

Insiders View - Data Fusion “the Future is at Hand

Researchers in this field are continually working to enhance the value, timeliness and ease-of-use of remotely sensed data products so that they can support an even broader range of information needs.

Among the most exciting recent advances in remote sensing are innovations in multi-sensor data fusion. The goal is to combine data from multiple sensors to exponentially increase both the quality and quantity of information about the sensed environment. Typically, complementary sensors are used, meaning that each provides some information that the others do not. For example, one type of sensor might supply detailed spectral information used to classify features on the Earth's surface, whereas another might supply precise spatial information used to geo-locate those features. Through sophisticated means of combining these data, remote-sensing scientists can often obtain even more information about both the locations and characteristics of the features of interest than could be derived from the sensors individually.

Within the NOAA, multi-sensor data fusion is being investigated to support integrated ocean and coastal mapping (IOCM). This initiative seeks to enhance co-ordination and increase efficiency in ocean and coastal mapping activities and to promote the multiple use of data. A multi-sensor, fusion-based operational approach lends itself naturally to this initiative, because data from a single flight mission can be used to support multiple ocean and coastal mapping needs. Specific NOAA programmes that stand to benefit include shoreline mapping, habitat mapping, coastal zone management, coral reef conservation, harmful algal bloom mapping and forecasting, and nautical charting, to name just a few.

NOAA's Remote Sensing Working Group (RSWG) is currently planning an IOCM demonstration project on the North Carolina Outer Banks this spring. The goal of the project is to demonstrate the capability to efficiently and effectively meet the geospatial needs of internal and external partners with high-quality products and services. Sensors such as a topographic airborne light detection and ranging (LIDAR) system and a four-band digital aerial camera will be combined to test the data fusion concept of producing products that are greater than the sum of their parts.

The coastal zone provides an especially fertile ground for the application of data fusion, where accurate elevations, depths and the 3D structure of the environment, including species composition, can greatly assist natural resource management, emergency response and recovery, navigation safety, coastal elevation monitoring and coastal resiliency. By providing synchronous, multi-dimensional layers of data at any geographic point, data fusion greatly strengthens the capacity of the mapping community in meeting the information challenges of a dynamic environment.