

The 3D Elevation Program National Indexing Scheme

Background

Elevation data are essential to a broad range of applications, including geologic resource assessment and hazard mitigation, flood risk management, infrastructure and construction management, and other business uses. All of these activities benefit from the availability of high-resolution, three-dimensional (3D) elevation information in the form of light detection and ranging (lidar) data and interferometric synthetic aperture radar (IfSAR) data.

The 3D Elevation Program (3DEP) of the U.S. Geological Survey (USGS) has been operating under an opportunity-oriented approach, acquiring lidar projects of varying sizes scattered across the United States on the basis of partner response to an annual announcement. As a result, the national 3DEP elevation layer is subject to data gaps or unnecessary overlap between adjacent collections. To mitigate this problem, 3DEP is adopting a strategic, systematic approach to national data acquisition that will create efficiencies in efforts to achieve nationwide elevation data coverage and help capture additional Federal and non-Federal investments resulting from advance awareness of proposed acquisitions and partnership opportunities.

A key element of the multi-year acquisition strategy is the development of an authoritative national indexing scheme, which will facilitate a more consistent, standardized elevation data acquisition process and will ensure that investments are

directed to achieving the 3DEP goal of complete, high-resolution 3D elevation data coverage for the conterminous United States, Hawaii, and the U.S. territories. A standard indexing scheme is already in use in Alaska for IfSAR acquisition, consisting of 1-degree by 1-degree tiles in the Alaska Albers Equal-Area Conic projection. The 3DEP Working Group, an interagency group managed by the USGS, has agreed that all future 3DEP collections within the lower 48 States should be coordinated by using a 1-kilometer (km) by 1-km tiling scheme for the conterminous United States. Separate tiling schemes for Hawaii and the U.S. territories currently do not exist and are needed.

National Indexing Scheme

The national indexing scheme has the following characteristics:

- Coordinate reference system is Albers Equal Area (European Petroleum Survey Group [EPSG] code 6350), with XYZ units in meters.
- Each tile is 1 square kilometer (km^2) in area (see figure 1).
- The standard naming convention is based on the easting and northing locations of the lower left corner for each tile, for ease of searching. An example of a tile name for a 1-km tile is w0002n0612.

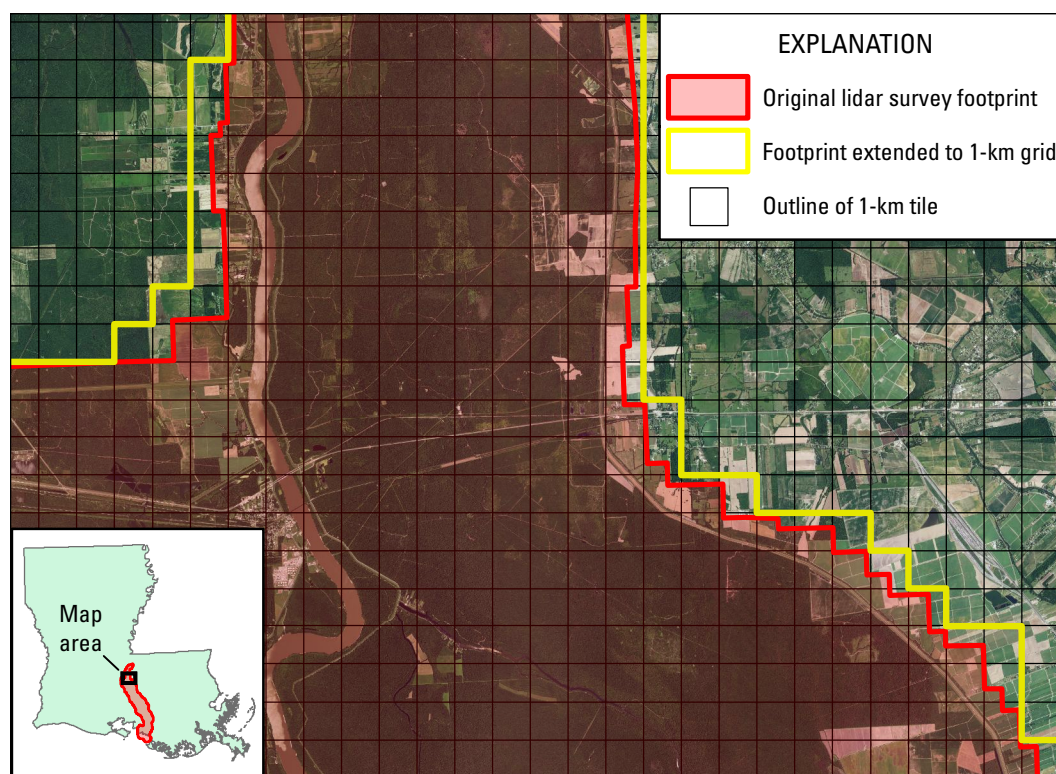


Figure 1. Map of an area in Louisiana illustrating how the original lidar survey footprint (red) is extended to complete the nearest 1-kilometer (km) tile, resulting in a slightly larger survey footprint (yellow). Each tile (black) is 1 km^2 in area. The footprint shown is for a lidar survey conducted in early 2013 of the Atchafalaya Basin, a large wetland and swamp adjacent to the Gulf of Mexico.

- Tiles can be grouped by various attributes (for example, by county, State, or hydrologic unit code), but each tile is part of one and only one group.
- New project boundaries will be extended to complete the nearest 1-km tile and enlarged as necessary to avoid leaving gaps between existing lidar collections and planned projects (see figure 2).

The 3DEP Working Group chose this scheme over the alternative proposal to use the U.S. National Grid because (1) tile sizes in the national indexing scheme are equal in area regardless of their geographic location, and (2) the national indexing scheme requires non-overlapping tiles of constant size, which in turn require a single plane zone over each contiguous area of interest (that is, the conterminous United States, Alaska, Hawaii, and territories), a condition not satisfied by the U.S. National Grid.

Next Steps

The USGS manages the 3D Elevation Program on behalf of the stakeholder community. In this capacity the USGS is:

- Developing an implementation plan for the national indexing scheme.
- Testing the determination of project boundaries using the 1-km by 1-km tiles.
- Creating outreach and educational materials.

When the 3DEP national indexing scheme is made available to the public, stakeholders will be encouraged to adopt it for all lidar acquisitions. Fiscal Year 2018 is being considered a transition year, and in Fiscal Year 2019 the national indexing scheme will be fully implemented, so that all 3DEP-supported projects will be acquired and delivered in the national indexing scheme and projected into the Albers Equal Area projection. If requested by the funding partners, the data can also be delivered in a local projection such as Universal Transverse Mercator (UTM) or in a State Plane projection. On the basis of informal discussions with the lidar vendor community, we anticipate an additional cost of about 1 percent to deliver lidar data in both Albers Equal Area and a local projection. Outreach and training on the use of the 3DEP national indexing scheme will be conducted by the 3DEP Working Group and the USGS National Map Liaisons network.

At the request of the 3DEP Working Group, the USGS is developing new applications that will facilitate the implementation of the 3DEP national indexing scheme. Initial plans include a new web application to translate lidar acquisition footprints into the 1-km by 1-km national indexing scheme.

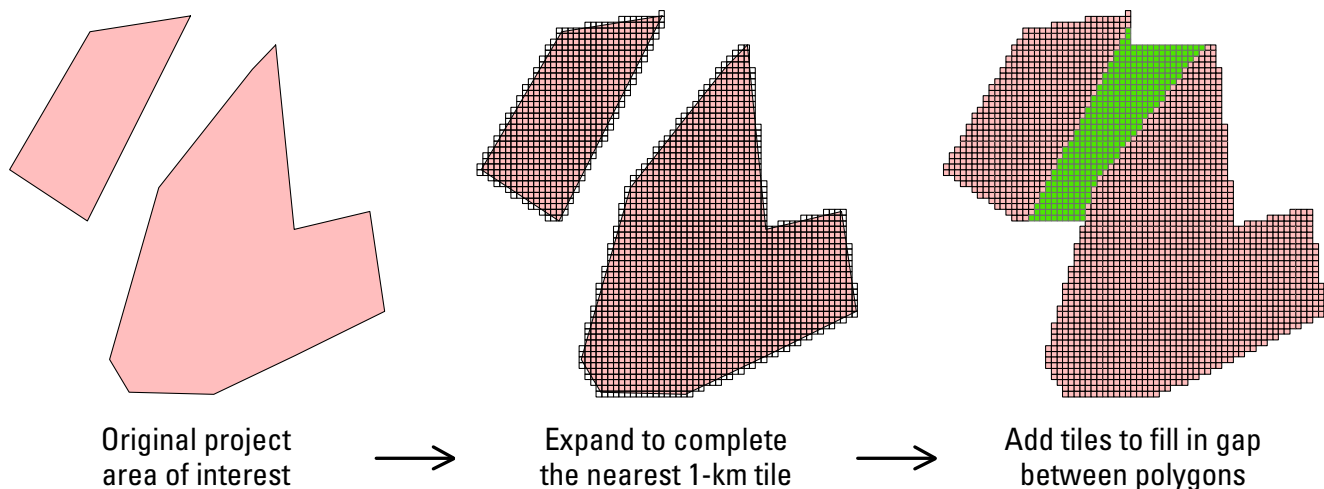


Figure 2. Flow diagram showing how the national indexing scheme will be applied to eliminate data gaps between adjacent lidar surveys. 3DEP delivers reduced unit costs by co-investing USGS and partner funding and achieving an economy of scale through larger project sizes. Through standardized acquisition and larger project areas, 3DEP provides consistent, high-quality data to meet user needs and maximize return on investment.

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Learn more about 3DEP

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