

**Notes from Geospatial/GIS Meetup
March 9, 2023**

Rivera Library, Room 140 and Zoom

Attendees: Janet Reyes, facilitator;

In person: Elia Scudiero, Isaiah Kim, Mike Cohen, Nan Li, Siddharth Kishore

Via Zoom: Bennie McGhee, Binhnhi Dao, Chikako Takeshita, Eddie Helderop, Gerald Winkel, Justin Huft, Kenneth D'Angelo, Lynn Sweet, Mohammad Koochi, Shanon Langlie, Tiffany Moxham, Tony Grubestic, Valeria Covarrubias, Yuemeng Yang

Announcements

This meeting was recorded; video is available [here](#). The passcode to view is X8=. *LRU

Support for ArcGIS Desktop (ArcMap) is being phased out, with only mature support available starting in early 2026. Instructors and researchers are encouraged to adapt their lesson plans and workflows in the near future to use other GIS tools. Below are some items pertaining to this change.

- [Sunsetting ArcMap](#)
- [Migrating to ArcGIS Pro](#)
- [Recent upgrades to ArcGIS Online](#)

Recordings and other materials from the series of **Planet workshops** held in October 2022 are available to UCR affiliates in this [Google folder](#).

[CalGIS](#) is being held in Monterey on March 13-15.

Esri is holding a [Geodesign Summit](#) at its Redlands headquarters on April 11-12. There's a charge for attending in person, but it's free if you register for digital access.

Do you map mountains? Check out the [Mountain Cartography workshop](#) in Snow Mountain Ranch, Colorado April 11-15.

Meetups in Spring quarter will be held on the second Tuesday of the month: April 11, May 9, and June 13.

Shanon encouraged UCR affiliates to [submit nominations](#) for the **International Affairs Recognitions Awards**.

Shared links

Janet shared a link to the **dashboard for monitoring snow conditions** in the San Bernardino Mountains: <https://snowinfo.sbcounty.gov/current-snow-removal-status/>

She also shared a link to San Bernardino County's **Dept. of Public Works** site where several maps are available, including flood control facilities: <https://sbcountypdw.maps.arcgis.com/home/index.htm>

Mike shared a link to an article about tips for using Google Maps: <https://www.pcmag.com/how-to/google-maps-tips-tricks>

Presentation - Part 1

Tony Grubestic, Director of the [Center for Geospatial Sciences](#) (CGS) and a faculty member in UCR's School of Public Policy, began the presentation by giving an overview of the Center. Several researchers from UCR and elsewhere are affiliated with CGS. An overview of topics for papers published in the last year included COVID-19 biomarkers in wastewater, solar panel placement optimization, storm surges, equity of tree distribution in Phoenix, and more. Tony and his teams at UCR and previous institutions have worked with federal agencies, national laboratories, and industry and community partners.

The Center's framework is to: identify important issues, typically with a spatial component; develop and apply theories, methods, and data for gaining additional insight; interpret outcomes; and develop strategic approaches and/or solutions for improvement. CGS is involved in spatial data science, a research area at the intersection of GIScience and Data Science. They are keen on developing specialized methods that support the systematic analysis of geographic data, which often has inherent inconsistencies and uncertainties. The tools used in spatial data science include GIS, sensors, statistics and other methods of analysis, and machine learning and AI.

Tony then described the NYMPHS (Networked Palynology Models of Pollen and Human Systems) project, a 5-year multi-university effort. The impetus was the Dept. of Defense's goal to track objects of interest through space and time. The team looked at the use of pollen as a biomarker because it is ubiquitous, durable, and has predictable distribution in space and time. The framework of the research involved pollen identification (using DNA metabarcoding), species mapping, assessing humans and land management, and geoforensic modeling. Spatial optimization for determining potential paths for an object involved employing network science and mathematical programs (GOFIND+), an advancement beyond state-of-the-art joint probabilities methodologies.

The project entailed a focus on outliers, where rare pollen occurs in urban areas. Outliers often result from human modification of species' habitat, which can confound species distribution models.

The use of remotely sensed data, such as from drones, allows access to locations where pollen collection isn't feasible. The project used Very High Resolution (VHR) imagery, which helps capture important characteristics of plants, including visible fruit and blooms. Furthermore, the variation in the near-infrared reflectance values of plants enables distinguishing between species. The camera on the Center's [Wingtra drone](#) has a 1 cm resolution. The drone can be used to collect data at frequent intervals and low cost.

In the study, [USDA CropScape](#) data and the GOFIND model were used in tandem to identify the geographic distributions of agriculture. The researchers were 80% accurate in determining the true site

of where a sample came from. They were also 40% accurate in identifying the true site of a sample that had visited four locations in Texas - a significant improvement over the 11% success rate of traditional approaches. The team had an even higher success rate when high-resolution drone imagery, geocomputation, and other methods were also used. For instance, they correctly determined with 91.6% probability that a bee had been sampled from the [Wildflower Center](#) in Austin.

Applications of these methods could include identifying the origin of bootleg agricultural products, the provenance of fake pharmaceuticals, and broader concerns in national security and counterterrorism.

Discussion - Part 1

In response to a series of questions and comments from **Mike**, Tony said:

- The type of plant species distribution information that the Herbarium has would mostly be needed by the contractors for overseas sites.
- The Wingtra drone could be made available to fly imagery for the Botanic Gardens.
- AI hasn't been used for genetic mapping in this project.

Isaiah asked about the success rate of identifying locations by studying pollen; Tony said it varies. They did 80% or better for identifying bee locations in Texas and California. In response to another question, Tony elaborated on the importance of identifying outliers (situations in which the plants are growing outside their expected range.)

Presentation - Part 2

Eddie Helderop, the Associate Director of CGS, spoke about a project that relates to assessing the "digital divide" in broadband access while leveraging computational methods involving geospatial uncertainty. (The digital divide basically refers to the difference in broadband coverage, speed and price available to rural vs. urban populations).

The combination of uncertainty in both spatial Census data and reported broadband coverage statistics leads to large uncertainty about the locations and numbers of US households lacking broadband access. The research goals in a study of Los Angeles and Orange counties included understanding how much the uncertainty impacts broadband coverage estimations, and the implications for telecommunications policy development (where significant amounts of government spending are in play).

Broadband providers self-report data using FCC Form 477, where they can claim to provide coverage to an entire Census block in which at least one house is served, or could be served in the next 7-10 days. There's no way to tell from the data itself how many of the households in a block are actually being served.

Additional errors come into play because the Census Bureau shows some census blocks in the US as being populated, even though they have no housing units (e.g. a segment of a wide street corridor). In the example Eddie showed, two providers indicated in the FCC data that they provide broadband service to residents in a street corridor block.

In the study, researchers identified all blocks that have no buildings, are represented as having a population of 10 or more, and are tallied as receiving broadband service. Overall, these erroneous blocks accounted for 1% of all blocks in the counties. The researchers next calculated the extent of broadband provision while ignoring the overcounted blocks, and then again while removing the erroneous blocks. Given the localized impacts of erroneous block distribution on disadvantaged communities, the results showed that the prevailing picture of broadband access in Los Angeles County has some troubling distortions; the existence of erroneous blocks made less of a difference in Orange County.

Discussion - Part 1

Isaiah wondered whether policy-wise it would make more sense to focus on broadband speed rather than the distribution of served areas. Eddie said that the Form 477 data doesn't include rate data or end-user speed data.

Isaiah had a further question about the four categories of broadband provision shown on one of the presentation slides (high/high, high/low, low/high, and low/low). Tony suggested thinking of those categories as analogous to mapping hot spots.

Related papers:

NYMPHS GOFIND paper: <https://doi.org/10.1016/j.compenvurbsys.2021.101615>

NYMPHS network analysis paper: <https://doi.org/10.1016/j.ecoinf.2021.101443>

Broadband uncertainty paper: <https://doi.org/10.1016/j.tele.2022.101837>

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