Visualization of Environmental Parameters for Lubbock TX over a 10 Year Period

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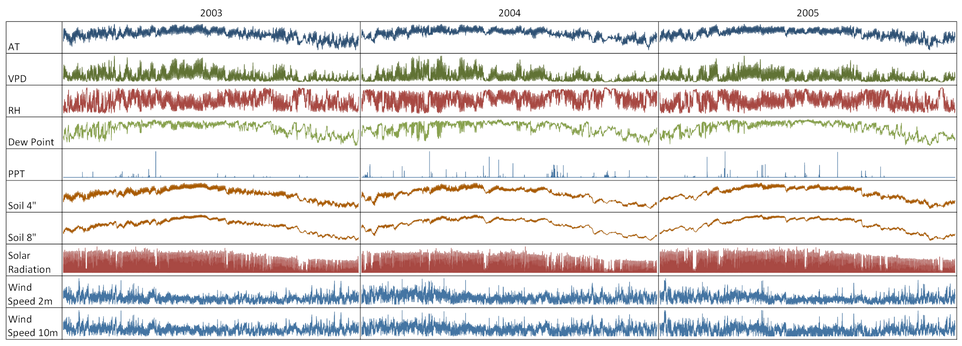
Traditional Approach to Data Visualization

Time series of 15-min environmental data, April through December collected for 3 years.
Can we improve visual inspection capability?

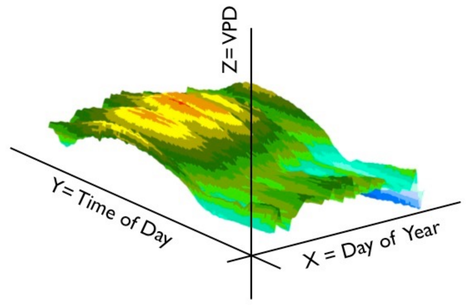


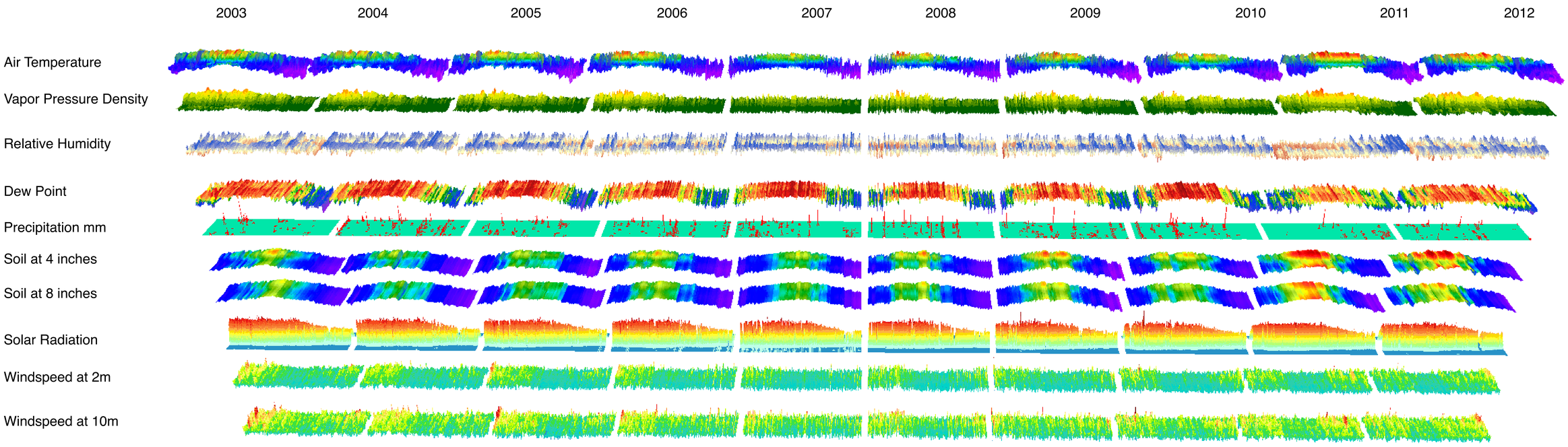
Visualization approach

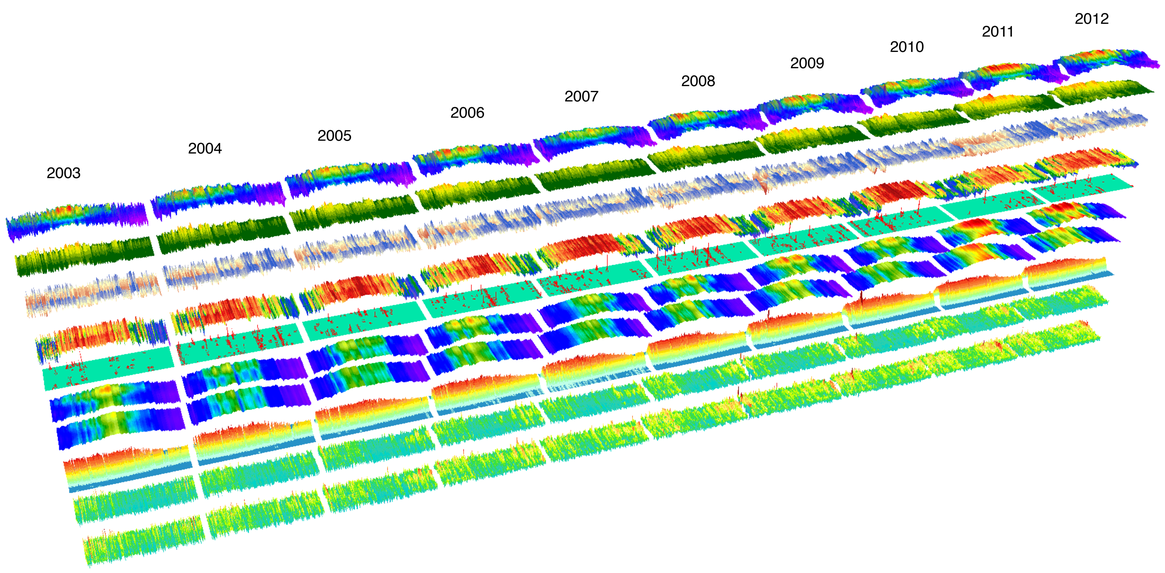
We have used a GIS platform to present seasonal time series data in the form of 3-dimensional time surfaces that allow the visualization of thousands of data points in an interactive exploratory setting.

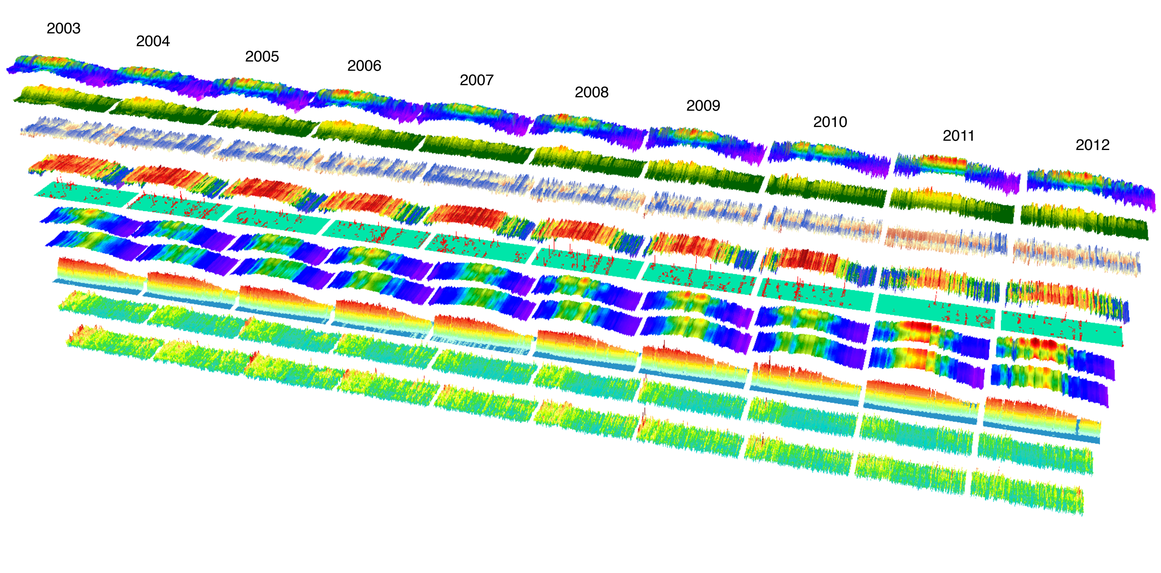
The time surface displays time on 2 axes; time of day vs day of year. The variable of interest in mapped on the time surface using color and elevation.

Time-surfaces - Seasonal Air Temp "time surface". This is not space...this is time...a visual representation of the growing season.







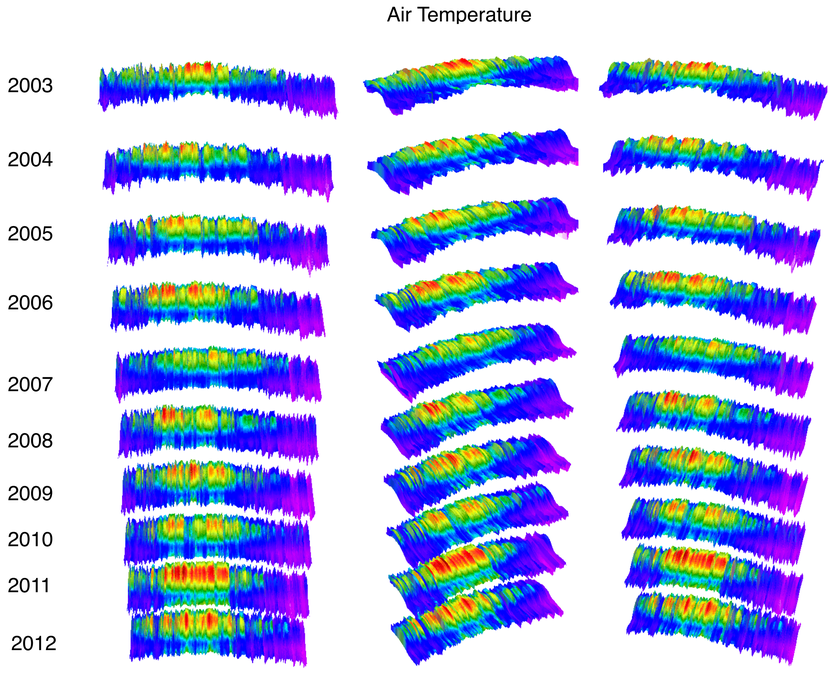


GIS-based environmental/plant time-surfaces as a tool

- simple to create
- creation can be automated
- GIS environment allows real time manipulation
- interactive nature facilitates data exploration
- possibly useful for initial data examination
- easy to create artifacts
- based on off-the-shelf GIS technology
- can handle lots of observations
- crop and environmental variables
- "instructive" views are easy to capture
- multiple perspectives are easy to achieve
- numerical analysis still required

Our current direction

- creating libraries of seasons
- developing "open source" implementation
- using visualizations as "maps" to direct numerical and physiological analysis
- using surface characterization tools for pattern recognition (id of the good, bad, and ugly)



Temporal aspects of plant/environment interactions. "Rosetta"

- We believe that near-continuous season-long measurements of the plant and its environment contain a great deal of information about the physiological status of the plant.

- Canopy temperature is well suited to near-continuous season-long plant monitoring. The temporal variation in canopy temperature coupled with environmental variability tells the story of the crop from planting to harvest.

- Our ability to translate these seasonal patterns of plant/environment observations into metabolic, physiological and agronomic patterns can be improved.

- The Rosetta Stone provided the basis for the translation of hieroglyphics into known languages.

- We attempting to use a Rosetta approach to develop tools that will allow the translation of near-continuous season-long plant/environment data into information that will inform and direct our approaches to plant stress management.