

**SUMMARY OF WORK EFFORTS  
OF THE SAN DIEGO REGIONAL GIS COUCL  
IMAGERY SUBCOMMITTEE  
(July through December 2006)**

The Imagery Subcommittee was formed to research options for and determine the feasibility of future partnerships for imagery and terrain data acquisitions. In the six months of work efforts, the committee has conducted a survey of local agencies to determine agency needs; had presentations by various vendors and attended local workshops to learn about new technologies to acquire terrain data and digital imagery; contacted other agencies to determine various structures for forming partnerships; and prepared budgetary cost estimates for acquiring subregional imagery and terrain data. In the following discussions, “regional” refers to the entire San Diego County area (4,300 square miles), whereas “subregional” is a reference to the urbanized portion of the region (roughly 800 – 1,200 square miles depending on the number of local agencies that actually partner in a future imagery or terrain data acquisition effort).

**Key Findings**

- Because of the varying needs of regional and subregional agencies, a regional image and/or terrain data acquisition partnership will most likely not be feasible.
- Many regional agencies’ needs for imagery have been cost-effectively satisfied by the commercially available, off-the-shelf imagery products.
- Since the off-the-shelf imagery is fairly inexpensive, the cost to acquire higher resolution and higher accuracy products is just not justifiable.
- There is no cost effective source for an updated high-resolution terrain model for the region; even when pooling funds in a partnership.
- There are only about \_ dozen regional agencies that would be able to partner; therefore the cost per agency would be too high to obtain a terrain model or digital imagery for the region from scratch.
- Regional agencies do not have adequate budgets for the types of products they desire.
- Some commercial aerial imagery vendors are looking into using Intermap’s NextMap terrain model in their orthorectification process, flying the entire San Diego region, and are also entertaining the idea of allowing multi-agency partnerships to acquire their imagery products. These changes may offer much more accurate products and be a viable way for regional agencies to pool funds to get better imagery products for the region.
- Subregional agencies tend to have the budgets required to obtain the products they desire.
- Subregional image and/or terrain data acquisition partnerships, similar to the 2005 City of San Diego effort, have a good chance of occurring and will most likely continue in the future.
- Advancements in digital cameras and in digital collection and image processing methods have the potential to significantly reduce the costs of acquiring imagery and reducing the time between image capture and delivery of final image products.

## Summary of Background Research

**Survey of Local Agencies to Determine Imagery and Terrain Data Needs** – the Imagery Subcommittee conducted a survey of local agencies in the region to better understand their imagery and terrain data needs. Key findings from the survey include:

- Needs of regional agencies and subregional agencies are different. Regional agencies require imagery and terrain data for the entire region at medium to high resolutions with moderate accuracies to support planning efforts; whereas subregional agencies require very-high resolution data for only portions of the region (jurisdiction, water district, etc) at very high accuracies to support engineering-level work.
- The 2008, 2009, and even 2010 are viable timeframes for a subsequent partnership to acquire new terrain data and/or imagery.
- Most agencies are willing to pay a third party consultant to QA/QC final products.
- Most agencies responding to the survey are in favor of partnerships for acquiring imagery and/or terrain data.
- Most agencies were in favor of partnering with USGS to receive federal contributions towards the partnership and allowing the data (or some derivative of the final products) to be available in the public domain.
- Although agencies want high resolution and accurate terrain data and imagery, generally the budgets allocated for these products are insufficient, even considering cost sharing benefits of partnerships.

### Summary of General Image and Terrain Data Requirements

	<u>Regional Agencies</u>	<u>Subregional Agencies</u>
<b><i>Terrain Model</i></b>		
Resolution	5-meter	5-foot
Accuracy	1:12,000 scale	1:100 or 1:200 scale
Contour Interval	20-foot/40-foot	2-foot
<b><i>Imagery</i></b>		
Resolution	1-foot / 2-foot	3-inch to 6-inch
Accuracy	1:12,000 scale, or better	1:100 or 1:200 scale

### Research Efforts for Acquiring a Regional Terrain Model for the San Diego Region

The most current terrain model for the San Diego region is the USGS 10-meter DEM generated from contours representing the earth's surface in the early 1970s. Research has indicated that it is cost prohibitive to obtain a high resolution terrain model for the region. Possible options include:

1. Generating a bare earth terrain model from our existing NOAA 2003 1<sup>st</sup> return terrain model (3-meter resolution, 2-meter vertical accuracy, 4-meter horizontal accuracy). Cost is \$250,000 or more and pursuing this option is not recommended by consultant who prepared the existing 1<sup>st</sup> return surface because too many unacceptable anomalies would be contained in the final bare earth surface product.
2. Purchasing the Intermap Technology 2005 NextMap terrain model (5-meter resolution, 1-meter vertical accuracy, 2-meter horizontal accuracy). The NextMap terrain model is cost prohibitive

and does not offer viable multi-agency partnership licensing options: \$250,000 for one agency to purchase the data, with a 50% mark up for each additional agency.

3. Obtaining a LIDAR generated terrain model with similar specifications as the NextMap terrain model would cost between \$500,000 and \$600,000 for an area as large as the San Diego region.

#### **Research Efforts on Acquiring Subregional Terrain Models**

- The City of San Diego and other agencies have found the LIDAR terrain data to be very good, very accurate; the City felt it was better than their older models derived from traditional photogrammetric methods.
- Many subregional agencies already have very high-resolution and very accurate terrain models that could be re-used, with or without spot updates in areas of change, for orthorectification in future image acquisition efforts.
- Spot updates to existing terrain models are possible for areas that have changed since the data was initially collected.
- It may not be necessary to obtain new terrain data for each image acquisition project.
- A mix of different types of terrain models and associated metadata can be submitted to and used by vendors in the orthorectification process to prepare new imagery. The Subcommittee is gathering metadata about existing digital terrain data that is currently available from the various subregional agencies in the region. The Subcommittee also plans to create a shapefile showing which parts of the County have relatively recent and accurate digital terrain data. This data and documentation will be made available to vendors as part of a future image acquisition project.

#### **Research Efforts for Acquiring Imagery for the San Diego Region**

- Most regional agency needs are cost effectively being met by the commercially available, off-the-shelf imagery products.
- Current terrain data sets are too coarse and inaccurate to support the desired higher resolution imagery specifications.
- It appears to be too costly to do a custom image acquisition project from scratch, even if a high resolution terrain model exists.

### **Research Efforts on Acquiring Subregional Imagery**

Based on past subregional partnership efforts in the region, the Imagery Subcommittee has determined budgetary cost estimates for acquiring subregional imagery. These are summarized below and will be presented to the full SDRGC at the January 2007 meeting. These figures will be used by subregional agencies for budgeting purposes for a future image and/or terrain data partnership and allow some flexibility as to the products individual agencies can acquire as part of the partnership.

**Option 1 - \$600 - \$700 per square mile** for new imagery only (assumes agency already has a viable terrain model, and no new contours are required)

**Option 2 - \$900 – \$1,000 per square mile** for new imagery, spot updates to an existing terrain model, and contours only for the spot update areas

**Option 3 - \$1,200 to \$1,400 per square mile** for new imagery, a new terrain model, and new 2-foot contours (prices could decrease by \$200 - \$400 if no new contours are needed)

### **Vendor Presentations/Workshops Attended**

DMI

InfoTech

GeoVista

Pinnacle Mapping

Intermap Terrainscape Workshop

### **Agencies contacted about past/existing imagery and terrain data acquisition partnerships**

Denver Council of Governments

Texas Council of Governments

Kern County

Los Angeles Region - Imagery Acquisition Consortium (LARIAC)