Virginia Information Technologies Agency

Virginia's LiDAR Projects
High Resolution Elevation Data for the Coastal Zone

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Coastal Partners Workshop
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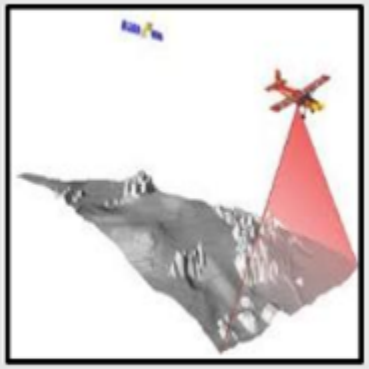
Plane Table Surveying

Photogrammetry (Analog)

Photogrammetry (Digital)



LiDAR

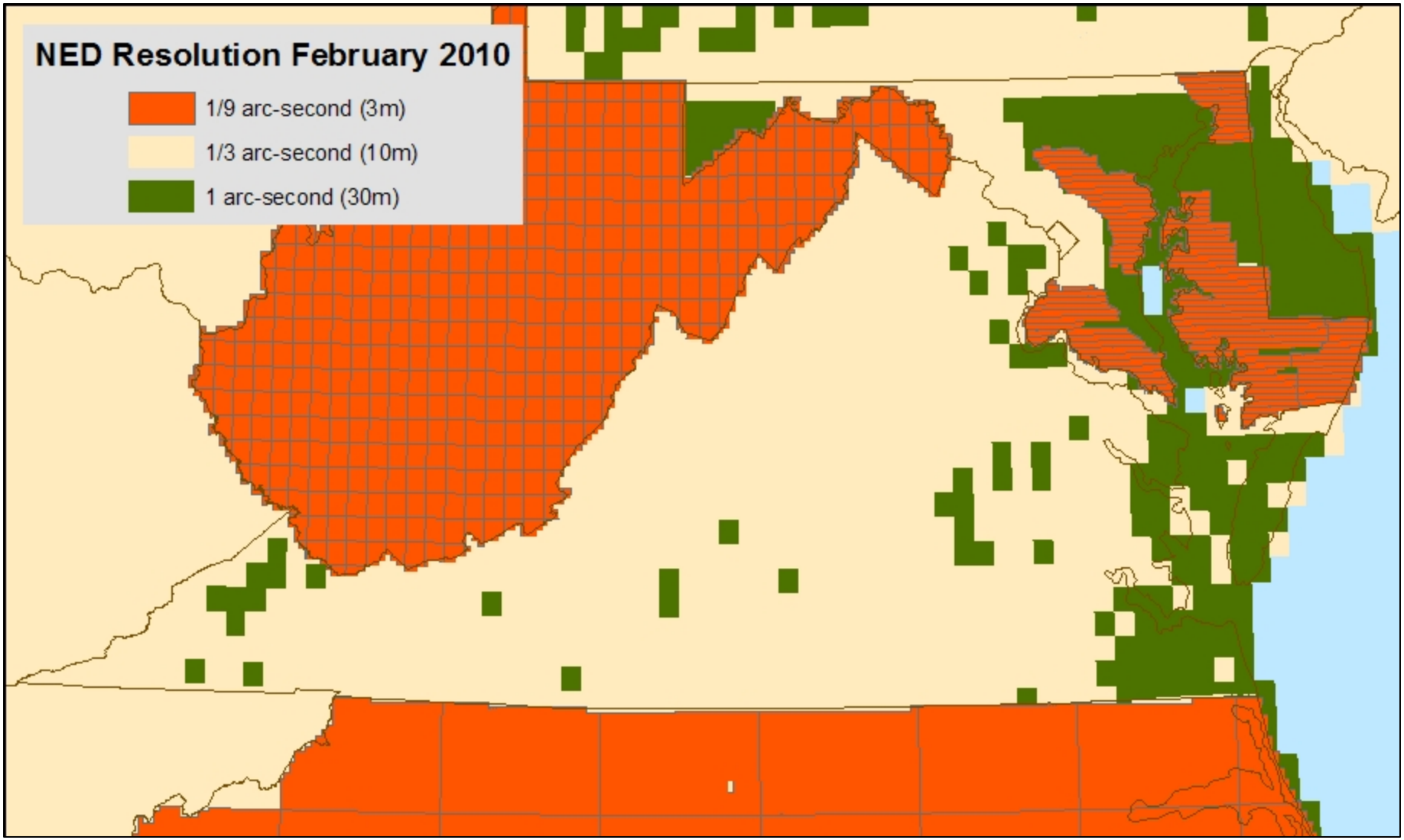
Evolution of elevation data technology

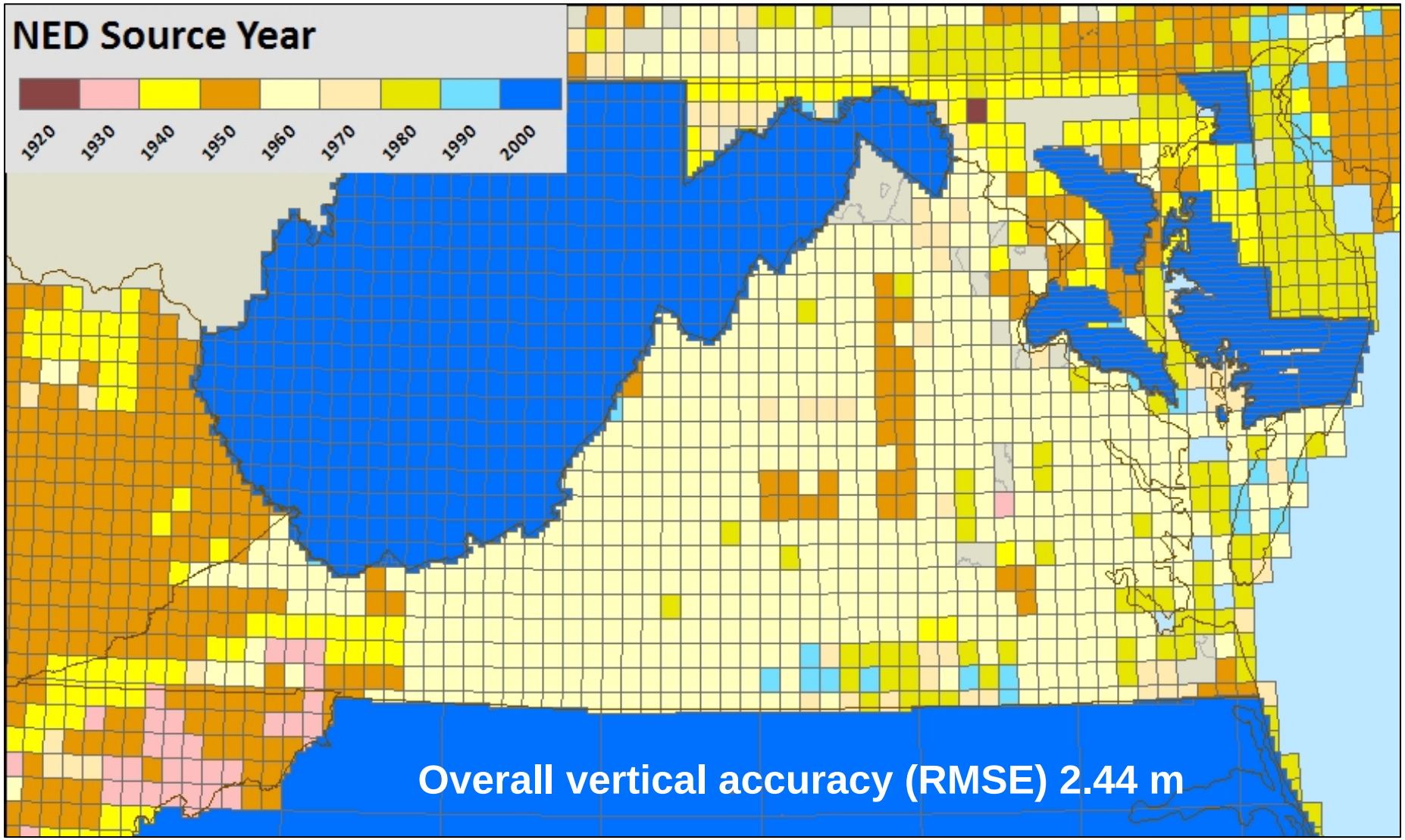
USGS NED

VBMP

National Elevation Dataset (USGS)

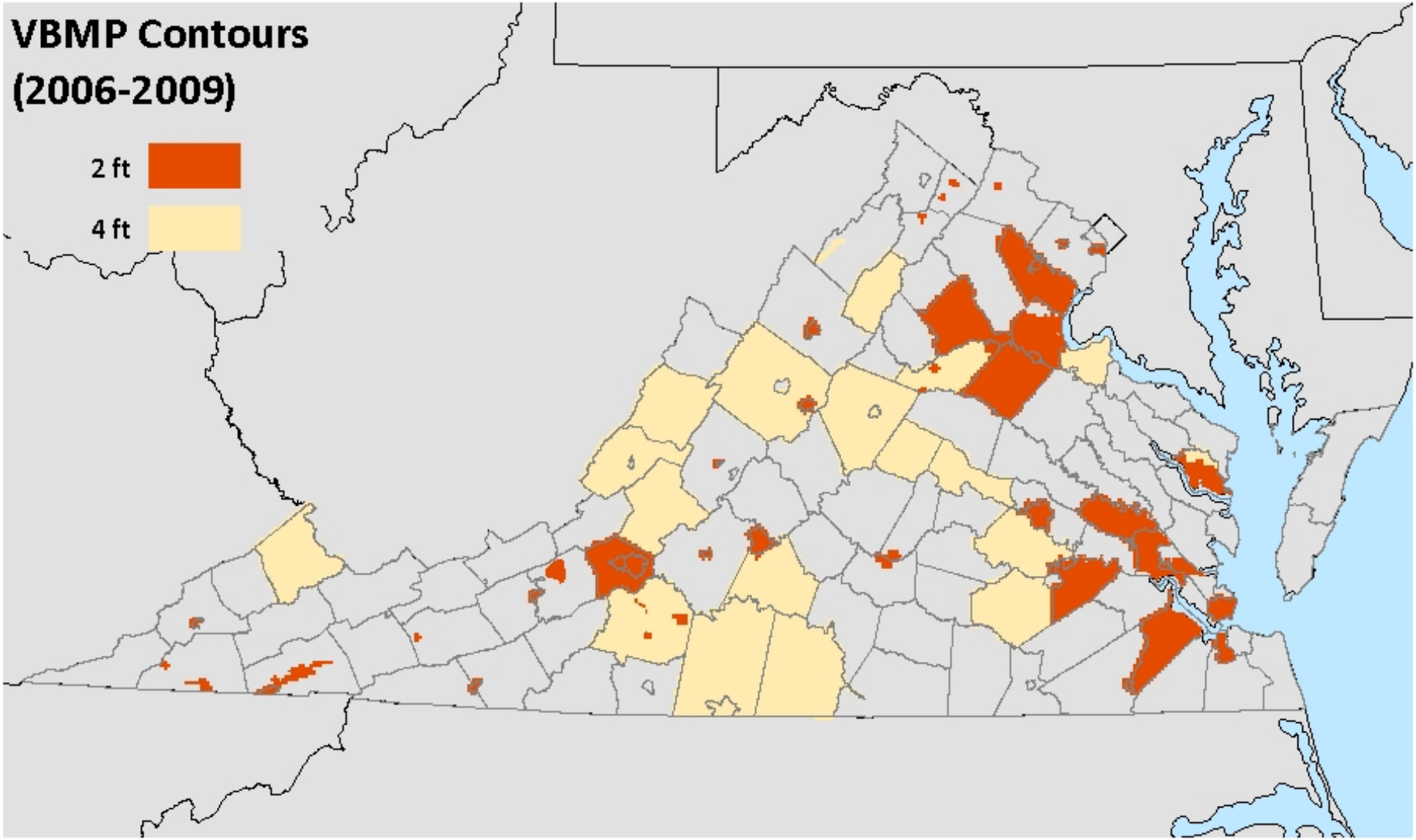
- Coverage completed in 1997
- Seamless grid of
  - 30 meter (1 arc-seconds)
  - 10 meter (1/3 arc-seconds)
  - 3 meter (1/9 arc-seconds)
- Overall vertical accuracy (RMSE) 2.44 m
- Most areas in Virginia based upon 1960's or older data and now 10m
- Will be updated to 3m using LiDAR where available

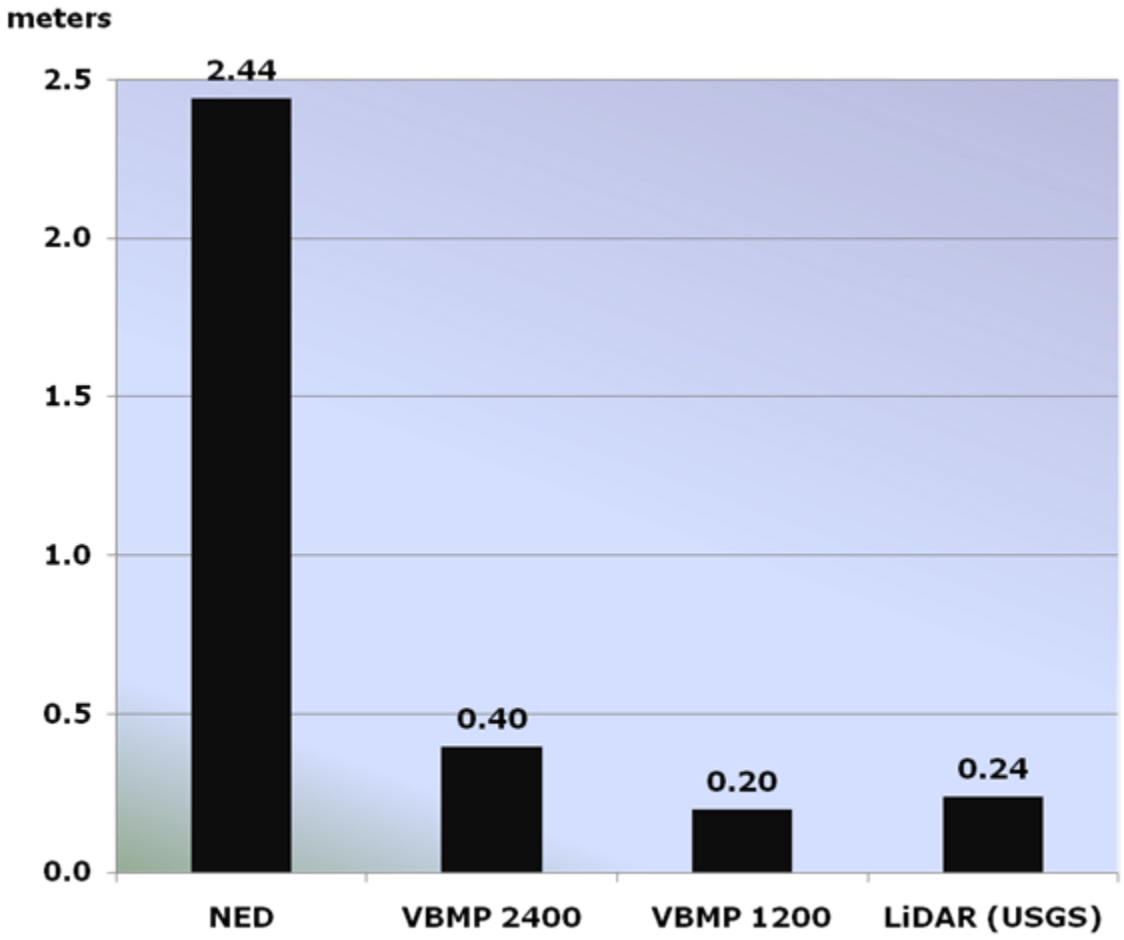

NED Resolution February 2010
1/9 arc-second (3m)
1/3 arc-second (10m)
1 arc-second (30m)


NED Source Year
1920
1930
1940
1950
1960
1970
1980
1990
2000
Overall vertical accuracy (RMSE) 2.44 m

VBMP – Virginia Base Map Program
Digital Terrain Models

- Program years 2002, 2006/7, 2009, 2011
- Base topo digital terrain model (DTM)– for orthophotography production
- Mass points and break lines
- Vertical accuracy of DTM mass points & breakline
  - RMSEz 0.66 ft NSSDA Accuracy 1.31 ft (1:2400)
  - RMSEz 0.33 ft NSSDA Accuracy 0.65 ft (1:1200)
- Hydro-enforced DTM – for contour generation
- 1-ft pixel flight areas support 4-ft contours
- 6-inch pixel flight areas support 2-ft contours
- Contour accuracies (2x DTM, 2.6 and 1.3 ft)


VBMP Contours
(2006-2009)
2 ft
4 ft



NSSDA Vertical Accuracies

at 95% Confidence Level

Contours are derived Products – accuracies are generally 2x base data accuracies

2010 LiDAR Projects

Accomack
Northampton
Gloucester
Lancaster
Mathews
Middlesex
Northumberland
Isle of Wight
James City
King & Queen
Suffolk
Surry
Williamsburg

Eastern Shore

TNC, UVA, USGS
660 mi^2
$156K

ARRA

USGS
2,573 mi^2
$1,000K

USGS Specification v13

- Nominal Pulse Spacing:1-2m (1m for ES)
- No data voids (with some exceptions)
- Scan Angle (total FOV <= 40°
- Vertical accuracy requirements using the NDEP/ASPRS methodology are:
  - FVA <= 24.5cm ACCz, 95% (12.5cm RMSEz)
    Fundamental Vertical Accuracy (FVA) open terrain
  - SVA <= 36.3cm, 95th Percentile
    Supplemental Vertical Accuracy (SVA) other terrain types
  - CVA <= 36.3cm, 95th Percentile
    Consolidated Vertical Accuracy (SVA) combined terrain types

USGS Specification v13 Deliverables

- Raw point cloud
- Classified point cloud

Code	Description
1	Processed, but unclassified
2	Bare-earth ground
7	Noise (low or high, manually identified, if needed)
9	Water
10	Ignored Ground (Breakline Proximity)
11	Withheld (if the "Withheld" bit is not implemented in processing software)

- Breaklines for hydro-flattening (2 acres, 100-ft)
- Hydro-flattened bare-earth DEM

Project Specifications

- Spatial Reference
  - Horizontal Datum: NAD83 HARN
  - Vertical Datum: NAVD88
  - Projection: Virginia State Plane Coordinate System, South Zone
- Tiling scheme
  - VBMP 1:200' tile grid
  - 5,000 ft x 5,000 ft
  - Conforms to VBMP 2009 orthophotography

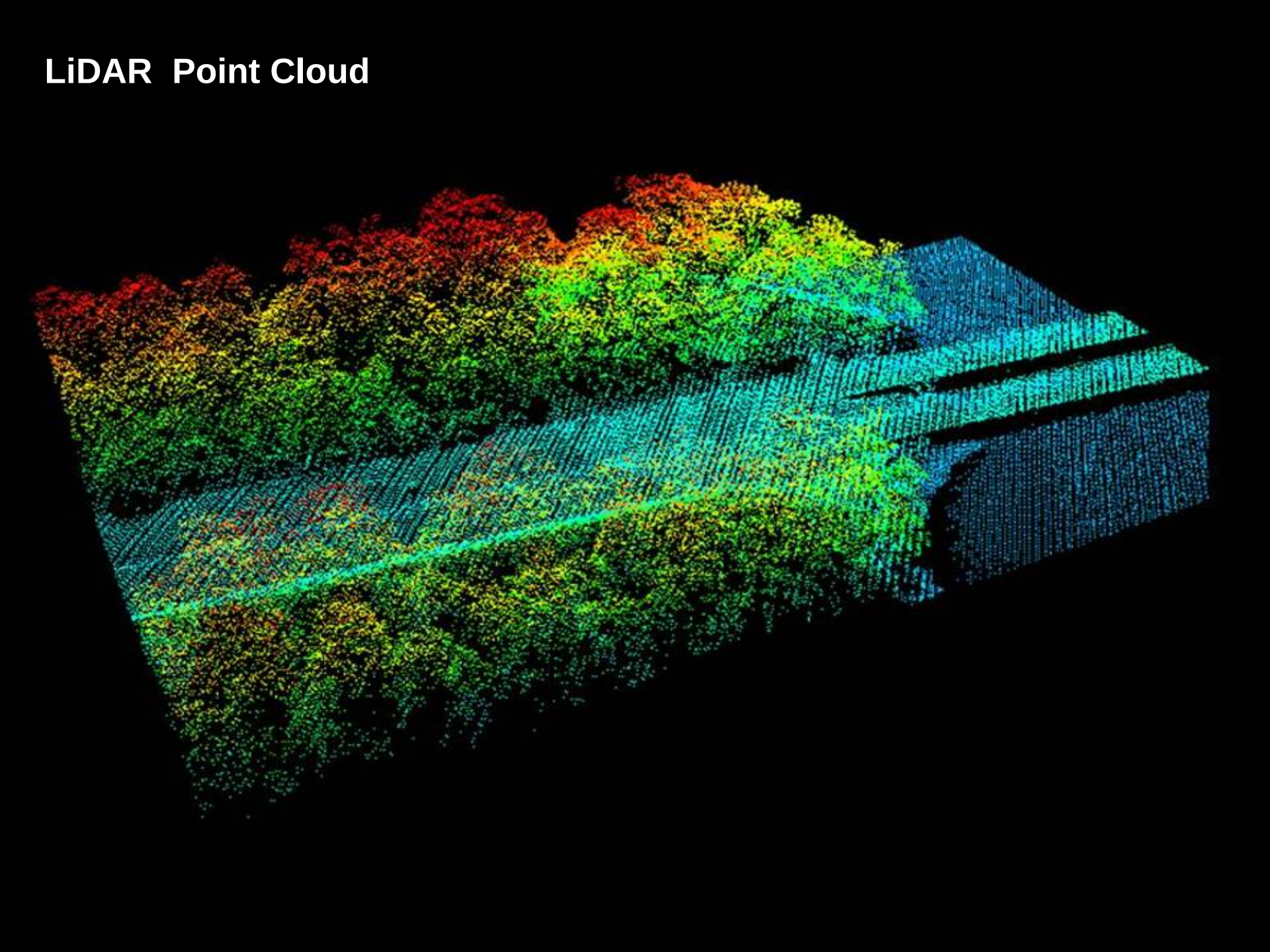
VBMP Ortho

VBMP DTM

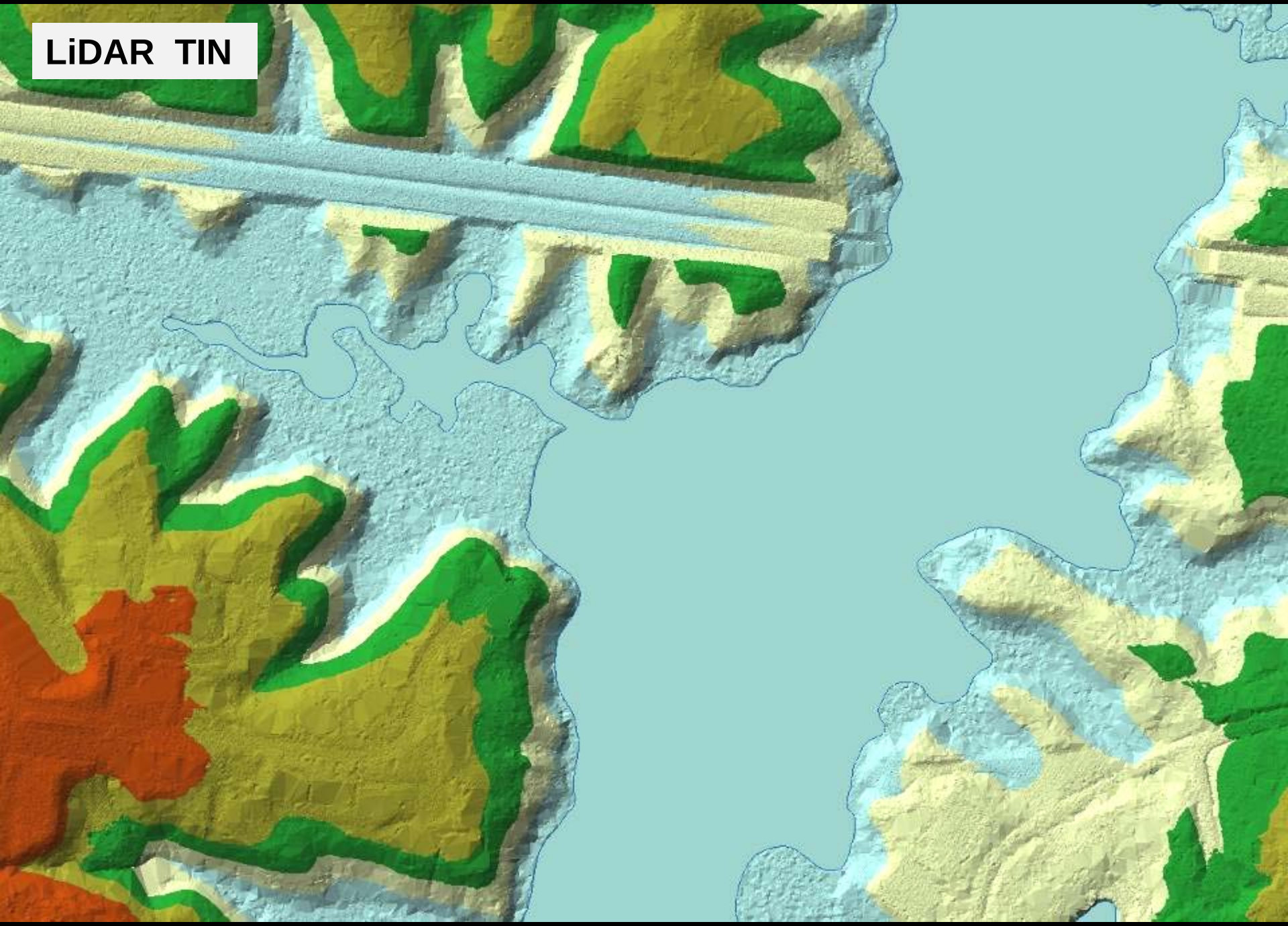
VBMP TIN

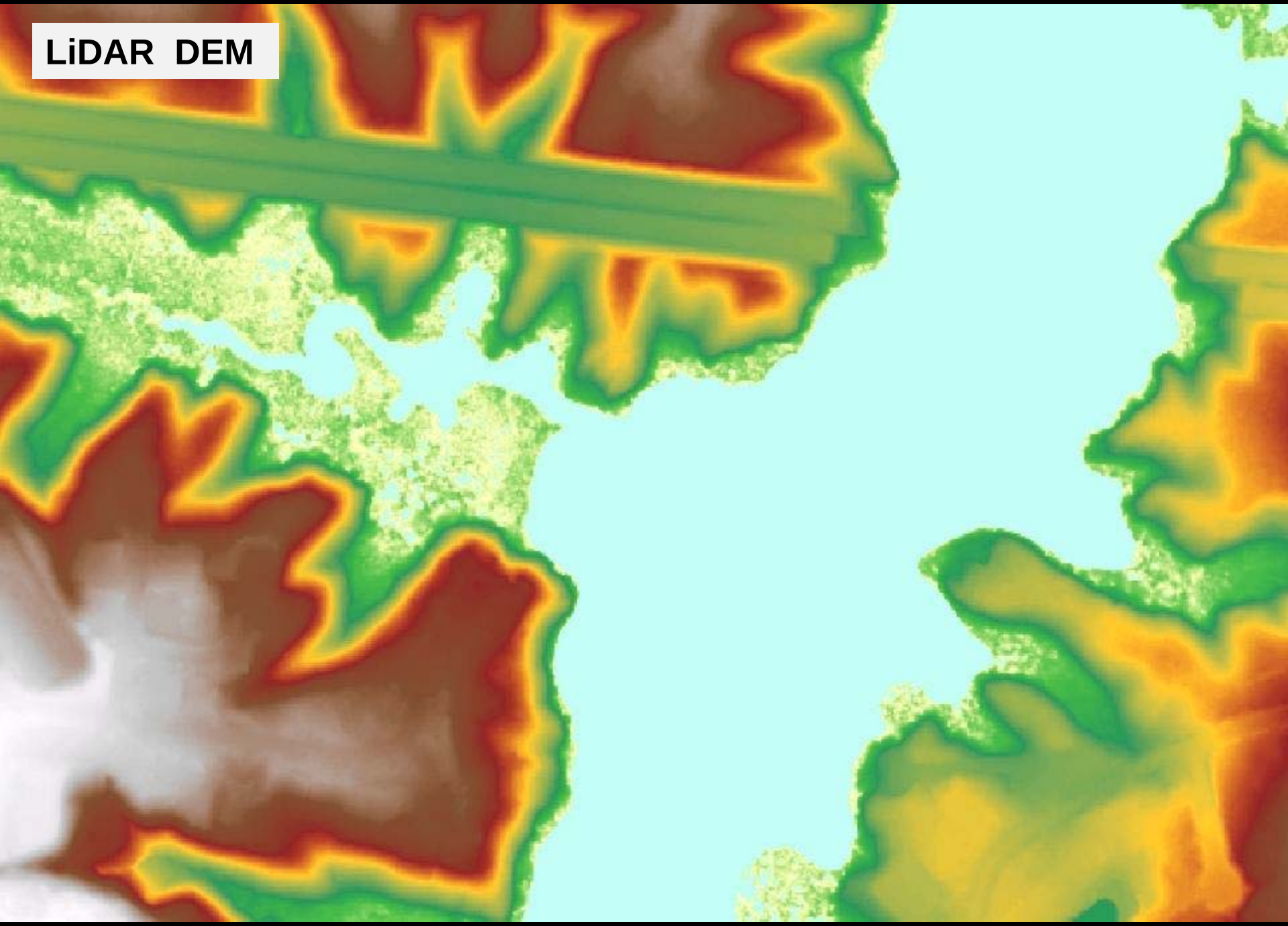
VBMP Contours 2-ft

LiDAR Point Cloud

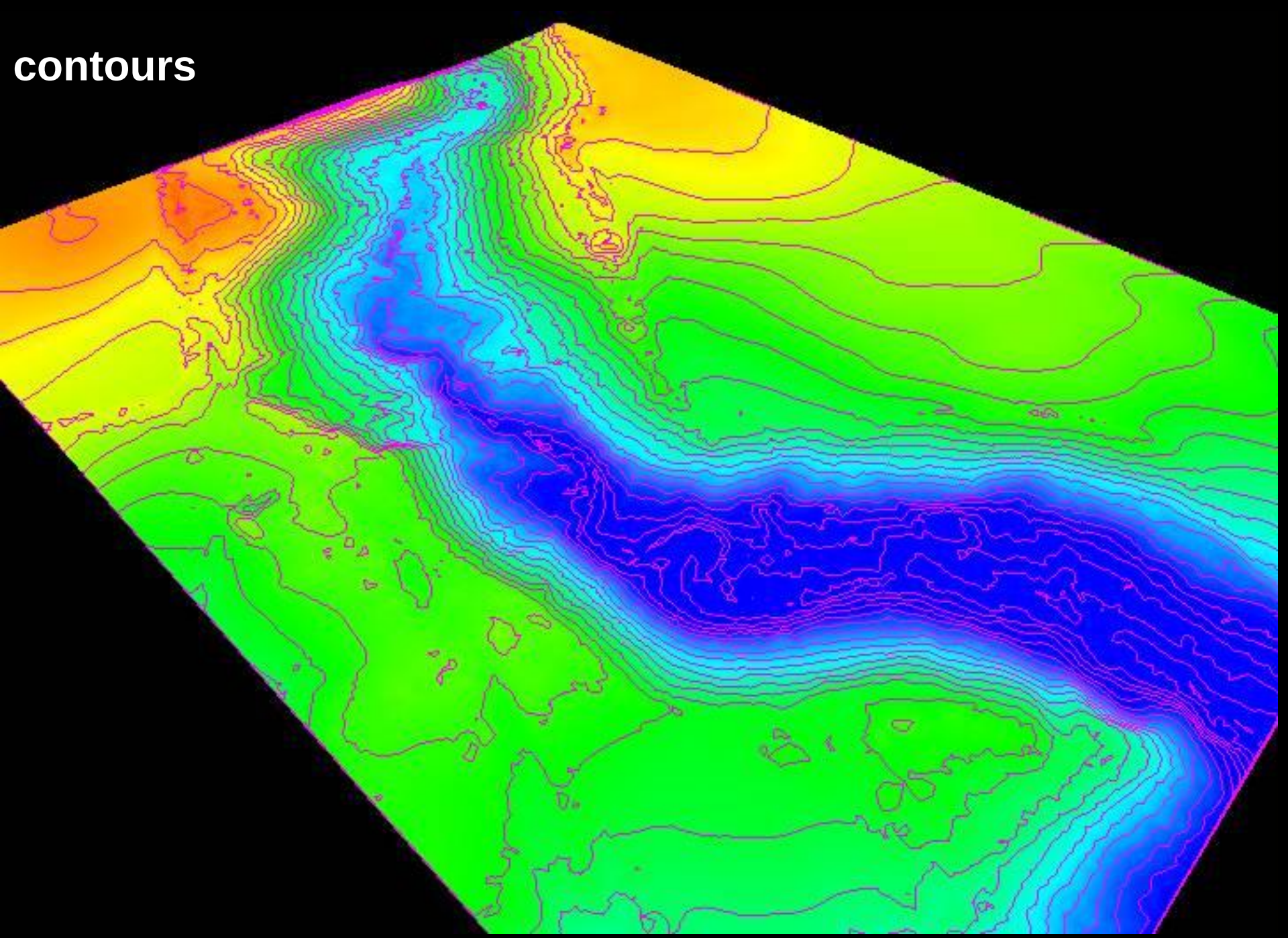


LiDAR Intensity


LiDAR TIN


LiDAR DEM

contours



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