

Sparse Data / Spatial Interpolation

TIN IDW
Surf.tps (GRASS)
Thin Plate Spline TOPOGRID

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Data Clouds / Spatial Filtering

- **L**ight **D**etection **A**nd **R**anging
- Measures distance to, or other properties of a target by illuminating target with light, using pulses from a laser
- Three components
 - Airborne scanning laser rangefinder
 - Differential GPS
 - Internal Navigation System
- Generates millions of points at relatively low cost ...

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Cottonwood Creek DEM

Source Data Final DEM

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Topographic attributes

- Elevation (z)
- Slope gradient (α)
- Slope aspect (w)
- Curvatures (k)
- Distance to the nearest ridge
- Downslope length
- Upslope length
- Upslope area
- Downslope area

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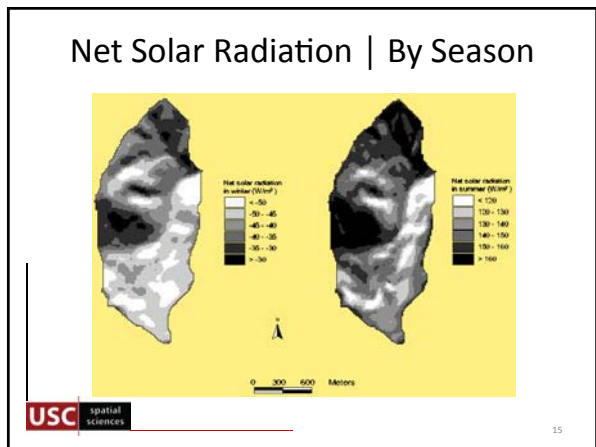
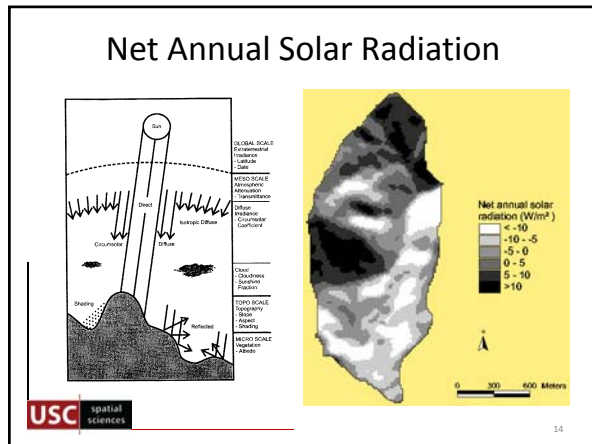
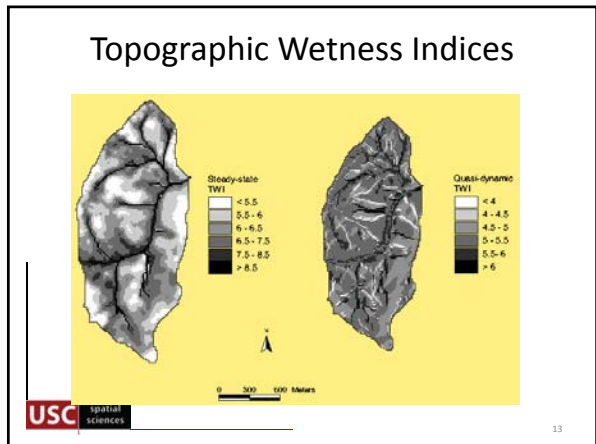
Pre-Processing Decisions

- Source and granularity of DEM used
- Presence and handling of spurious pits (interpolation)
- Choice of drainage enforcement option (if any)
- Choice of flow routing algorithm
- Dynamic character of key variables and processes
- **It is the topographic shape that matters most!**

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Slope | Upslope Area

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Landscapes | Fuzzy Classification

- Calculated 8 topographic attributes
 - Elevation
 - Slope
 - Profile Curvature
 - Plan Curvature
 - Distance to ridgelines
 - Solar insolation
 - Topographic wetness index
 - Sediment transport capacity index
- Used a fuzzy k-means classifier to identify 6 landform classes
 - Assigns membership values to grid cells
 - Assigns classes based on largest membership values

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