recently embarked upon a new study focussing on the effect of management decisions on rangeland health and changes to the range landscape. We will be reporting on the results and progress of this research in coming issues, for now we would like to introduce our readers to the scientists and research staff (for more information please visit <http://giscenter.isu.edu/Research>).



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Watch for our next issue detailing the July Conference and Workshops.

