

ATLSS High Resolution Multi-data Source Topography (HMDT) : A means to a finer Hydrology Subdivision

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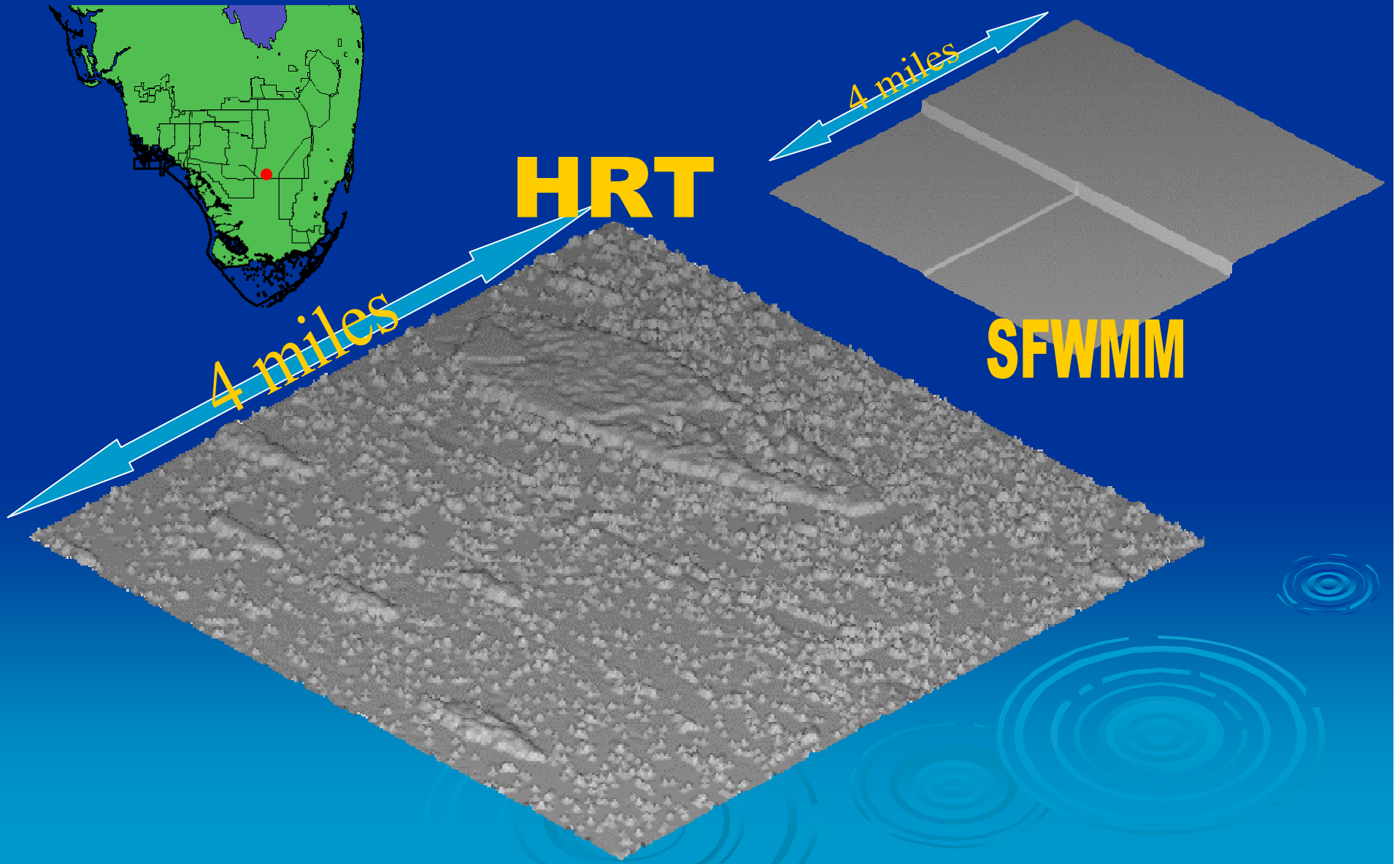
Purpose

- The High Resolution Multi-data Source Topography (HMDT) is used to provide estimates of ground surface elevation at a 500x500 meter resolution.
- The HMDT elevations are used to estimate water depths at a 500x500 meter resolution.
- Make use of available topographic data where it is available and use modeled topography elsewhere.

Why 500x500 meters?

- Plants and animals respond to local variations in hydrology at a spatial resolution finer than the 2x2 mile SFWMM blocks:
 - Tree islands
 - Transition from slough to prairie
 - Permanent ponds vs. marsh with transient water depths

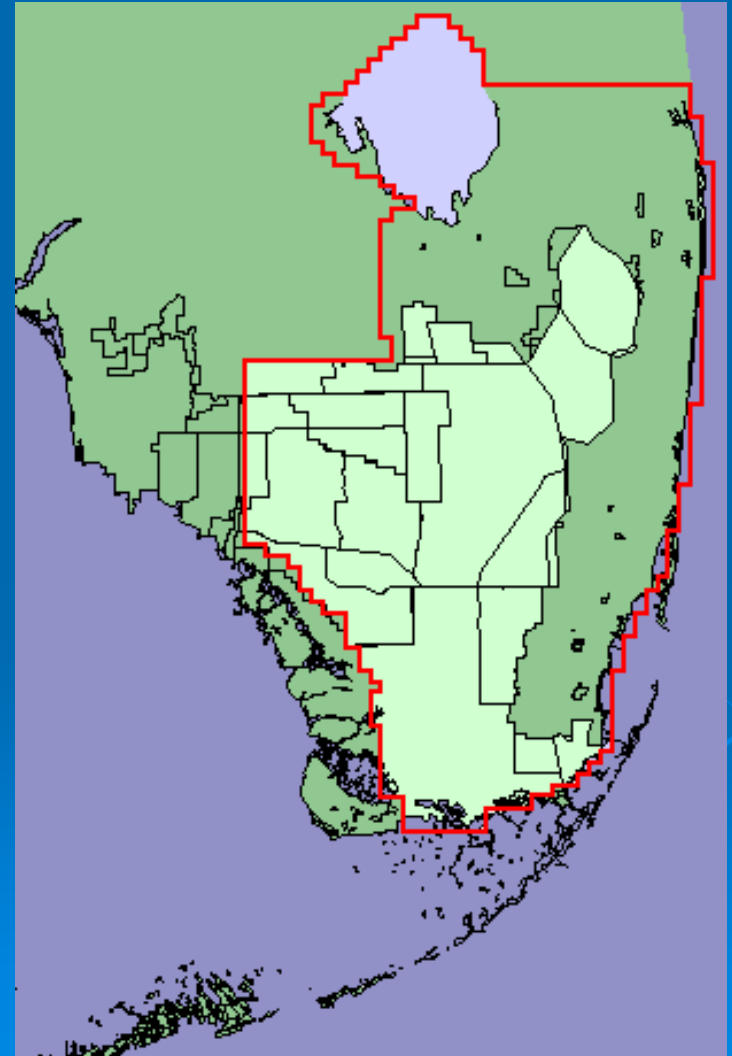
Tree Island : Skinner's Camp



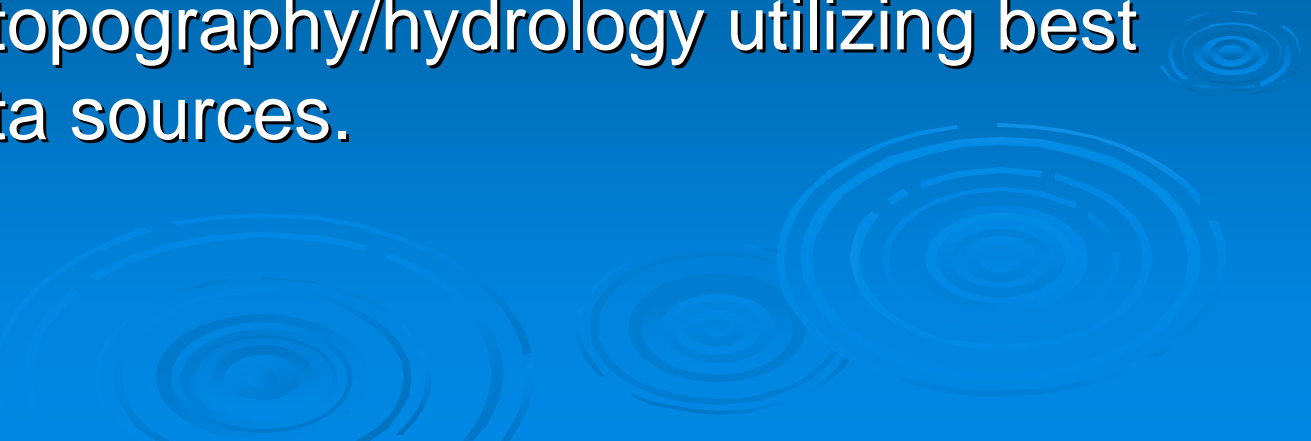
Features

- Includes most natural areas
 - Loxahatchee
 - WCA-2 and WCA-3
 - ENP
 - BCNP
- 500x500 meter resolution
- 264 columns
- 419 rows
- 38,000 active cells
- January 1, 1965 to December 31, 2000
- Daily time step

- ATLSS study area
- SFWMM model area



ATLSS HMDT and High Resolution Hydrology(HRH)

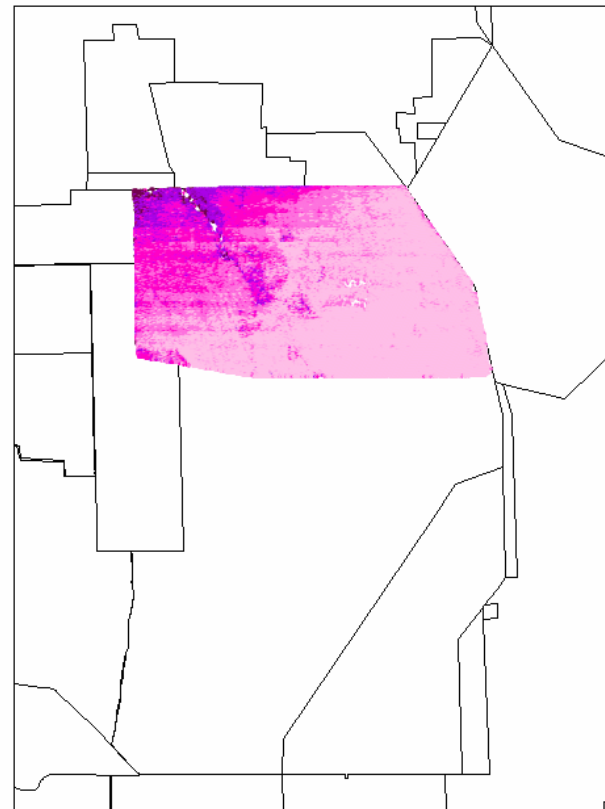
- Implemented and transferred to IMC / NWRC
 - Maintained and Updated for 10 years
 - Utilized in CERP scenario evaluations
 - Accounts for daily Variation of the SFWMM
 - Modifies the 2x2 Hydrology with preservation of Water Volume.
 - Produces a topography/hydrology utilizing best available data sources.
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Data

- The HMDT currently makes use of four sources of topographic data:
 - Light Detection and Ranging (LIDAR)
 - High Accuracy Elevation Data (HAED)
 - SFWMM topography
 - ATLSS High Resolution Topography

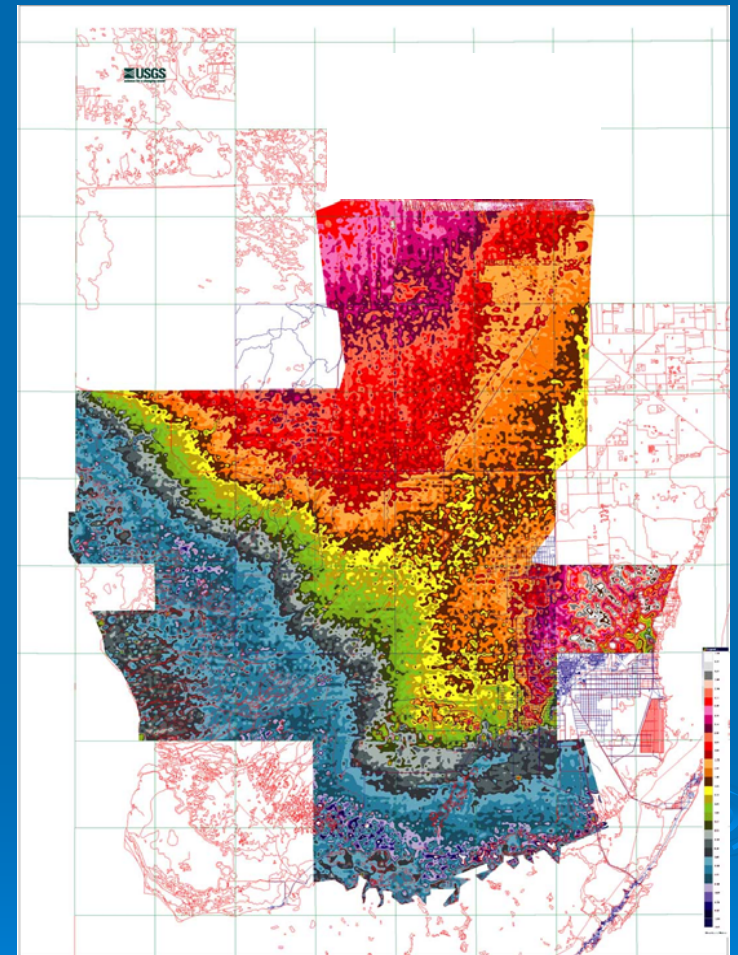
LIDAR

- USGS Project
- 100x100 meter grid
- Currently only using data for WCA-3A north of I-75



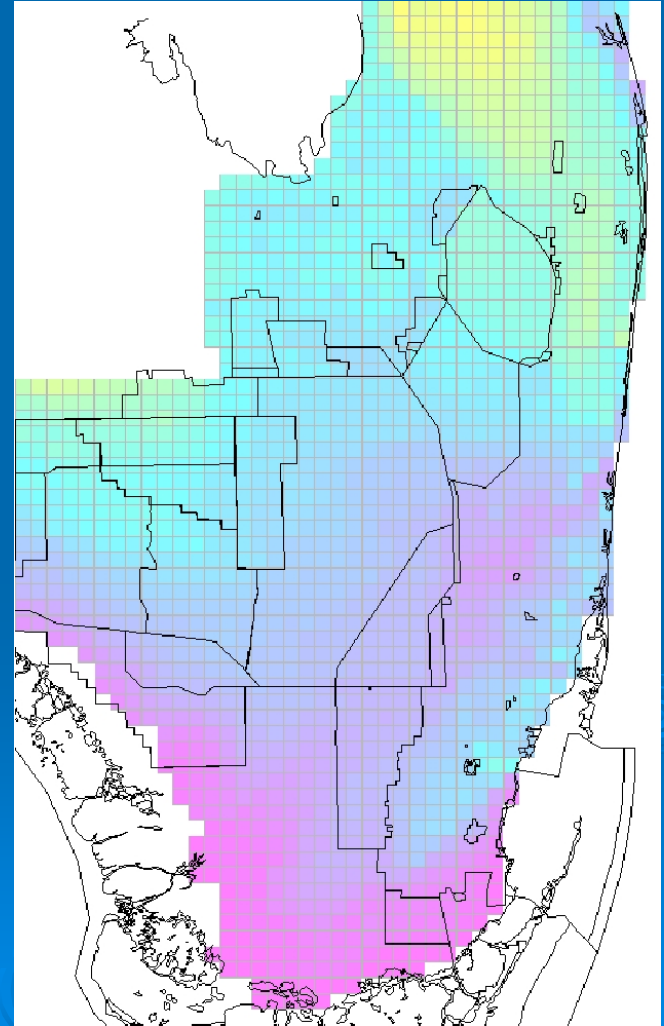
HAED

- USGS Project
- Measures topography on an irregular 400x400 meter grid
- Covers:
 - Most of ENP
 - Most of BCNP
 - Most of WCA-3A
 - Some urban areas



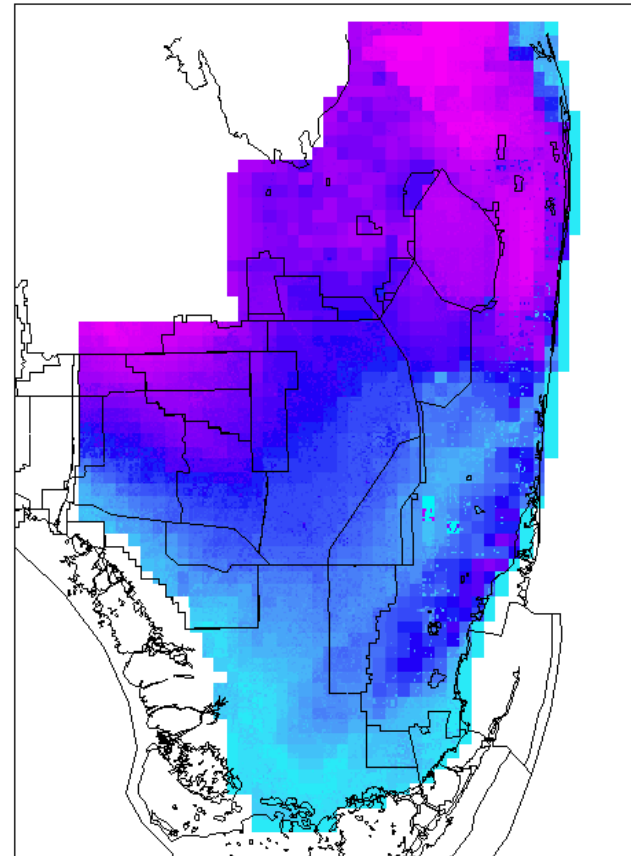
SFWMM Topography

- South Florida Water Management District Product
- 2x2 mile



ATLSS HRT


- Covers
 - Loxahatchee
 - WCA-2
 - WCA-3
 - BCNP
 - ENP
 - Surrounding natural areas.
- Topographic estimates computed by the ATLSS HRT model
- 30x30 meter resolution



HRT Creation

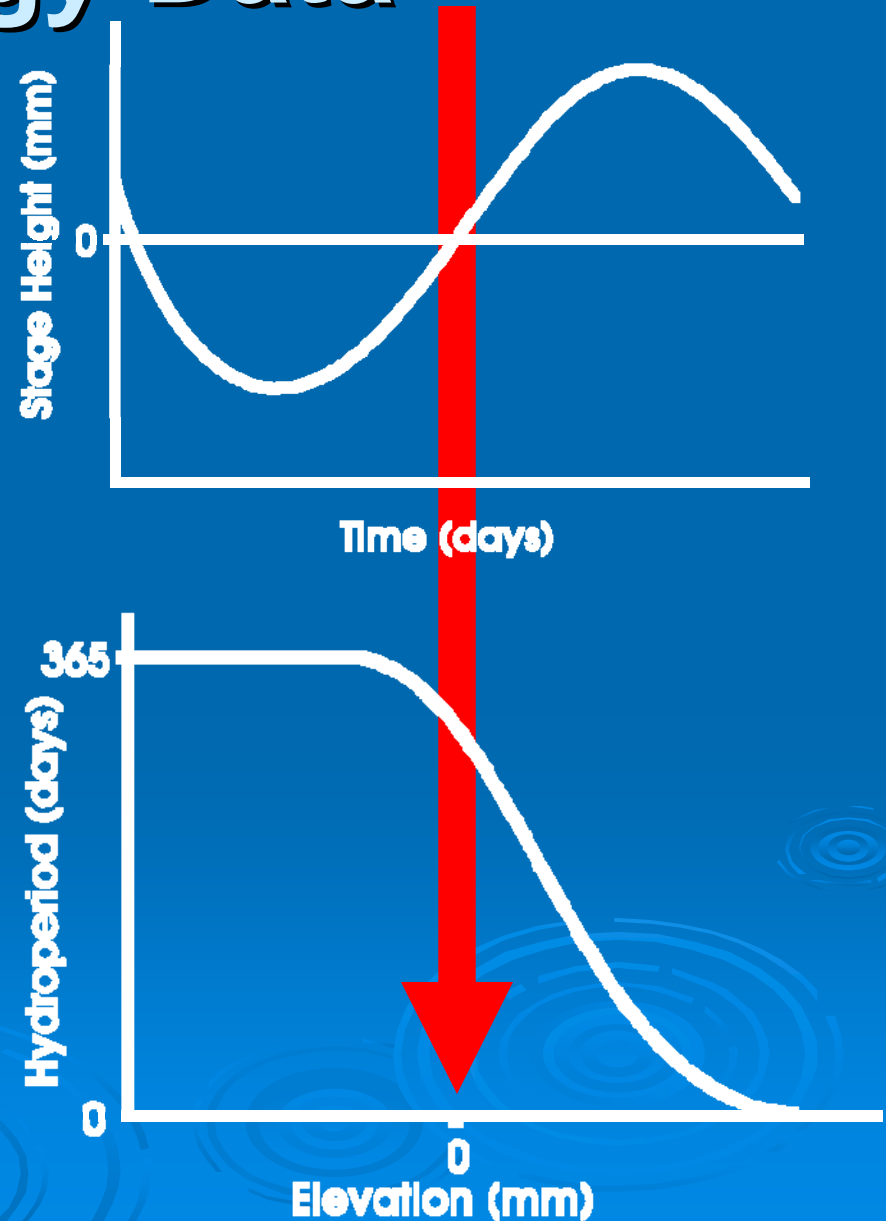
- Basic premise : Plants are present in locations where local topography and hydrology combine to create favorable hydroperiods
 - Topography + Hydrology => Vegetation
 - Vegetation + Hydrology => Topography

HRT Inputs

- Hydrology : SFWMM Calibration/verification run
 - Vegetation : FGAP
 - Hydroperiod ranges : Literature, expert opinion
 - Adaptable to other data sets
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Hydrology Data

- Transform the Stage Height data into hydroperiod histograms.
 - Describes the number of days at or above each elevation.
- We use an average of values from 1986 to 1995.
- Currently based on the Calibration/Verification (Cal/Ver) run of the SFWMM.



Hydroperiod values for vegetation types.

- For each vegetation type in the FGAP map we estimate a range of hydroperiods.
- The hydroperiod used for any particular cell in the FGAP map is interpolated as follows:

$$H_I = H_{\max} * S + H_{\min} * (1 - S)$$

$$S = \frac{H_{\text{SEWMD}}}{365}$$

- Hydroperiod values are drawn from the literature.

Class	H _{max}	H _{min}
0	0	0
1	365	365
2	45	10
3	180	60
4	30	0
5	15	0
6	40	10
7	45	0
⋮	⋮	⋮

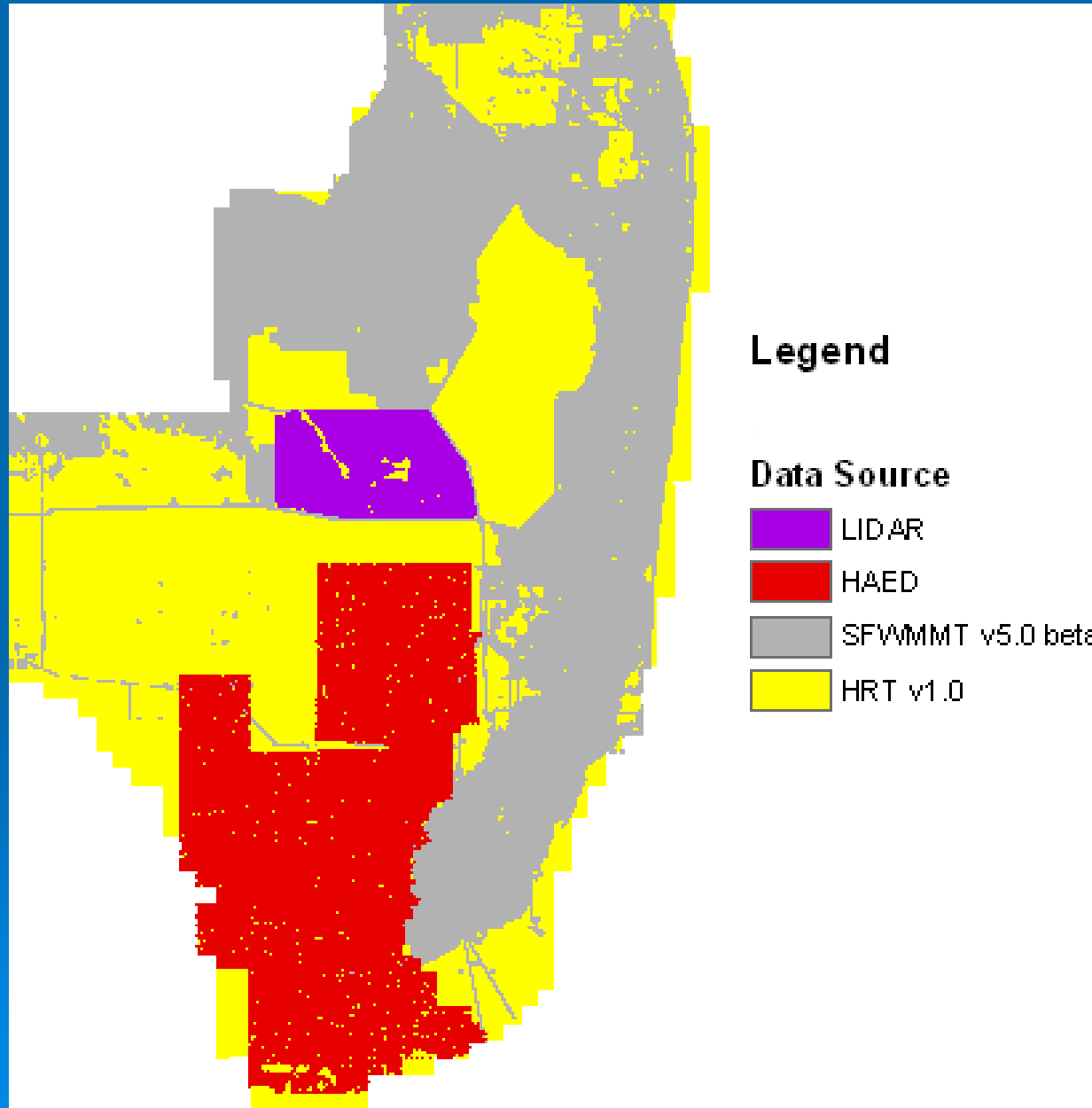
Creating HMDT

- 500x500 meter grid
- Convert all vertical data to mm NGVD 1929
 - VERCON
- Convert all horizontal data to UTM NAD 1983, using meters
 - ARC GIS
- Basic rules:
 - Only one source of data is used in each 500x500 meter plot.
 - Use LIDAR or HAED where available
 - However, limit HAED to areas used by SFWMM Topo. This is for compatibility with SFWMM.
 - Use SFWMM Topo in urban and agricultural areas
 - Otherwise use HRT

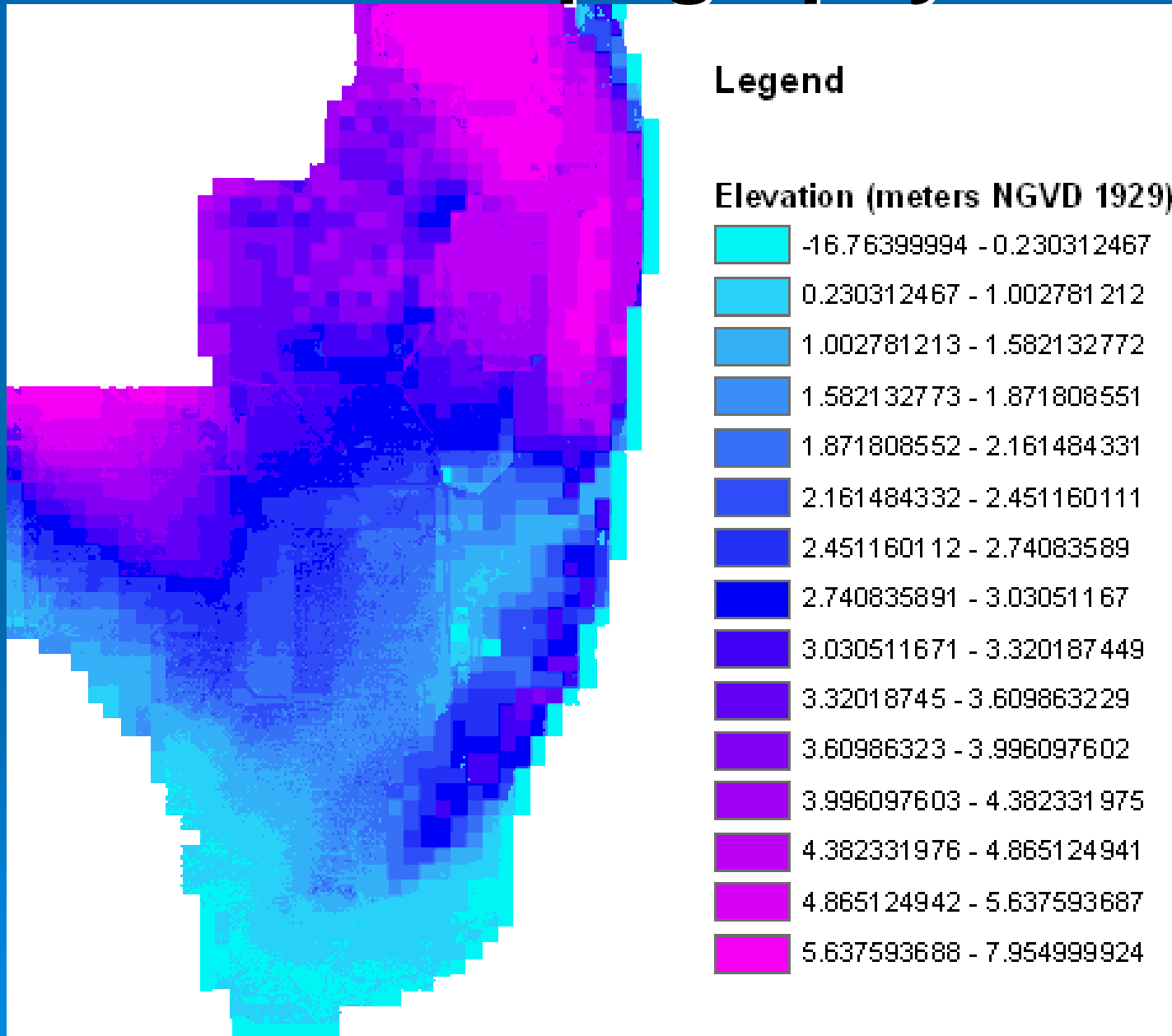
Creating HMDT: Refined rules

- For areas where LIDAR, HAED and HRT are used, the HMDT elevation is the mean of the data points within the 500x500 meter plot
- If there are fewer than 16 LIDAR data points in a 500x500 meter cell then do not use LIDAR
- If there are no HAED data points in a 500x500 meter cell then do not use HAED
- SFWMM Topo is used in any 500x500 meter cell that contains at least one urban or agricultural cover type as determined by the Florida GAP map v6.6

Data Source Map

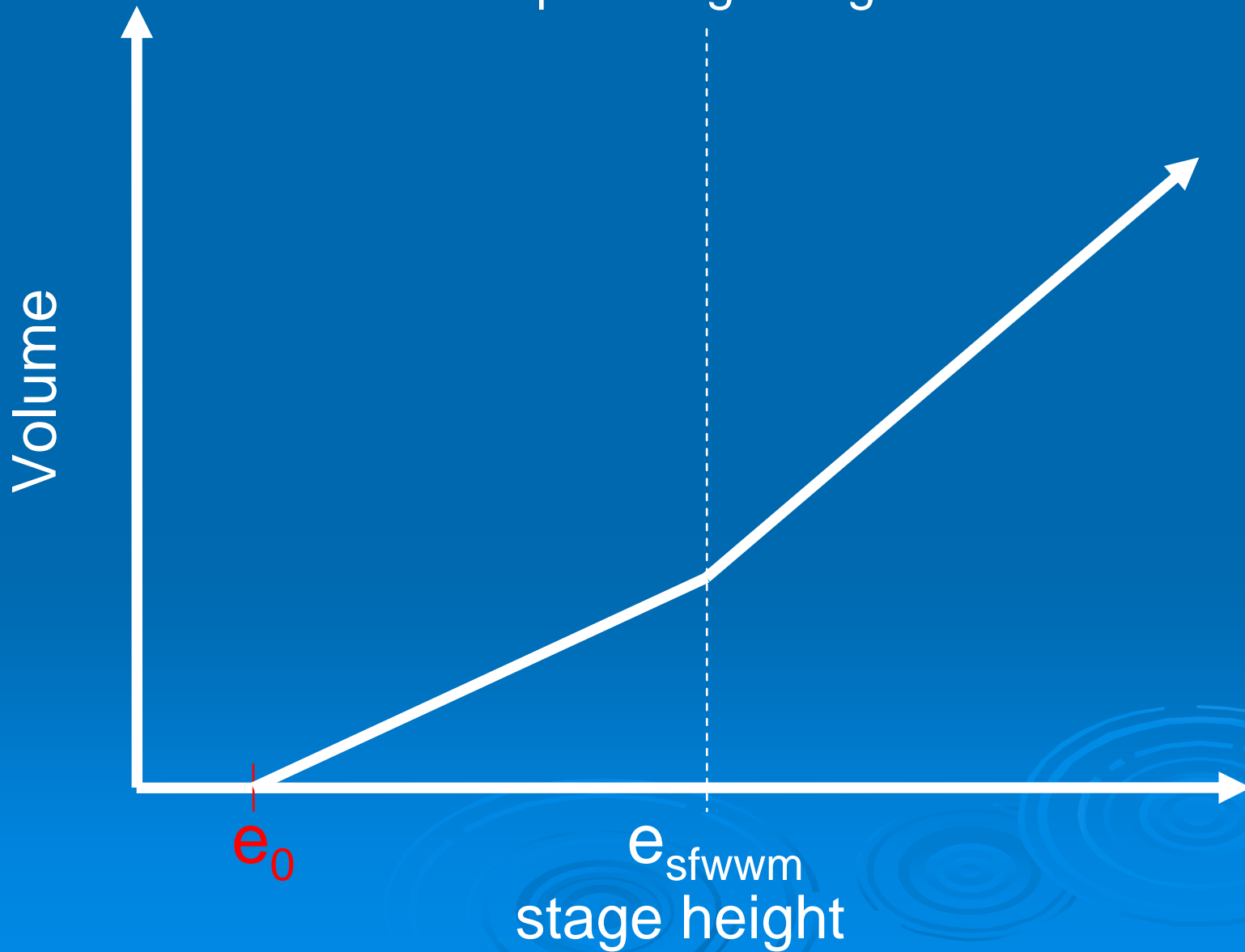


HMDT Topography

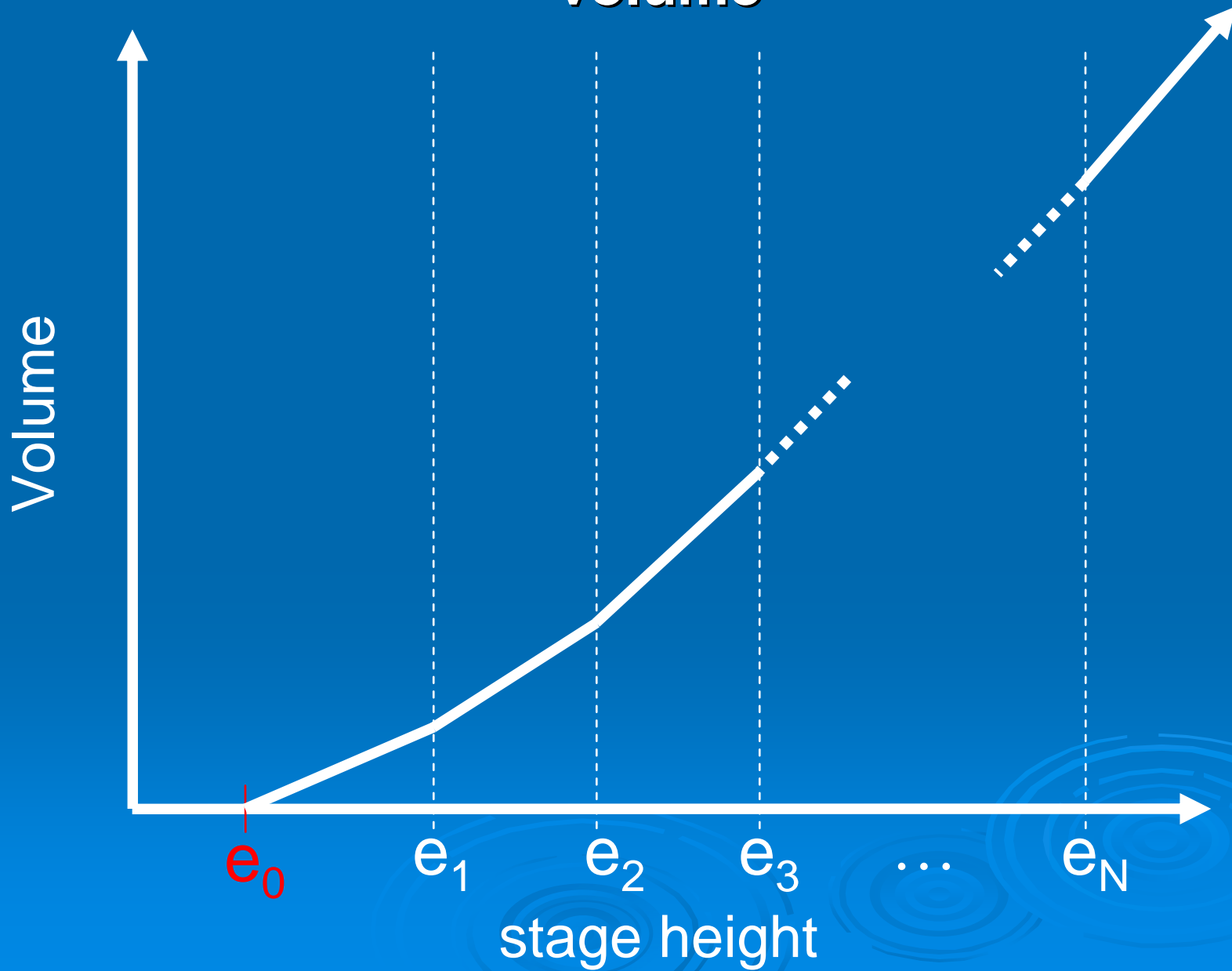


Compute volumes for full range of stage heights.

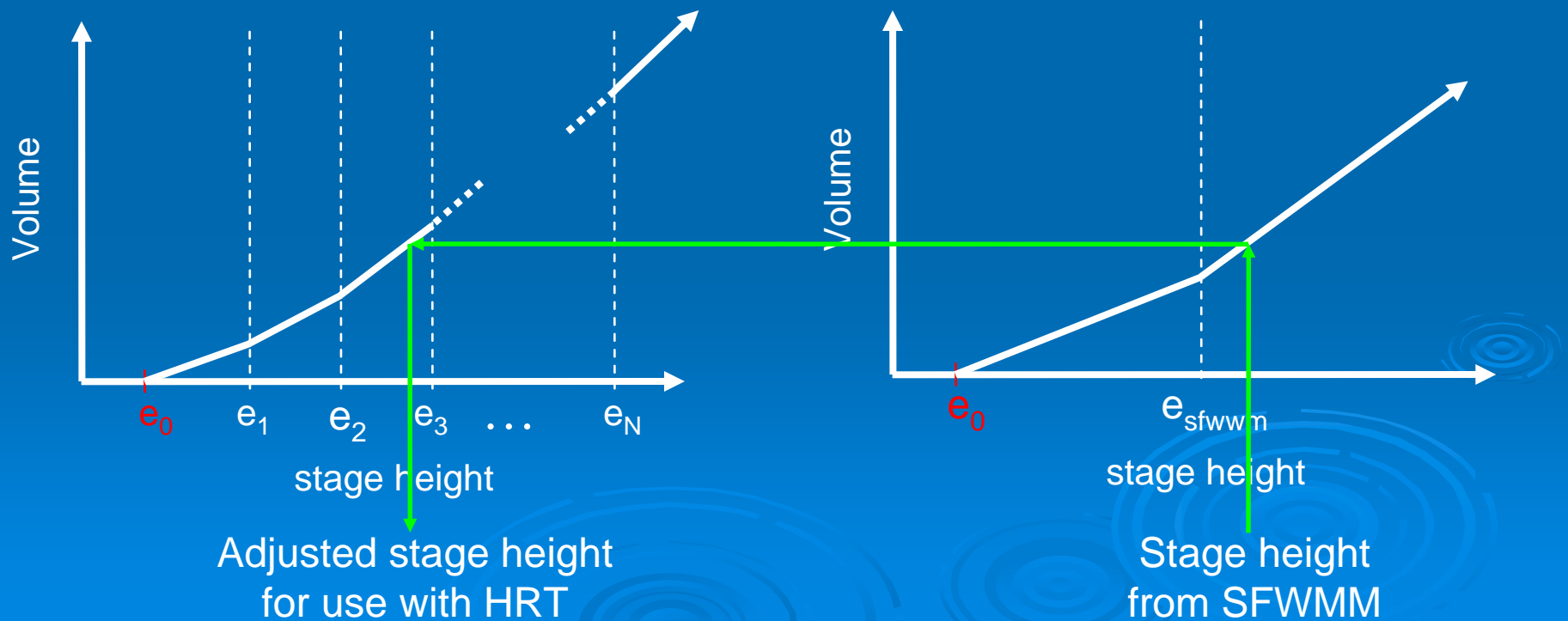
SFWMM Topo : stage height vs volume



High resolution topography : stage height vs volume



- Combine the two functions to adjust 2x2 mile stage height to preserve volume when applied to a high resolution topography map
- This approach preserves water volume within a 2x2 mile plot



Conclusion

- A finer resolution than 2x2 is needed.
 - Topographic variations such as Tree islands are important.
 - Conservation of water is a basic tenant to the process.
 - Ability to incorporate best available topographic information.
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