# LSU C4G ANNOUNCES INTERNATIONAL PARTNERSHIP TO ADVANCE GEODETIC ANALYSIS AND MODELING

**For Immediate Release**
Monday, March 21, 2016
Baton Rouge, Louisiana, USA

On June 9, 2015, the Center for GeoInformatics (C4G) at Louisiana State University (LSU) established a scientific partnership with the Space & Earth Geodetic Analysis Laboratory (SEGAL) at the Universidade de Beira Interior (UBI) and Instituto Dom Luis (IDL), Portugal.

This cooperative provides a framework for advancing geodetic analysis and modeling endeavors pursued by both entities. The partners will collaboratively pursue research and support for the precise point positioning of GPS/GNSS data, gravimetric geoid modeling, and the application of emerging geo-informatics technologies and services.

A letter of intent between the two institutions was approved by Dr. Hector O. Zapata, executive Director of the LSU International Programs, and Dr. Rui Manuel Silva Fernandes, director of the SEGAL at UBI.

In the coming months, the C4G and SEGAL will develop new tools and automation scripts for analyzing Global Navigation and Satellite Systems (GNSS) data. These efforts are essential for studying subsidence, measuring tectonic motion, assessing climate change and more. Additional activities may include technical support, publication cooperatives, and coordinated training and outreach events.

“Subsidence is a leading cause, if not the principal driver of wetlands losses in Louisiana,” said C4G researcher Joshua Kent. Findings published by the U.S. Geological Survey (USGS)[†] indicate that Louisiana’s coastal wetlands are lost at a rate of 24.1 $mi^2$ (62.4 $km^2$) per year since 1932. “That’s nearly one football field every hour.”

George Z. Voyiadjis, Boyd Professor and Director of C4G, added: “Modeling of subsidence processes in coastal Louisiana involves a variety of causes, including tectonic activities, Holocene sediment compaction, fluid withdrawal, etc.” The C4G leverages its vast network of continuously operating GNSS reference stations (CORS) to record positional changes across the State and the northern Gulf of Mexico. “We will work together to develop automation scripts and processing routines that can more quickly produce the data we need to improve our subsidence models.”

SEGAL has experience processing CORS data, doing it routinely for more than 600 stations across the globe. “We are involved in several research projects focused on the use of GNSS data for scientific (geodynamic and atmosphere) and technical (monitoring of national GNSS networks in several countries) applications,” Rui Fernandes, of SEGAL at UBI, described. SEGAL manages multiple CORS networks in Europe, Africa, South America, and Asia. “We are sure that the exchange of different experiences in data processing and CORS installation with C4G will permit both groups to improve the current methodologies that we are using.”

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[†] Couvillion et al, 2011 - http://pubs.usgs.gov/sim/3164/

Long term collaboration will also advance the development of a new gravimetric geoid model for Louisiana.

“Elevations are only as good as our geoid,” said C4G geodesist Cliff Mugnier, describing the model of sea level used to calculate elevations from GNSS heights. “Across south Louisiana, flooding is a serious issue that requires effective mitigation. Knowing which direction water will flow is predicated on knowing how high we are above sea level.”

Decades of subsidence has had consequences for maintain vertical control in Louisiana, he said. “Gravimetric surveys conducted by the C4G will ultimately allow us to re-connect with the geoid to calculate better elevations.”

Researchers from SEGAL and C4G will collaborate on new geoid models for Louisiana. Machiel Bos, SEGAL researcher, said: “We have applied our in-house developed software in the computation of regional and national geoid projects in North Mozambique, Madeira and more recently in Bhutan. Such experience, which also includes field work, can be also applied in Louisiana where extremely high accuracy (few centimeters) on the geoid is crucial.”

Combining the skills and experiences from these of capable and motivated partners will lead to new opportunities that were previously inaccessible.

“This collaboration is a unique opportunity to partner with a very enthusiastic team that combines pure and applied research in several areas of geosciences with enormous societal implications,” said Fernandes.

Voyiadjis agreed. “SEGAL has a remarkably talented group of researchers,” he said. “I anticipate significant innovation from our relationship.”

## About the SEGAL

The Space & Earth Geodetic Analysis Laboratory (SEGAL) is a collaborative scientific venture between University of Beira Interior (UBI) and Institute Geophysical Infante D. Luíz (IDL), which is physically located at Department of Computer Sciences (DI-UBI), located in Covilhã, Portugal. SEGAL has vast experience in the acquisition and processing of GNSS observations for scientific applications, namely for reference frame and geodynamic studies, which have the highest requirements in terms of GNSS data quality. SEGAL, in collaboration with many institutions, has installed and maintains a network of GNSS stations distributed across Europe, Africa, South America, and Asia. Furthermore, SEGAL has several active collaborations with science organizations distributed all over the world that provide local support and hosting services at several projects. Currently, SEGAL processes on a daily basis data from more than 400 CORS (Continuously Operating Reference Stations) distributed all over the world.

## About the C4G

The Center for GeoInformatics (C4G) is a science and technology research unit and data provider focused on high precision 3-D and 4-D Earth positioning. The C4G is part of the Department of Civil & Environmental Engineering, College of Engineering at Louisiana State University (LSU), located in Baton Rouge, Louisiana, USA. The C4G installs and maintains a multi-state wide infrastructure of Global Navigational Satellite System (GNSS) technologies, which allow scientific and professional users to

precisely measure positions anywhere within the network at centimeter-scales in real-time. This infrastructure, called C4GNet, is the single largest, self-sustaining, university owned and operated positioning network in the world. As an official positioning reference system for Louisiana (R.S. 50: 173.1), the C4GNet supports scientific, commercial, and legal applications that are recognized by state and national organizations.