Community Forum Presents LiDAR for California

December 5, 2024, from Noon to 1:30 PM

Forum email address: calgischair@cgia.org
Forum website: https://cgia.org/cagiscouncil/

MEETING TOPIC: Applications of LiDAR Across California and Across Sectors
The group that was formerly known as the California GIS Council and then the CGIA Community Council is now the CGIA Community Forum. We aim to offer a series of events three or four times per year, each of which will focus on one California Spatial Data Infrastructure theme. The Elevation data theme was chosen for this event to mark a significant milestone:
High quality LiDAR covering the entire state has now been acquired through regional and state collaborations with the USGS 3D Elevation Program!

AGENDA

Welcome and Opening Announcements—CGIA Community Forum Committee Chair Jane Schafer-Kramer, (Geographic Data Specialist, CA Department of Water Resources) welcomed the audience and the speakers, offered housekeeping items, and thanked the CGIA Chair Roland Martin as well as the **sustaining members**:
ARUP
California Tribal GIS
Dewberry
Parcel Quest
Shasta College GIS/Geography
UC Santa Barbara Geography
USC Dornsife Spatial Sciences Institute
Underground Service Alert

USGS and State of California LiDAR Programs: Making data available to all, the status of California lidar coverage, and future plans

Nathaniel (Nate) Roth, Chief Science and Data Advisor, California Department of Conservation
Drew Decker, National Map Liaison, US Geological Survey

Nate provided a status update on the Lidar project, highlighting its completion and the ongoing process of making it publicly available. He emphasized the importance of partnerships in the project's success, mentioning the significant contributions of various state and local agencies, academic institutions, and NGOs. Nathaniel also discussed the quality levels of the collected data, with many of the most recent collections being made at Quality Level 1 (8 points per square meter). Drew presented on the 3D Elevation Program (3DEP) https://www.usgs.gov/3d-elevation-program , its goals, and the transition to the next generation of elevation data, the 3D National Topography Model which will include inland bathymetry. He also discussed the integration of 3D hydrography and the potential use of other platforms and sensors in the future.

The data (1 meter resolution DEMs and Point Clouds) can be accessed using the 3DEP LidarExplorer - https://apps.nationalmap.gov/lidar-explorer/#/
FAQ: https://www.usgs.gov/faqs/what-lidar-data-and-where-can-i-download-it

Geologic Hazards Use
Dr. Wendy Bohon, California Geological Survey, Seismic Hazards and Earthquake Engineering Branch Chief, was not available to present as planned, due to the occurrence of a significant earthquake off the northern coast shortly before this presentation happened. But you can check out her videos on YouTube www.youtube.com/@Drwendyrocks and follow @drwendyrocks on Instagram and Facebook

Forestry and Wildfire Response Use
Rodney Hart, Research Data Specialist II, California Department of Forestry and Fire Protection (Calfire)
Rodney works with the Calfire INTEL program. He discussed the use of airborne laser scanning (ALS) data to improve forest metrics utilized in their fire simulation software. He highlighted the challenges of accurately quantifying forest metrics across large areas and the potential of ALS data to improve structural data and fuel model classification. Rodney presented a case study of a mixed conifer stand, demonstrating how improved structural data from ALS data could lead to more accurate fire simulation outputs. He also mentioned the potential use of ALS data for visualization of wildfire response and the creation of fly-through reels to show fire effects and response and efforts to deal with storage and bandwidth constraints.

Q: Any efforts to change the fire models to use finer vegetation classification mapping data?
A: There is plenty of finer resolution vegetation data but the constraint that happens is the scale of the data in terms of storage and computational efficiency. The 20-m scale is what Technosylva found would produce good simulations in a timely fashion. Waiting less than a minute for a simulation result is critical to get the information out to the first responders, whereas a 1-m resolution database may take significantly longer.

Q: But while spatial resolution is one thing, I was wondering about fine-ness of vegetation classification. So not just WHR or CalVeg classification, but finer NVCS. Wonder if finer distinctions in vegetation in terms of dominance and consistency of species would improve the model.
A: Understood. Finer distinctions of vegetation would require finer distinctions of Fuel Modeling which is where some of the science is still catching up with. Ultimately, the splitter vs. lumper debate has always favored the lumpers in terms of fuel modeling. Does Salvia burn differently enough from Artemisia californica to deserve a fuels distinction? Probably not. Being that I was a Splitter in my CALVEG days, finding peace with the fuel model lumping has been an ongoing exercise. 😆

Local Government Use
Steve Steinberg, Geographic Information Officer, County of Los Angeles
Steve discussed the use of Lidar data in Los Angeles County, trees speciation and other vegetation classification, fire risk, modeling urban heat islands, and infrastructure mapping. They are looking forward to delivery of the 2nd LiDAR collection for the county to be delivered in 2025 which will be useful for change detection. He also mentioned the potential for using gaming engines for 3D model object-based modeling and visualization.

Q: Steve, any suggestions on applied Lidar projects on a local scale with undergraduate students?

A: For students, working with lidar is certainly something that can provide good experience and value. Of course, if your campus has an ArcGIS Pro license available using some of the intro lessons they make available is a good start: https://learn.arcgis.com/en/paths/using-lidar-data-in-arcgis-pro/

You could replicate these methods using local data from the 3DEP program, or (if available) data obtained from a UAS-base d lidar on a site level which would be much more meaningful, especially if it can be aligned with fieldwork/local knowledge of the landscape. Cleaning up the point cloud and developing key lidar outputs such as surface models, classified point clouds and contours are good basics to start with at the introductory level.

There are also some nice, free tools available through the Open Topography website https://www.opentopography.org / which could be used for similar purposes.

I think it is important for students to understand that lidar is not magic and that quality outputs and derived products take some work to develop, seeing real lidar data, with all the warts, and learning how to thoughtfully process and document these outputs is important whether they will ultimately be developing these products themselves in the future, or simply so they are informed end-users of these products developed by others. (Steve)

Considerations for LiDAR Users: Understanding what constitutes a licensed surveying practice
Ryan Hunsicker, County Surveyor, County of San Bernardino

Ryan noted that the earliest 3DEP data collection in California was done for San Bernardino County back in 2013. He discussed the professional practice of land surveying as defined in state law, highlighting the importance of understanding state laws and the potential for GIS professionals to stray into the practice of land surveying as defined by the statute. Ryan is involved with the CGIA Ad Hoc Committee on the Practice of GIS and Land Surveying and another group working nationally on this issue in order to provide more clarity for GIS professionals when working with LiDAR and other GIS data. Review the law at https://www.bpelsg.ca.gov/laws/pls_act.pdf

Comment from chat: I would bow to @Ryan Hunsicker when he's finished speaking, but I'll add that there's a CGIA sub-committee currently working on creating guidance on this. @Marcus Harner leads this group. (Nate Roth and Jane Schafer-Kramer are also members of this Ad Hoc committee. Stay tuned.)

Q: Would creating contours and elevations include using already created USGS DEMs?
A: At present, I don't think there is a clear answer to this. A conservative, but reasonable, reading of the state law could say that it is.(Nate)

BPC DIVISION 3. PROFESSIONS AND VOCATIONS GENERALLY, Chapter 15. Land Surveyors, Article 3:
https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=BPC&division=3.&title=&part=&chapter=15.&article=3.

Q: Curious about the cases being brought against GIS professionals. Would like to get a summary of some of them; to know what is considered 'frowned upon'.

A: There are two recent ones in California that we know of. One is the Ryan Crownholm "MySItePlan" case that is ongoing, now at the SCOTUS. Rather than give a summary here, one could easily find articles on this via internet search. The case was discussed in a California GIS Council meeting in December 2022 https://cgia.org/cagiscouncil/2022/12/20/12-8-22-council-meeting-highlights/. A second case was brought to CGIA's attention by Michael Bean, a GIS Technician working as a volunteer, who was cited by the Board, but the citation was dismissed after an informal meeting with the Board where he successfully demonstrated his lack of intent to practice surveying without a license. This case involved a map made for planning purposes that involved a parcel polygon and a road centerline. Michael is an active member of the aforementioned Ad Hoc Committee. (Jane.)

Q: Question to Ryan H (or anyone else). Can you provide a statement example – saying, "This is a NOT land surveying product'. Or a similar kind of note you think would help, if that was not the intent, of course.

A: Ryan H did not answer this, but please note that no specific statement or disclaimer will guarantee that nobody will make a complaint against you to the Board. A disclaimer did not help Ryan Crownholm of MySitePlan.com avoid a citation (see above comment.) (Jane)

Using LiDAR for Flood Modeling and Planning
Weihua (Wayne) Li, Senior Water Resources Engineer, Risk Assessment and Mapping Section, Floodplain Management Branch, California Department of Water Resources

Wayne spoke on the use of LiDAR data in hydrologic and hydraulic modeling for floodplain management. Wayne discussed various projects, including the CVFED 2.0 San Joaquin River Flood Model Update, the Statewide

Advisory Mapping, and the Climate Informed Flood Inundation Mapping Pilot Study. He highlighted the importance of LiDAR data in updating models to reflect current conditions, including land subsidence, and in sharing data with the public. https://water.ca.gov/Programs/Flood-Management/Risk-Assessment-and-Mapping

3D Hydrography

Erik Fintel, Project Manager, Geographical Information Center, North State Planning and Development Collective at CSU, Chico
Joel Osuna-Williams, Senior Project Manager, Center for Geospatial Science and Technology, CSU Northridge

Joel explained the process of deriving hydrography from 3D elevation data, emphasizing the complexity and semi-automated nature of the process. Erik then discussed the tool sets they've been developing to support the Elevation Derived Hydrography workflow, including tools for data preparation, barrier breaching, channel derivation, and compliance with USGS standards and rules.

Q: Since the derived Z values would seem to depend on water conditions at time of flight, and most would seek to maximize LIDAR acquisition when water levels are lower and more land is exposed, is field conditions (i.e. water levels) something USGS would now have to specify in order to ensure consistency?

A: 3DEP does typically request in our project task orders that lidar not be collected in high water/flood conditions; same with snow. (Drew)

A: Jane asked this question at the December 10 USGS Hydrography Community call. Silvia Terziotti of USGS said that this specification would be preferable, but Sue Buto of USGS added that sometimes the needs of the funding partners will determine the time of collection.

Q: How are intermittent streams and pools modeled (their intermittence) in the EDH?

A: Hi Rosie, USGS is modeling the probability of streamflow permanence using the PROSPER model https://www.usgs.gov/centers/wyoming-montana-water-science-center/science/probability-streamflow-permanence-prosper We should see the initial results in the first quarter of 2025. (Jane)

The next CGIA Community Forum Meeting will be in about three months. Send ideas for Spatial Data Infrastructure theme topics and speakers for future meetings to calgischair@cgia.org

Check the Forum website for meeting announcements and details: https://cgia.org/cagiscouncil/.

Please send questions and comments to: calgischair@cgia.org.

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