Innovative Technologies That Can Be Used on the Farm

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UCCE Ventura
Andre Biscaro , Farm Advisor UCCE-LA County

Session 2
1:15 pm to 2:45 pm, Monday

Goal of this presentation:

- Show examples of available technologies and ideas that can improve farm management

Tools

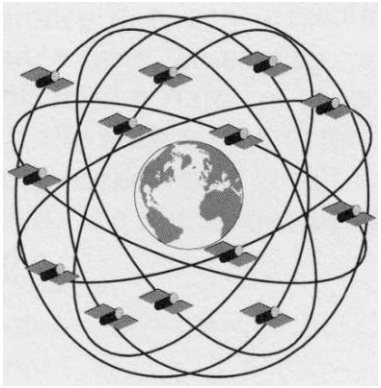
- GIS – keep track of area, management, crop and soil properties
- GPS – direct soil samples and delineate different management
- Data Connectivity
- Free satellite imageries and low cost aerial/airplane imageries
- USDA Web Soil Survey
- Soil Electrical Conductivity sensors (Veris and EM 38) for rent
- Cell phone apps: soils to go and others

GPS and GIS

- What's GPS?

  (Global Positioning System)

  Devices that give you positioning/latitude and longitude

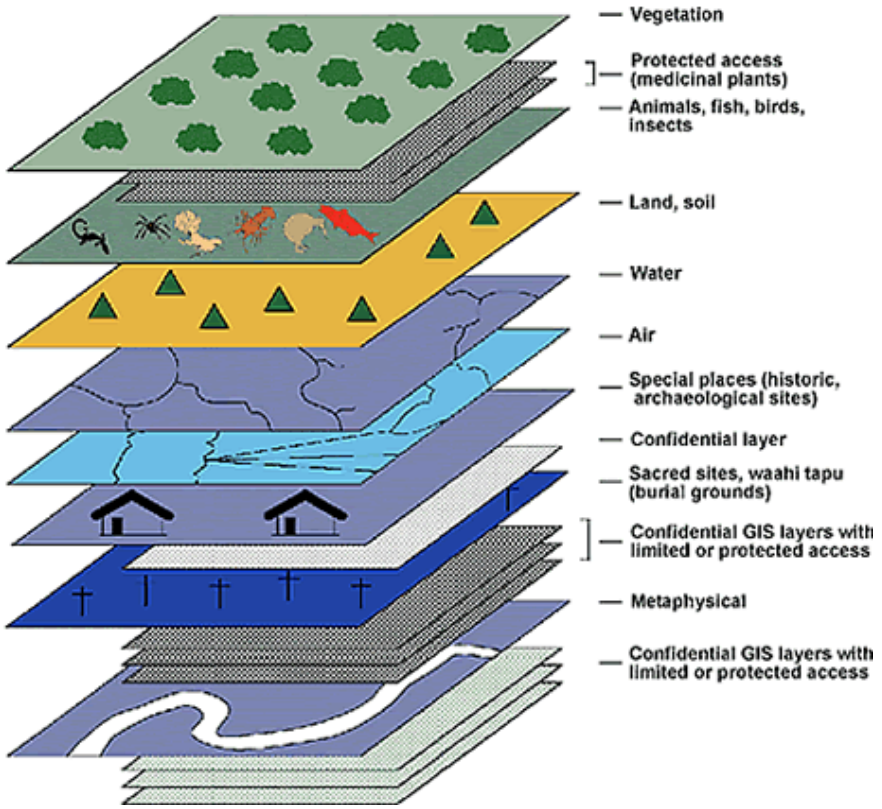


GPS and GIS (cont.)

- What's GIS?

  (Geographic Information System)

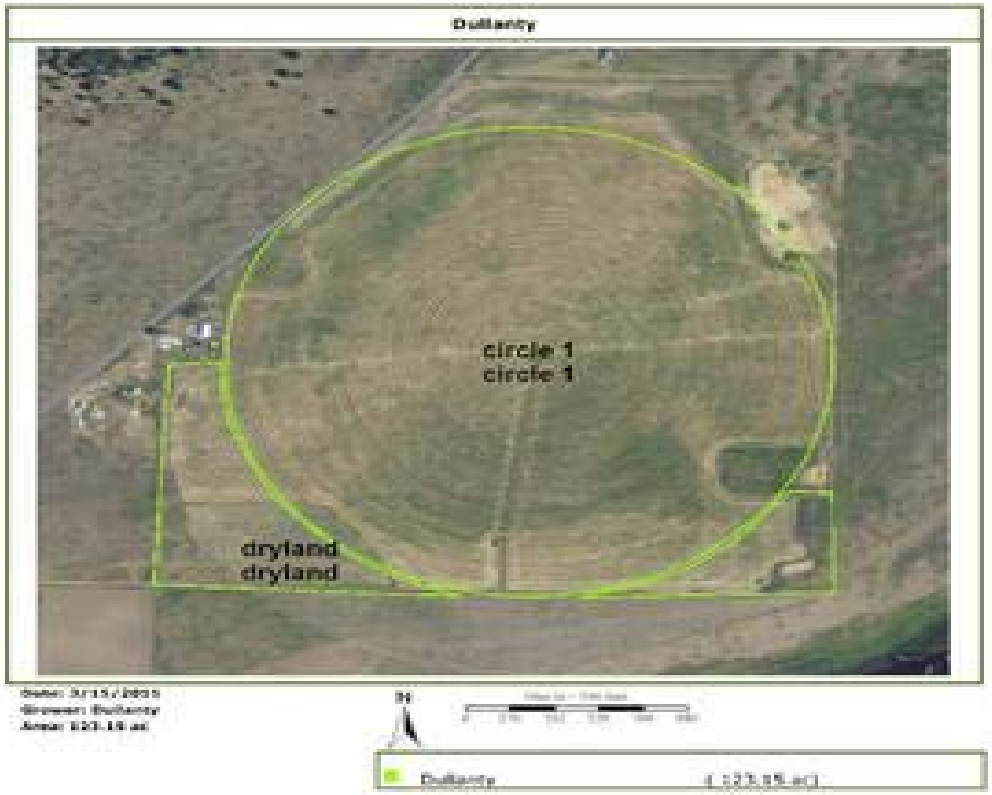
  Software used to visualize and edit data with coordinates = maps



GPS and GIS

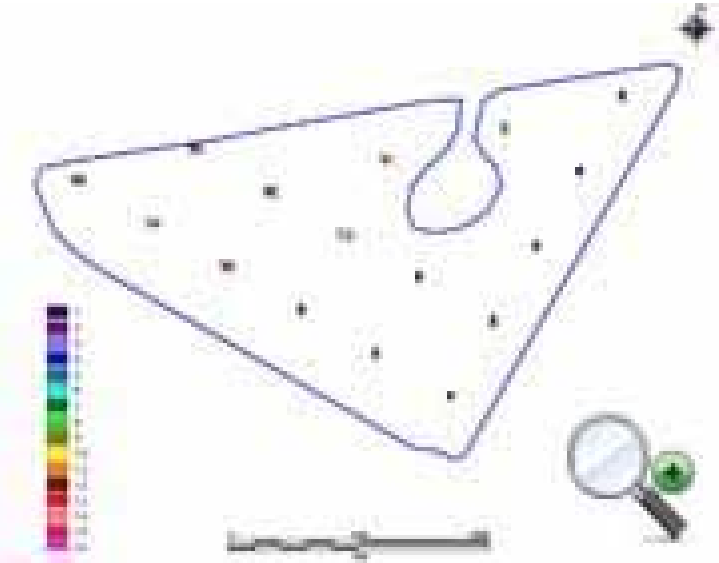
Examples of uses

- Record boundary of your fields and obtain area (GPS)



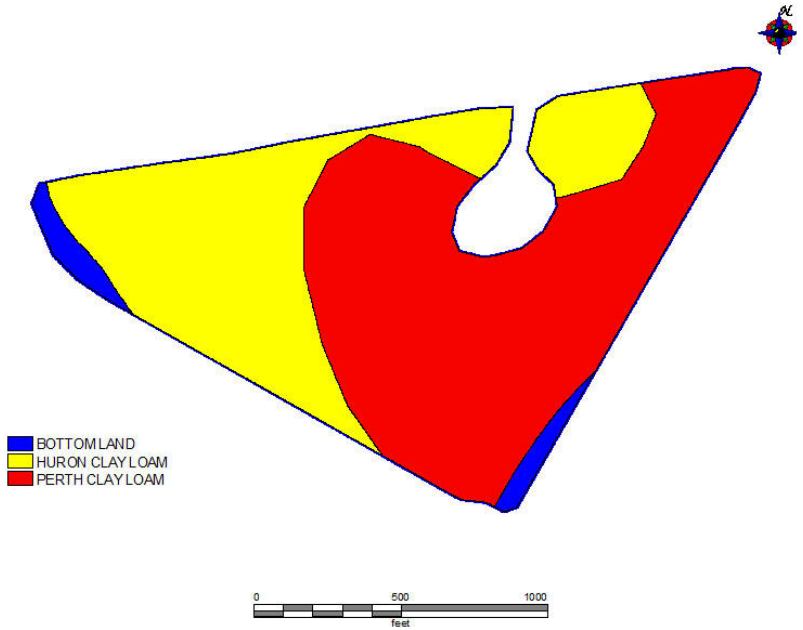
Examples of uses (cont.)

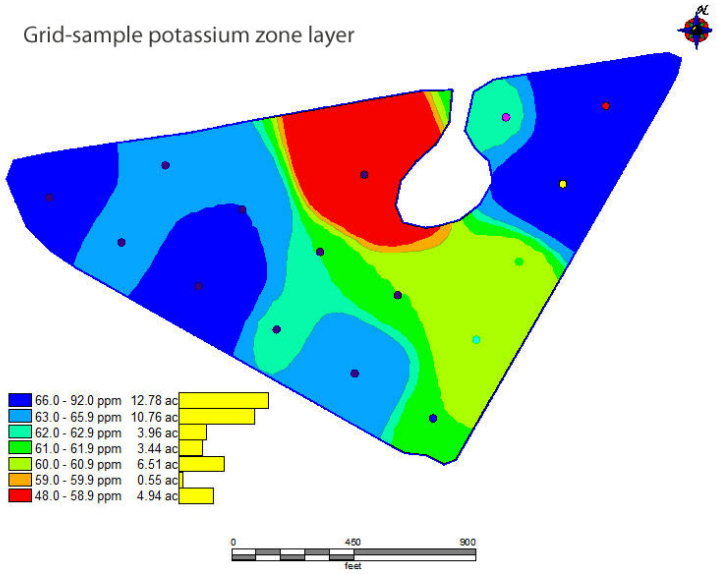
- Record points where soil samples were taken or create points to guide soil sampling (soils are variable, even within a 15 acre field) (GPS)



Examples of uses (cont.)

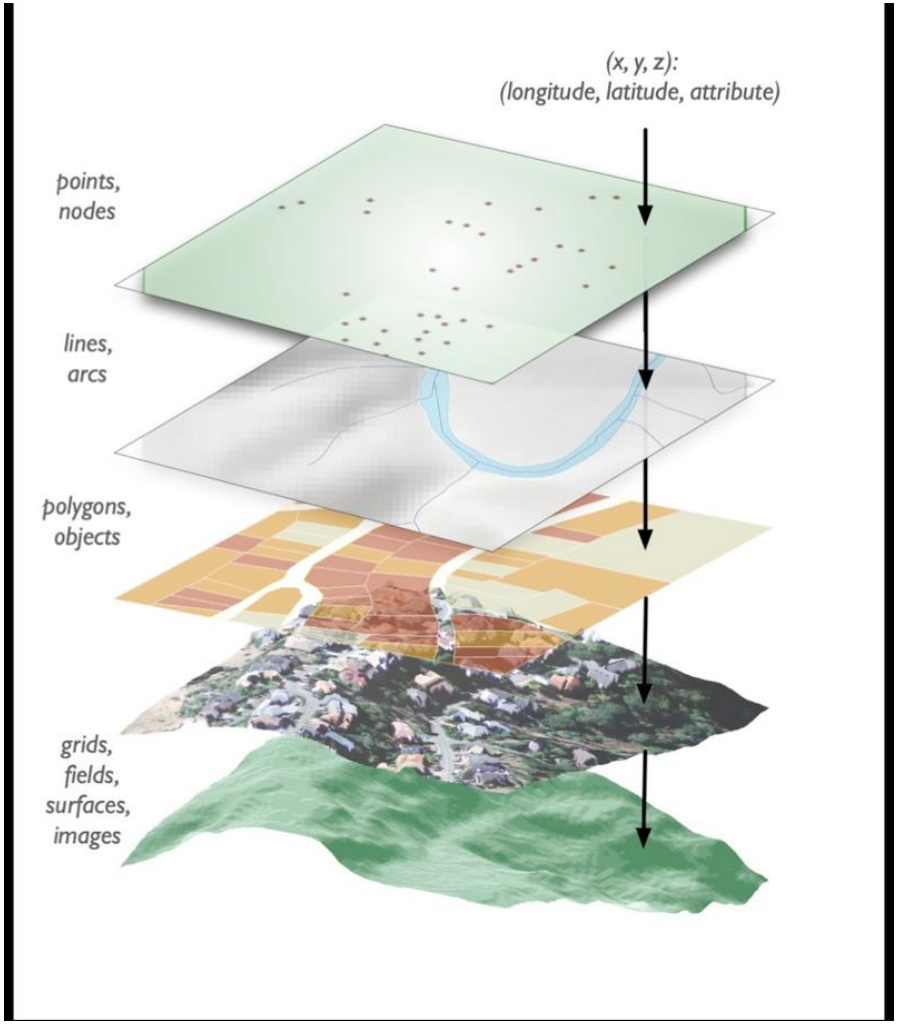
- Create boundaries for areas with different management, soil type, varieties, diseases etc (GPS)





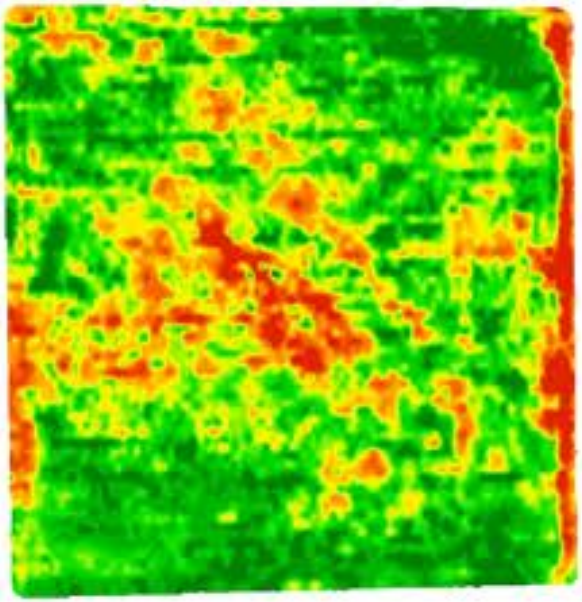
Examples of uses (cont.)

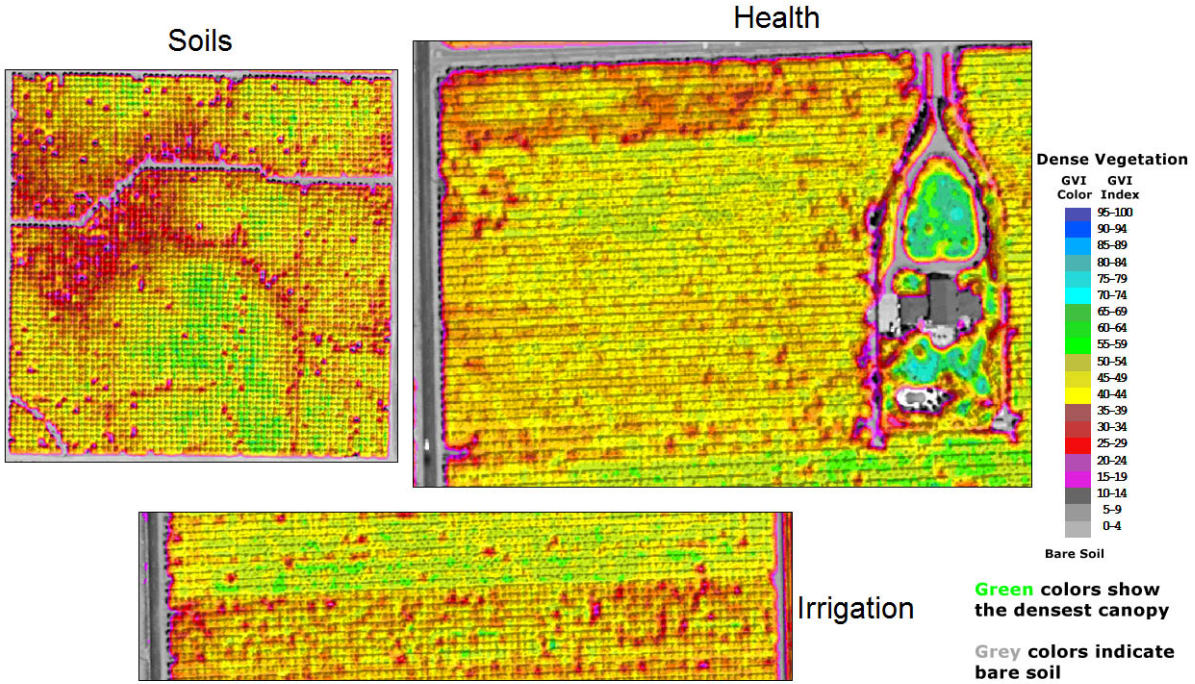
- Great for record keeping (overlap maps from different years) – substitute of paper maps, you gain accuracy. Platforms for record keeping (GIS)



Examples of uses (cont.)

- Visualize aerial/satellite imageries (GIS)



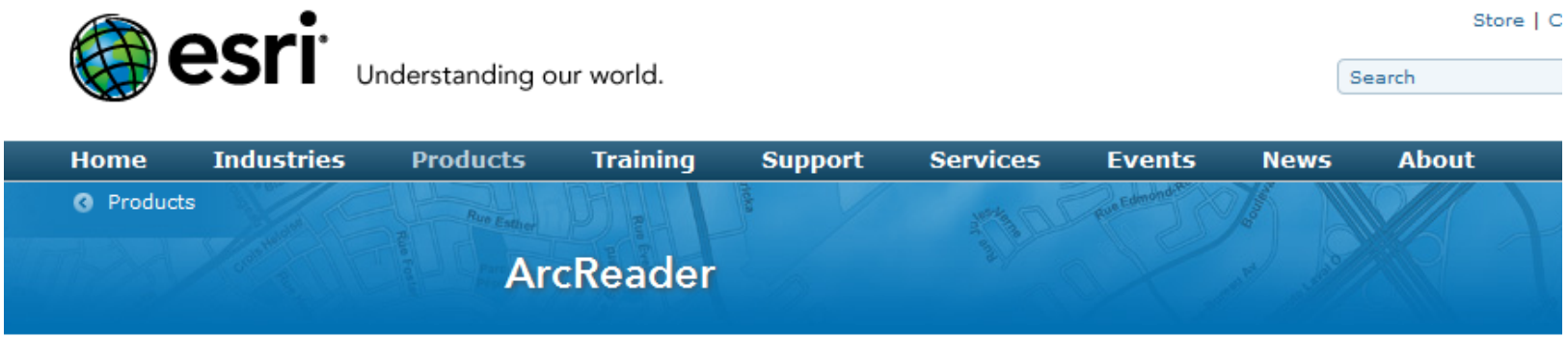


Examples of uses (cont.)

- Corn maze (GPS and GIS)

- Free basic mapping software:
  - Google Earth
  - GE-Path
    - http://www.sgrillo.net/googleearth/gepath.htm
  - ArcGIS Explorer
  - Bing Maps
  - EasyGPS
    - http://www.topografix.com
  - BaseCamp & MapSource (Garmin)
  - VantagePoint (Magellan)
  - University of New Hampshire Cooperative Extension KML Tools Project
    - http://extension.unh.edu/GISGPS/KMLtools.htm
  - DNRGarmin
    - http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html
  - fGIS
    - http://www.forestpal.com/fgis.html
- Free GIS: QGIS and MapWindow GIS

Free GIS



Product Overview

Key Features

Demos

Brochures/White Papers

Common Questions

System Requirements

User Stories/Reviews

Download Now

What's New

Training Available for ArcGIS for Desktop 10
Get up to speed on ArcGIS 10 with instructor-led training, no-cost live training

Overview

ArcReader is a free, easy-to-use desktop mapping application that allows users to view, explore, and print maps and globes. Anyone with ArcReader can view high-quality interactive maps authored by a high-level ArcGIS for Desktop product and published with the ArcGIS Publisher extension.

With ArcReader, you can

- **View, navigate, and print** published ArcGIS maps using ArcReader (.pmf files).
- Deploy your GIS data **to novices and professionals alike.**
- **Zoom, pan, and switch** between map and page layout views.
- **Communicate more efficiently** with the ability to graphically mark up maps.
- **Print published map and globe documents** including all layer symbology and cartographic map elements on any supported printer.

Free GIS

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Products

ArcGIS Explorer Desktop

Overview

- Key Features
- Demos
- Common Questions
- System Requirements
- Flyers/Podcasts
- Download
- What's New

Highlights

User Showcase
See how Lake County, Florida leverages ArcGIS Explorer for decision making.

Overview

ArcGIS Explorer Desktop is a free GIS viewer that gives you an easy way to explore, visualize, and share GIS information. ArcGIS Explorer adds value to any GIS because it helps you deliver your authoritative data to a broad audience.

With ArcGIS Explorer, you can

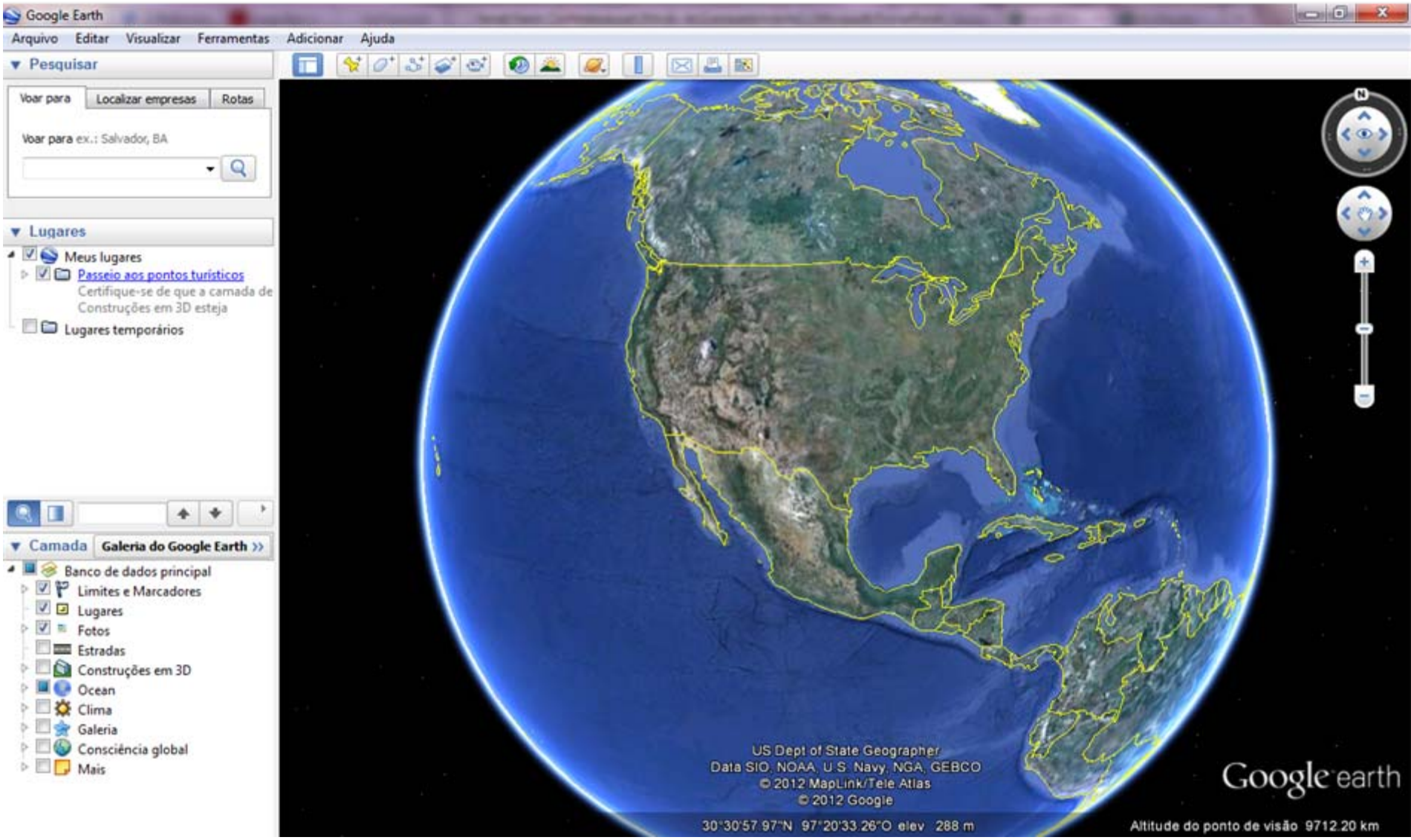
- Access ready-to-use ArcGIS Online basemaps and layers.
- Fuse your local data with map services to create custom maps.
- Add photos, reports, videos, and other information to your maps.
- Perform spatial analysis (e.g., visibility, modeling, proximity search).

Download ArcGIS Explorer.

Easily explore, visualize, share, and present your geographic information.

Free GIS

Google Earth



GPS and hardware

- Low-cost: ExpertGPS (http://www.topografix.com)
- Low-cost hardware: Garmin and Magellan
- Mid-range and high-end hardware: Trimble
- Companies: Trimble, Navigation Electronics, Inc. and Landmark Systems, Inc.
- Apple-based products: Magellan ToughCase GPS adapter, iGPS and iGIS
  - May be used on iPhone or iPod touch

Approaches to Irrigation Scheduling

Weather-based

- CIMIS
- Weather Station

Plant-based

Soil-based

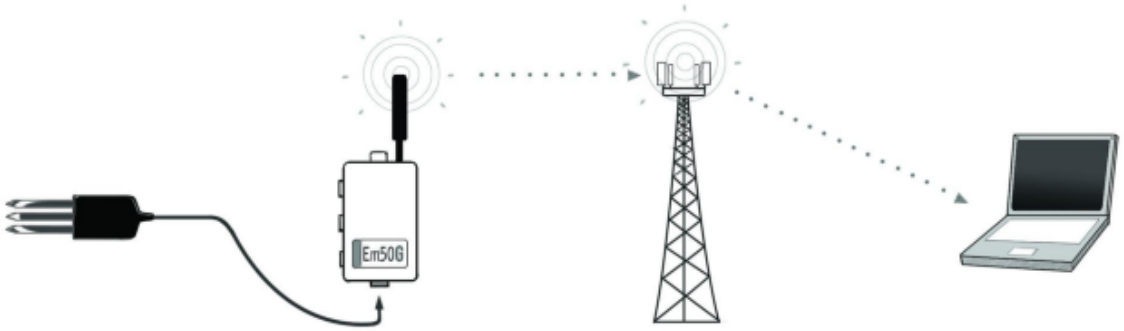
- Tensiometers
- Watermark blocks

Coastal crops: berries and vegetables

Moderate soil moisture deficits can cause yield loss

Soil and Weather Monitoring Services

Data Connectivity has improved:



Radio
Cell phone
Satellite
Internet

Field Data
Communication
Automation
Interaction

Frost Alert System

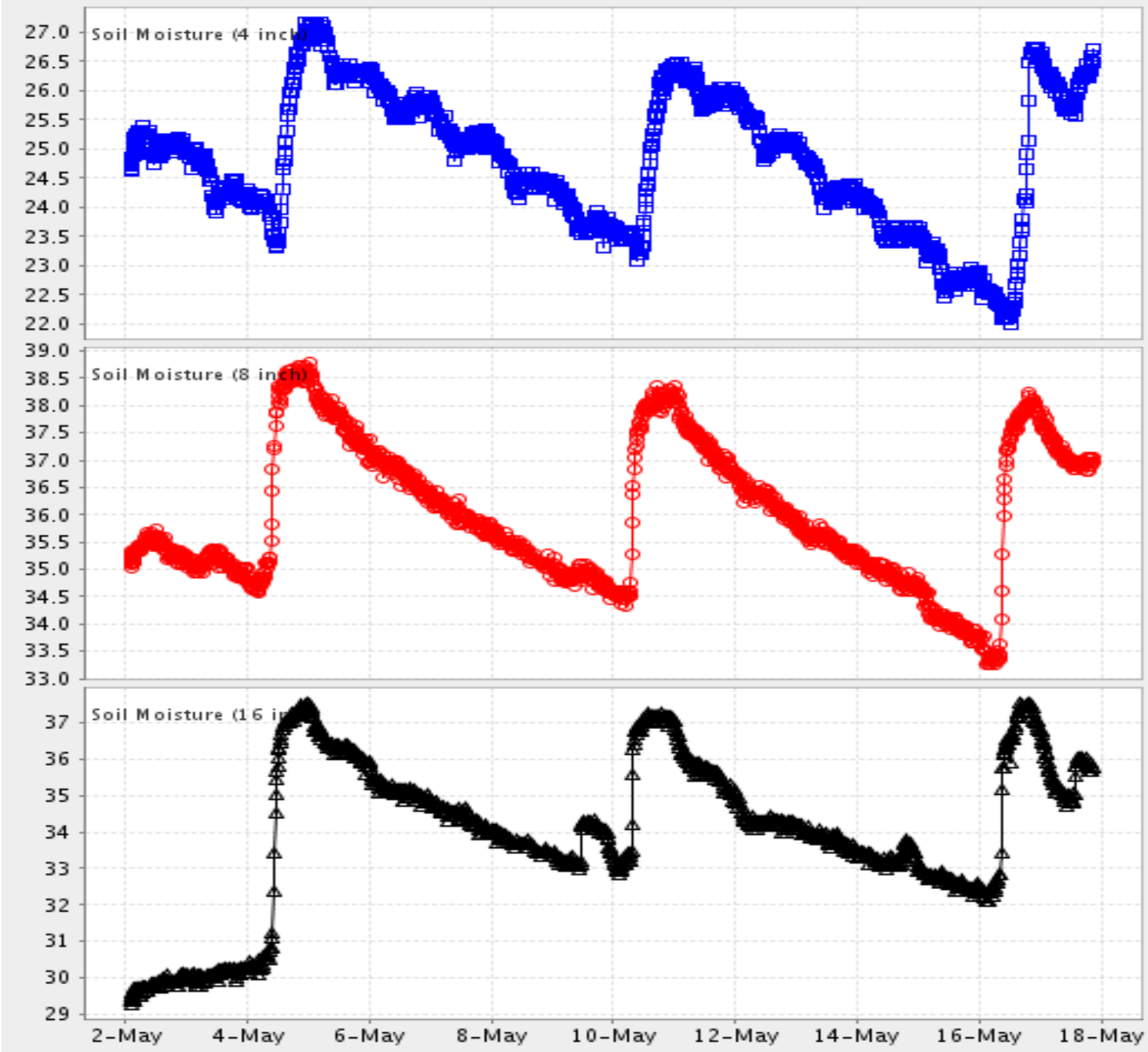
Solar Power

Request Status
from any phone

Alerts
up to 5
phones

Remote Sensor Unit

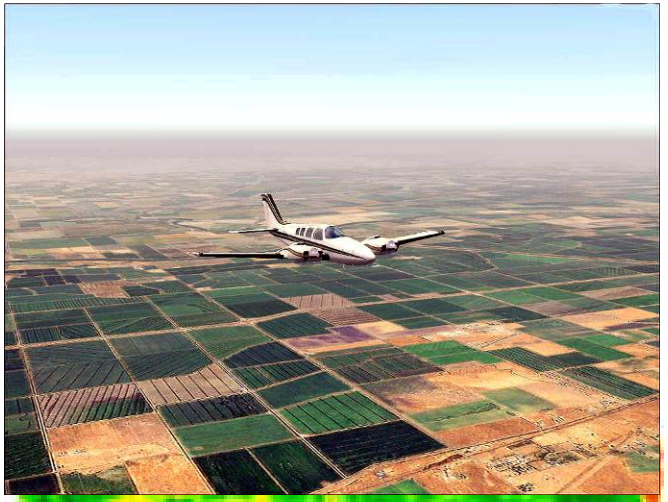
Soil moisture: drip - irrigated celery

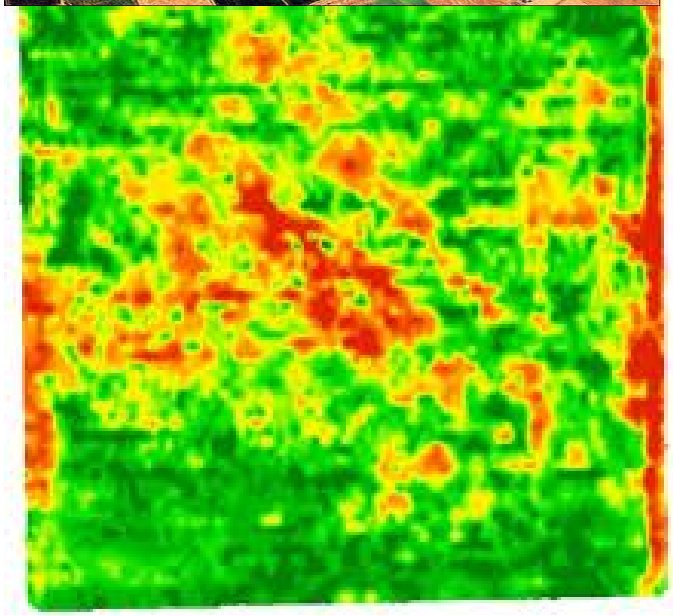


Recorded by ClimateMinder Sensors

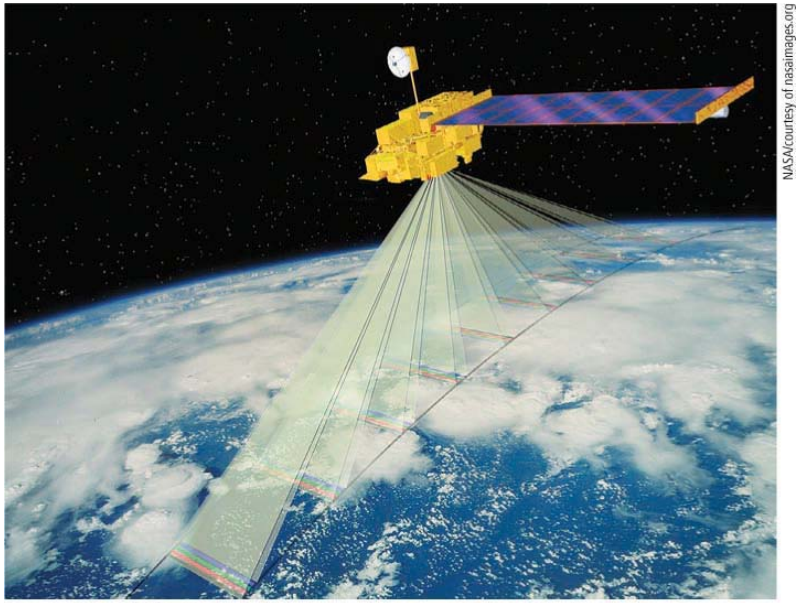
Imageries

Aerial

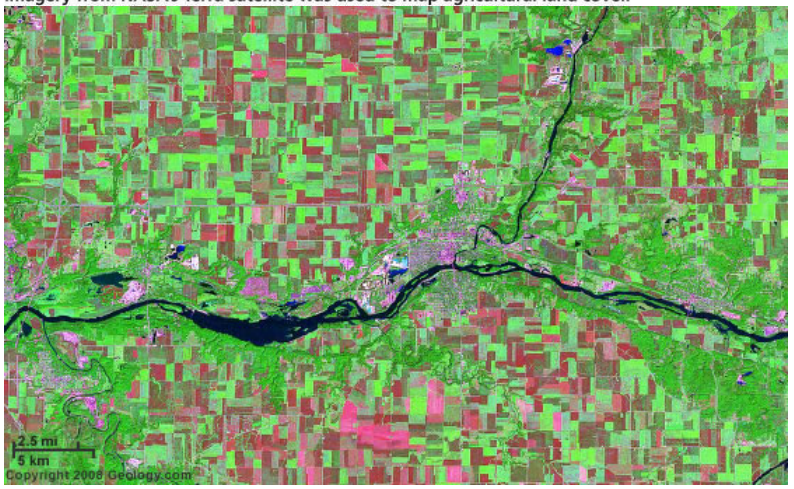




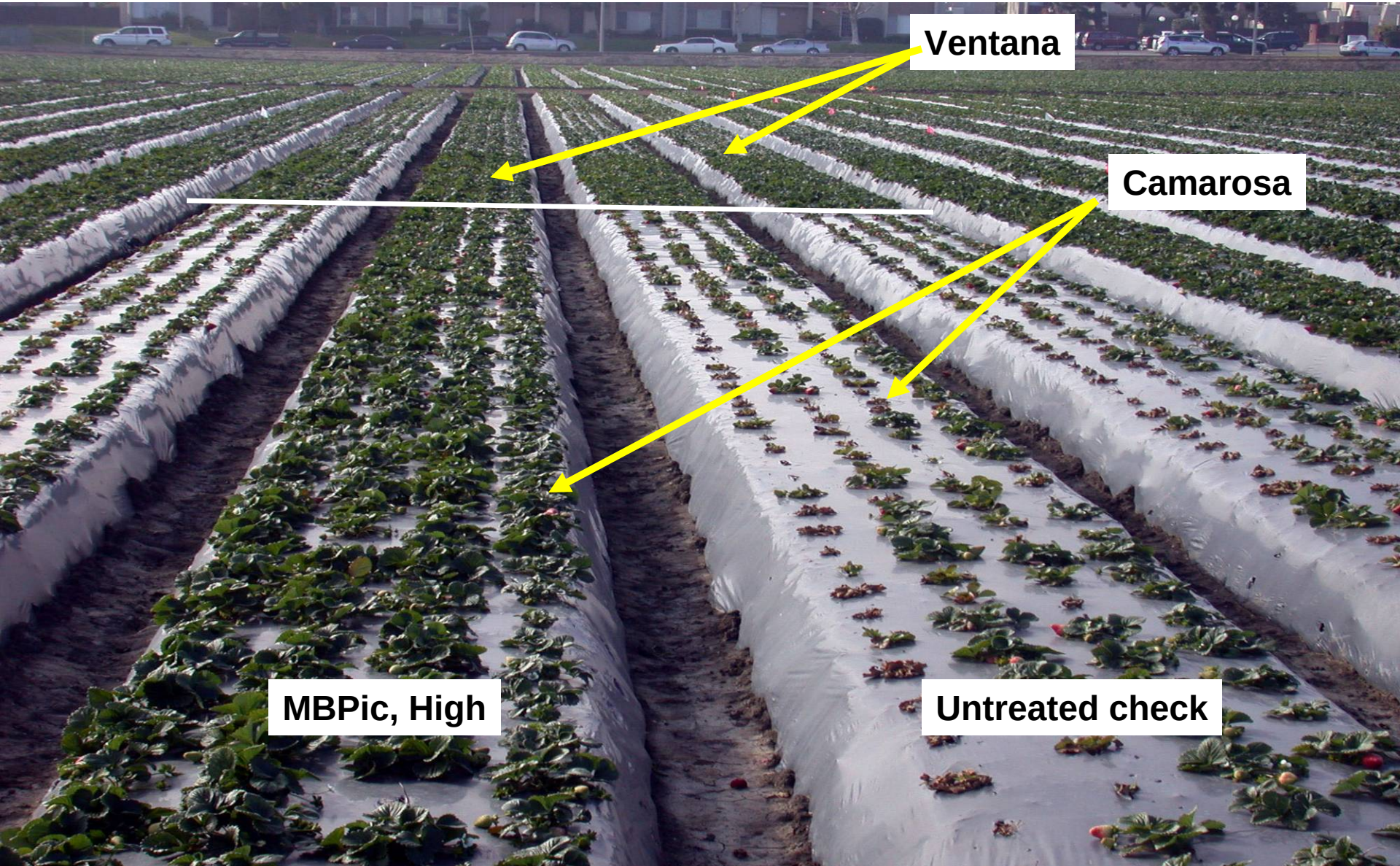
Satellite



Imagery from NASA's Terra satellite was used to map agricultural land cover.

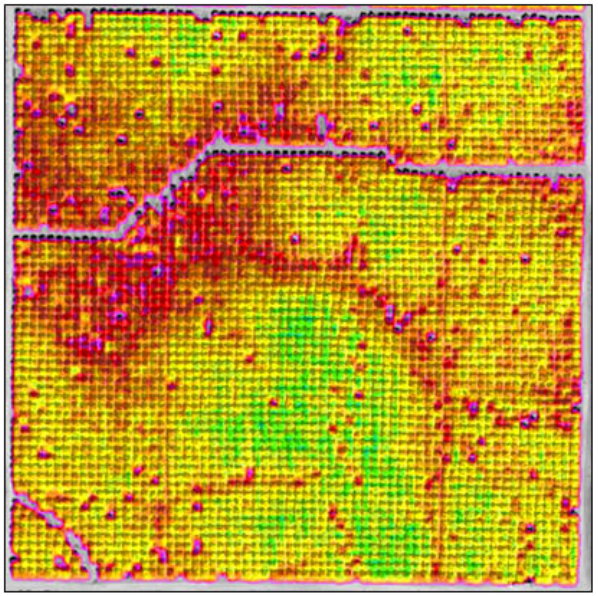


Ventura: early (Jan 5) variety specific die-back – only *Fusarium oxysporum* isolated

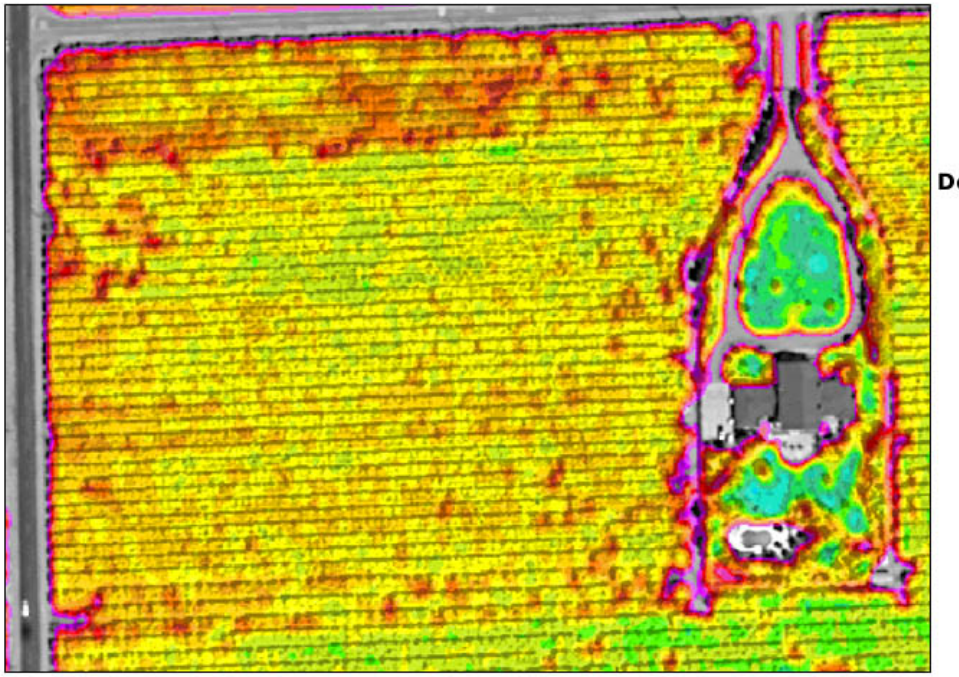


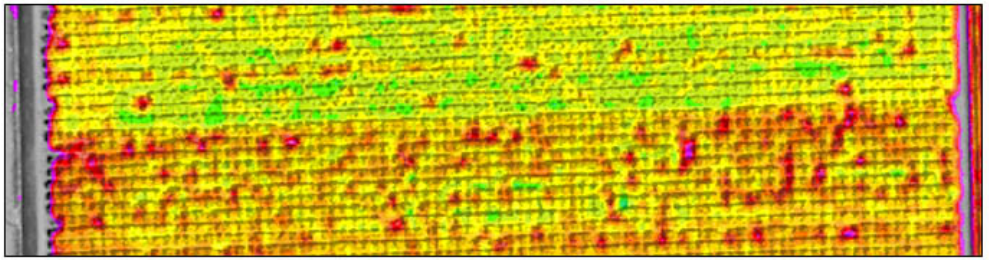
Aerial Imageries

Soils

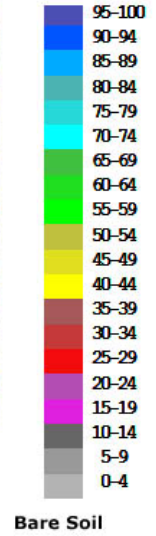


Health





Irrigation

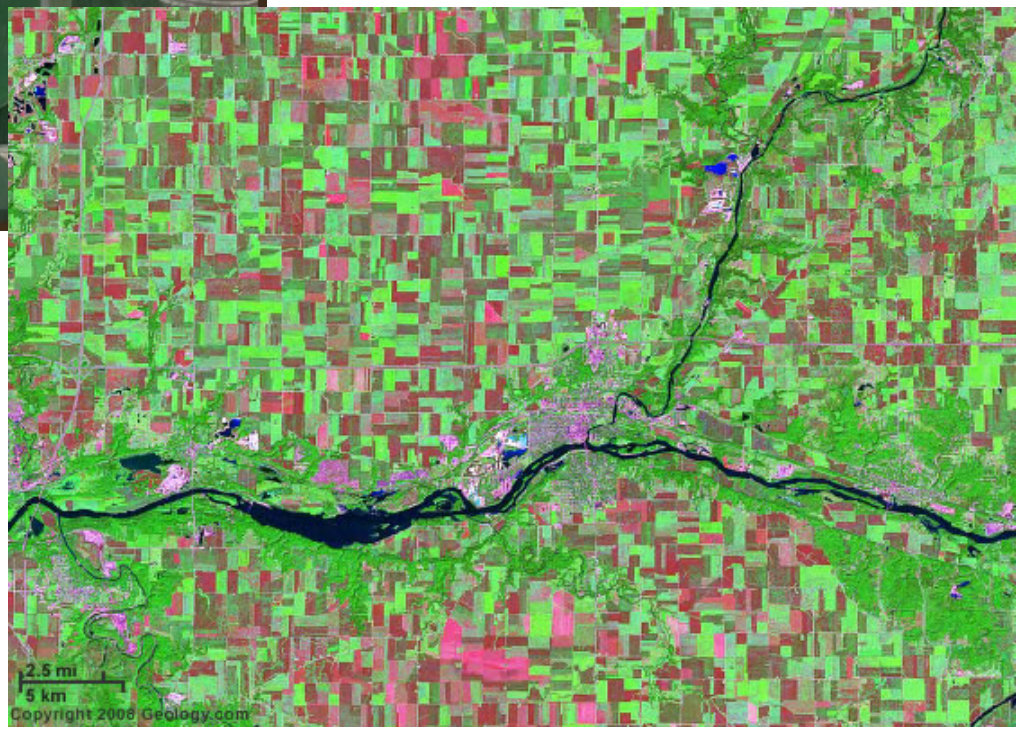


Green colors show the densest canopy

Grey colors indicate bare soil

Price = around $3/A, but there is a minimum acreage = ideal scenario is to purchase in a group of neighbors/growers; http://www.geog2.com/

Satellite Imageries



Free Satellite Imageries
http://datagateway.nrcs.usda.gov/

USDA Web Soil Survey - (Web based GIS)

Home | About Soils | Help | Contact Us

You are here: Web Soil Survey Home

Search

Enter Keywords | Go

All NRCS Sites

Browse by Subject

- Soils Home
- National Cooperative Soil Survey (NCSS)
- Archived Soil Surveys
- Status Maps
- Official Soil Series Descriptions (OSD)
- Soil Series Extent Mapping Tool
- Soil Data Mart
- Geospatial Data Gateway
- eFOTG
- National Soil Characterization Data
- Soil Geochemistry Spatial Database
- Soil Quality
- Soil Geography

The simple yet powerful way to access and use soil data.

START WSS

Welcome to Web Soil Survey (WSS)

Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

Four Basic Steps

1 Define.

Area of Interest (AOI)

Use the Area of Interest tab to define your area of interest.

I Want To...

- Start Web Soil Survey (WSS)
- Know the requirements for running Web Soil Survey — will Web Soil Survey work in my web browser?
- Know the Web Soil Survey hours of operation
- Find what areas of the U.S. have soil data

Announcements/Events

- Web Soil Survey 2.3 has been released! View description of new features.
- Web Soil Survey Release History

I Want Help With...

- How to use Web Soil Survey
- How to use Web Soil Survey Online Help
- Known Problems and Workarounds
- Frequently Asked Questions
- Citing Web Soil Survey as a source of soils data

Apps – SoilWeb for iPhone

App Store - SoilWeb for the iPhone

itunes.apple.com/us/app/soilweb-for-the-iphone/id354911787?mt=8

SoilWeb for the iPhone

View More By This Developer

By CA Soil Resource Lab

Open iTunes to buy and download apps.

View In iTunes

Free

Category: Education
Updated: Jun 14, 2010
Version: 1.2
Size: 0.1 MB
Language: English
Seller: Dylan Beaudette
© 2010 CA Soil Resource Lab
Rated 4+

Requirements: Compatible with iPhone, iPod touch, and iPad.Requires iOS 3.1.2 or later

Description

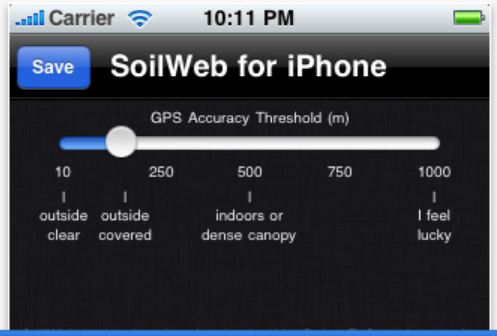
GPS based, real-time access to USDA-NRCS soil survey data, formatted for the iPhone. This application retrieves graphical summaries of soil types associated with the iPhone's current geographic location, based on a user defined horizontal precision. Sketches of soil profiles are linked to their official soil series description (OSD) page. Soil series

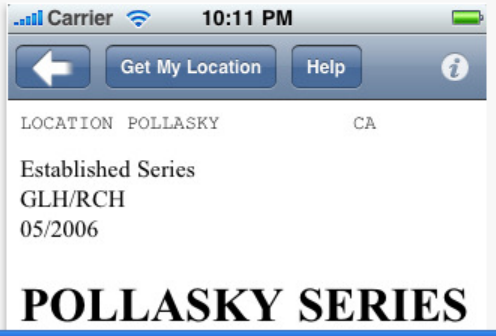
CA Soil Resource Lab Web Site ▸ SoilWeb for the iPhone Support ▸ ...More

What's New in Version 1.2

New interface, online help, and calibrated GPS accuracy threshold.

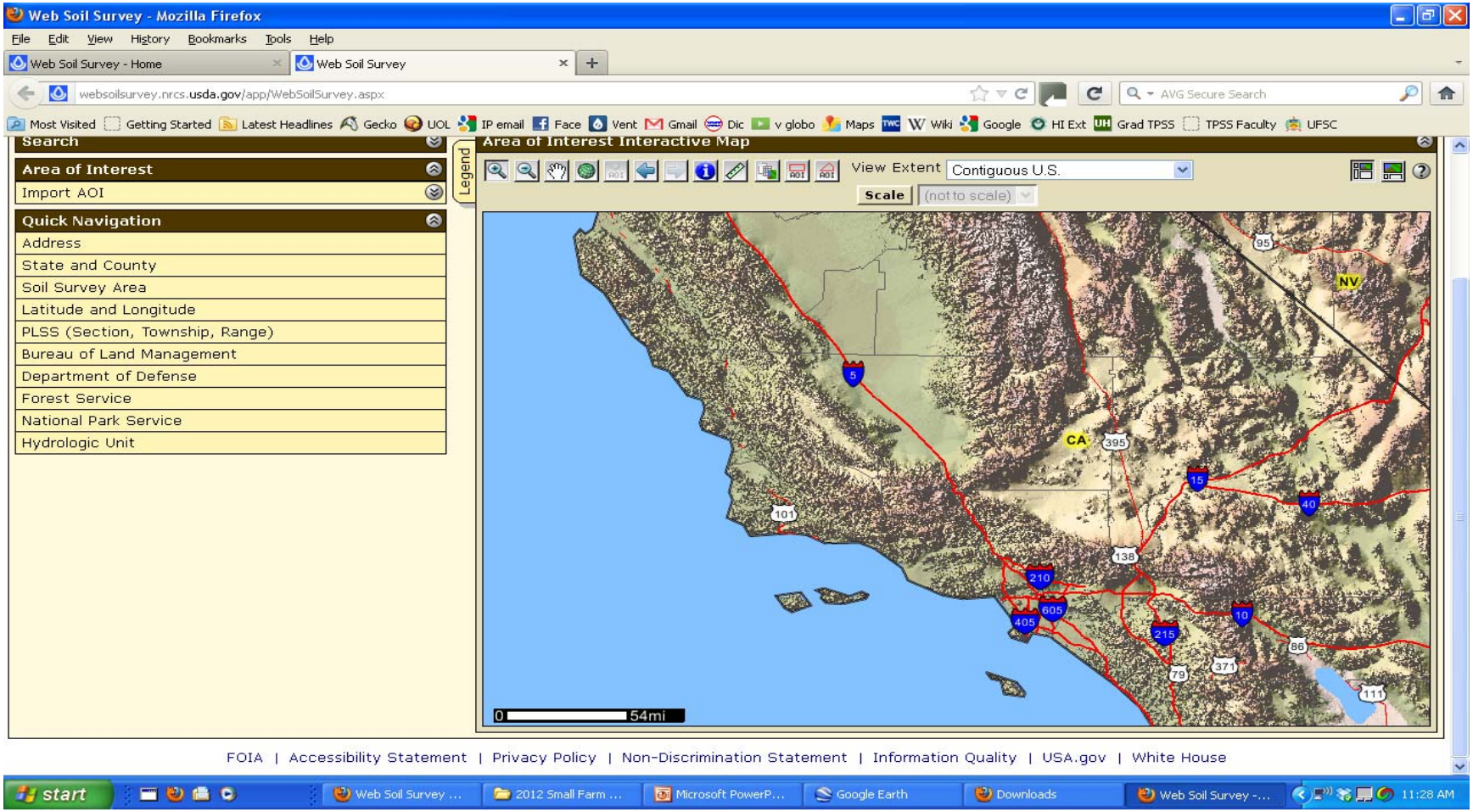
iPhone Screenshots





Web Soil Survey

- Free
- very easy to use (like Google maps)
- Online (need internet access)
- It’s the first step to look at your soils types and distribution in your property
- Resolution is good to have an idea of soil types in the property, but does not tell you P and K levels for soil fertility management, for example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PLSS (Section, Township, Range)
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Department of Defense
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National Park Service
Hydrologic Unit
Legend
Area of Interest Interactive Map
View Extent
Contiguous U.S.
Scale
(not to scale)
NV
CA
0
54mi
FOIA | Accessibility Statement | Privacy Policy | Non-Discrimination Statement | Information Quality | USA.gov | White House
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2012 Small Farm ...
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websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

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Area of Interest

Import AOI

Quick Navigation

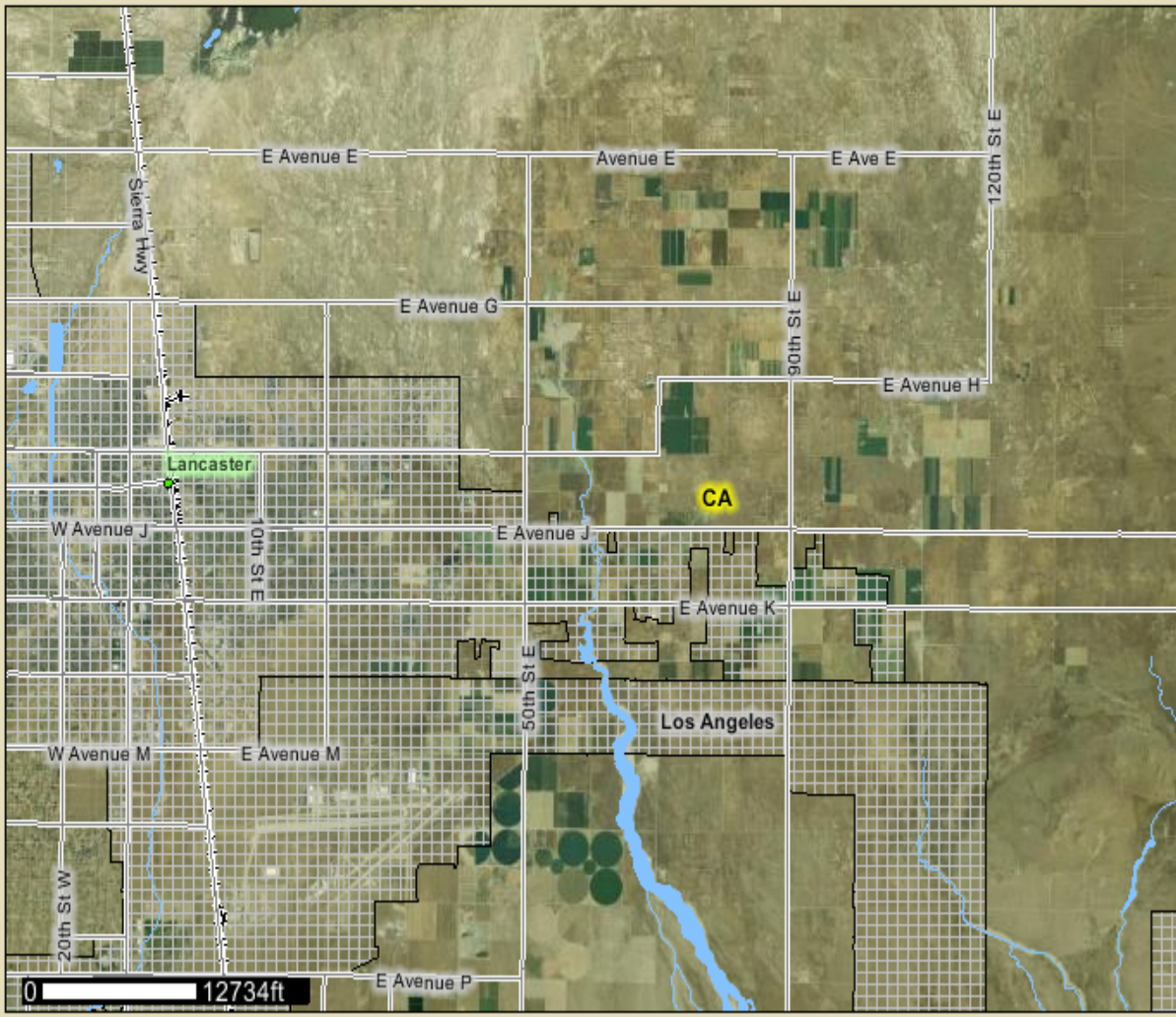
- Address
- State and County
- Soil Survey Area
- Latitude and Longitude
- PLSS (Section, Township, Range)
- Bureau of Land Management
- Department of Defense
- Forest Service
- National Park Service
- Hydrologic Unit

Legend

Area of Interest Interactive Map

View Extent: Contiguous U.S.

Scale: (not to scale)



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Area of Interest

Open All | Close All

AOI Properties

Clear AOI

AOI Information

Name

Map Unit Symbols

- (•) Use Soil Survey Area Map Unit Symbols
- ( ) Use National Map Unit Symbols

Area (acres) 935.3

Soil Data Available from Web Soil Survey

Antelope Valley Area, California (CA675)

Spatial Data	Version 1, Mar 2, 2004
Tabular Data	Version 5, Jan 3, 2008

Clear AOI

Import AOI

Export AOI

Quick Navigation

- Address
- State and County
- Soil Survey Area
- Latitude and Longitude
- PLSS (Section, Township, Range)

Area of Interest Interactive Map

Legend

View Extent: Contiguous U.S.

Scale: (not to scale)

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websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Most Visited | Getting Started | Latest Headlines | Gecko | UOL | IP email | Face | Vent | Gmail | Dic | v globo | Maps | Wiki | Google | HI Ext | Grad TPSS | TPSS Faculty | UFSC

Search

Map Unit Legend

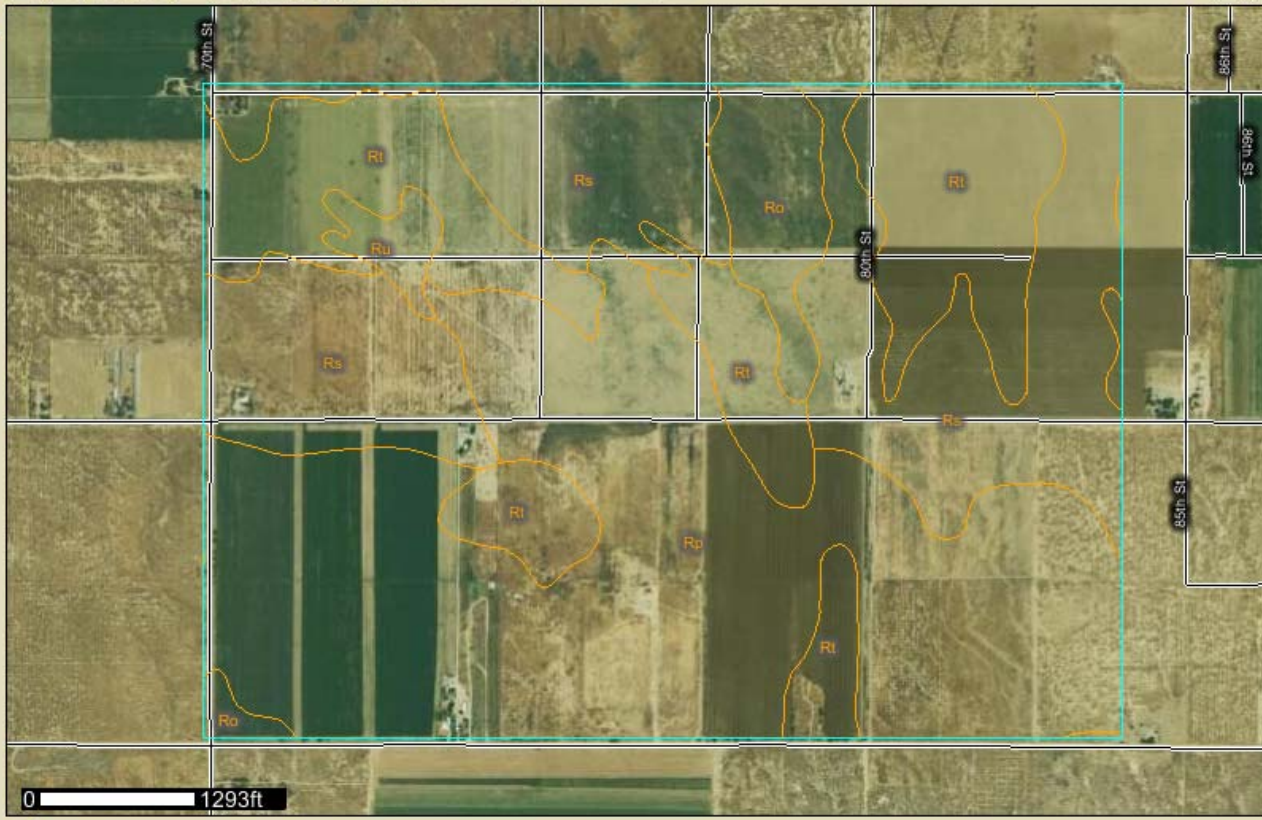
Antelope Valley Area, California (CA675)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ro	Rosamond fine sandy loam	42.1	4.5%
Rp	Rosamond loam	405.3	43.3%
Rr	Rosamond loam, saline-alkali	0.5	0.1%
Rs	Rosamond loam, sandy loam substratum	268.0	28.6%
Rt	Rosamond silty clay loam	207.3	22.2%
Ru	Rosamond silty clay loam, saline-alkali	12.1	1.3%
Totals for Area of Interest		**935.3**	**100.0%**

Legend

Soil Map

Scale (not to scale)



Warning: Soil Map may not be valid at this scale.

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Search

Map Unit Legend

Antelope Valley Area, California (CA675)

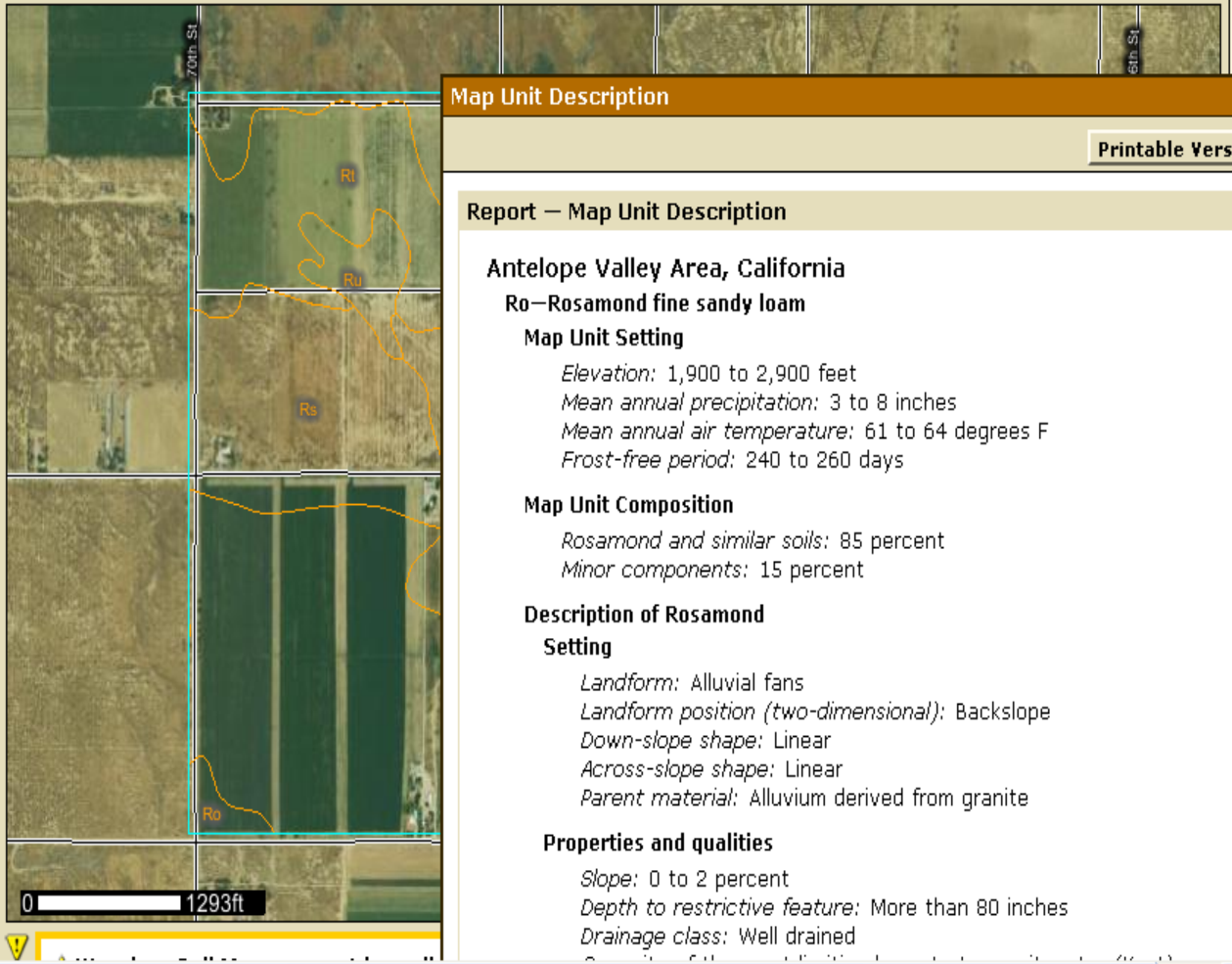
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ro	Rosamond fine sandy loam	42.1	4.5%
Rp	Rosamond		43.3%
Rr	Rosamond loam, saline-alkali	0.5	0.1%
Rs	Rosamond loam, sandy loam substratum	268.0	28.6%
Rt	Rosamond silty clay loam	207.3	22.2%
Ru	Rosamond silty clay loam, saline-alkali	12.1	1.3%
Totals for Area of Interest		**935.3**	**100.0%**

Display map unit description

Soil Map

Legend

Scale (not to scale)



Map Unit Description

Printable Versic

Report — Map Unit Description

Antelope Valley Area, California

Ro—Rosamond fine sandy loam

Map Unit Setting

Elevation: 1,900 to 2,900 feet
Mean annual precipitation: 3 to 8 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 240 to 260 days

Map Unit Composition

Rosamond and similar soils: 85 percent
Minor components: 15 percent

Description of Rosamond

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

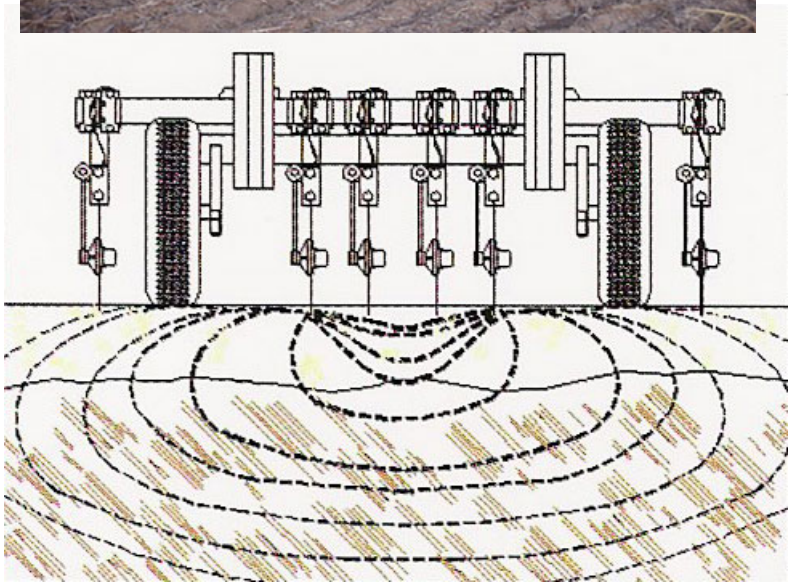
Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

start | Web Soil Survey ... | 2012 Small Farm ... | Microsoft PowerP... | Google Earth | Downloads | Web Soil Survey -... | 11:36 AM

Electrical Conductivity Sensors

Veris (depth1-3 ft)



EM38 (05-5 ft)

Electrical Conductivity Sensors

Depths of the readings: 0-1 and 0-3ft for veris, and 0-2.5 and 0-5ft.

Sensors stay in the surface of the soil

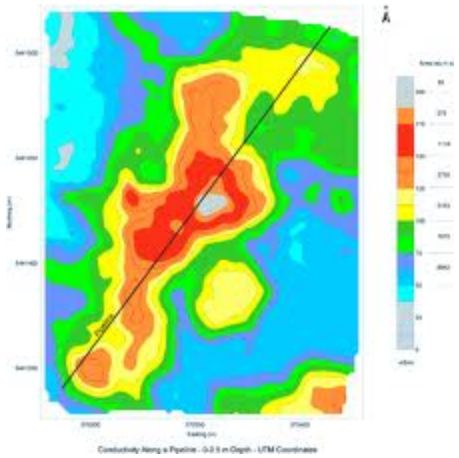
- Show variability of important soil properties:

  soil texture, salinity, yield potential, deep nitrate, organic matter (anything that influences electrical current)

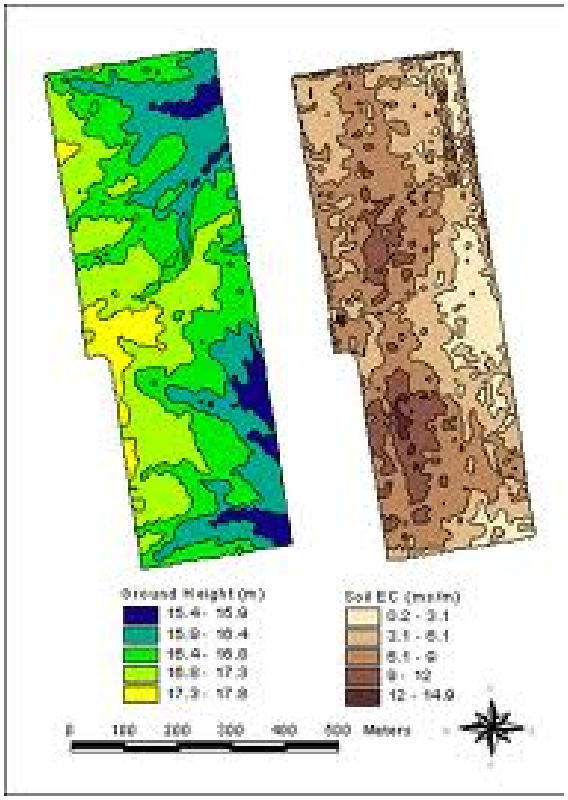
Soil Electrical Conductivity (EC) mapping:

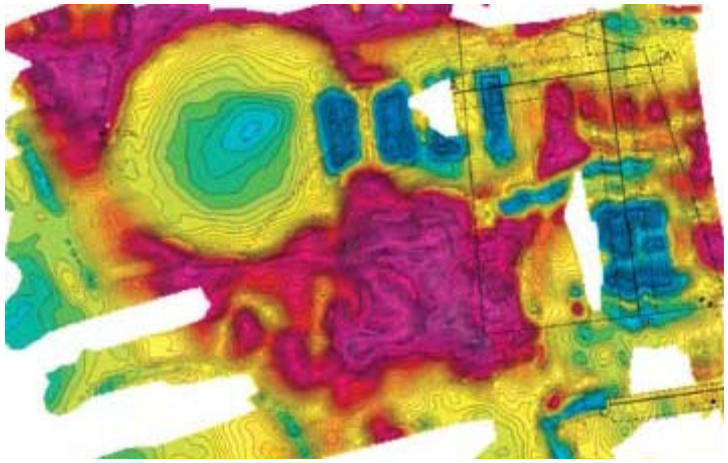
EC sensor + GPS data = EC map

EC Maps



definition of zones of similar EC (soil properties)





Apps: soil series at your location

SoilWeb for the iPhone

View More By This Developer

By CA Soil Resource Lab

Open iTunes to buy and download apps.

View In iTunes

Free

Category: Education
Updated: Jun 14, 2010
Version: 1.2
Size: 0.1 MB
Language: English
Seller: Dylan Beaudette
© 2010 CA Soil Resource Lab
Rated 4+

Requirements: Compatible with iPhone, iPod touch, and iPad.Requires iOS 3.1.2 or later

Customer Ratings

Description

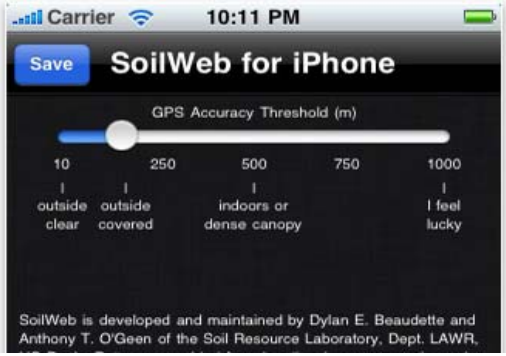
GPS based, real-time access to USDA-NRCS soil survey data, formatted for the iPhone. This application retrieves graphical summaries of soil types associated with the iPhone's current geographic location, based on a user defined horizontal precision. Sketches of soil profiles are linked to their official soil series description (OSD) page. Soil series

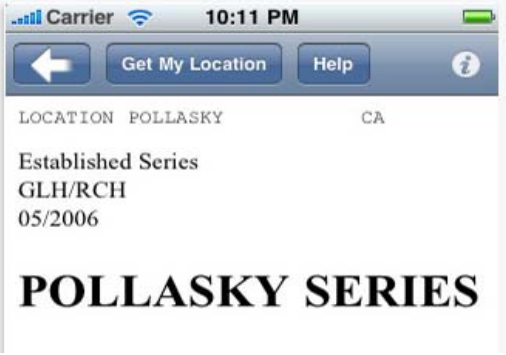
CA Soil Resource Lab Web Site ▸ SoilWeb for the iPhone Support ▸ ...More

What's New in Version 1.2

New interface, online help, and calibrated GPS accuracy threshold.

iPhone Screenshots





App by DuPont: calculates the amount of product and water you will need to treat a specific field area

What toys to get?

- Necessary?
- Fun?
- Cost-effective?

Fruit harvesting machine = $105, 000