

# DIGITAL MAPPING TECHNIQUES 2013

The following was presented at DMT'13  
(June 2-5, 2013 - Colorado Geological Survey and Colorado School of Mines  
Golden, CO)

The contents of this document are provisional

See Presentations and Proceedings  
from the DMT Meetings (1997-2013)

<http://ngmdb.usgs.gov/info/dmt/>

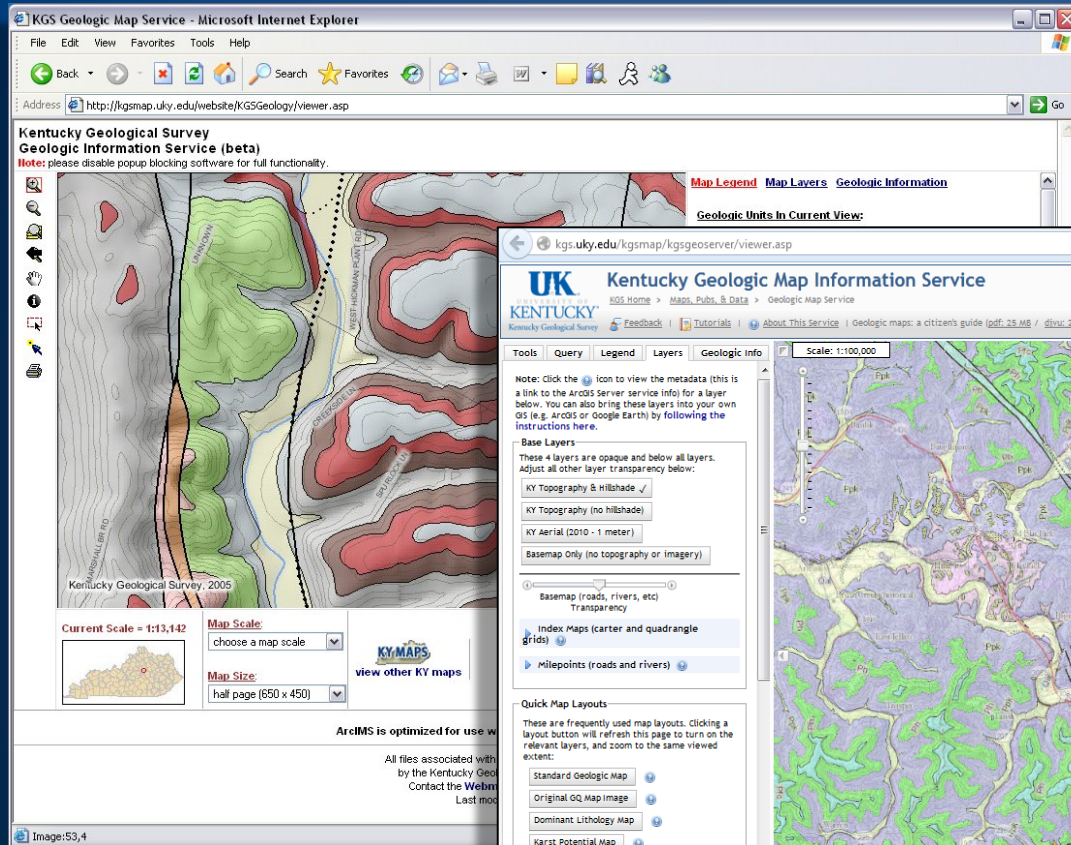
# *Development of the Kentucky Mobile Geologic Map Application*



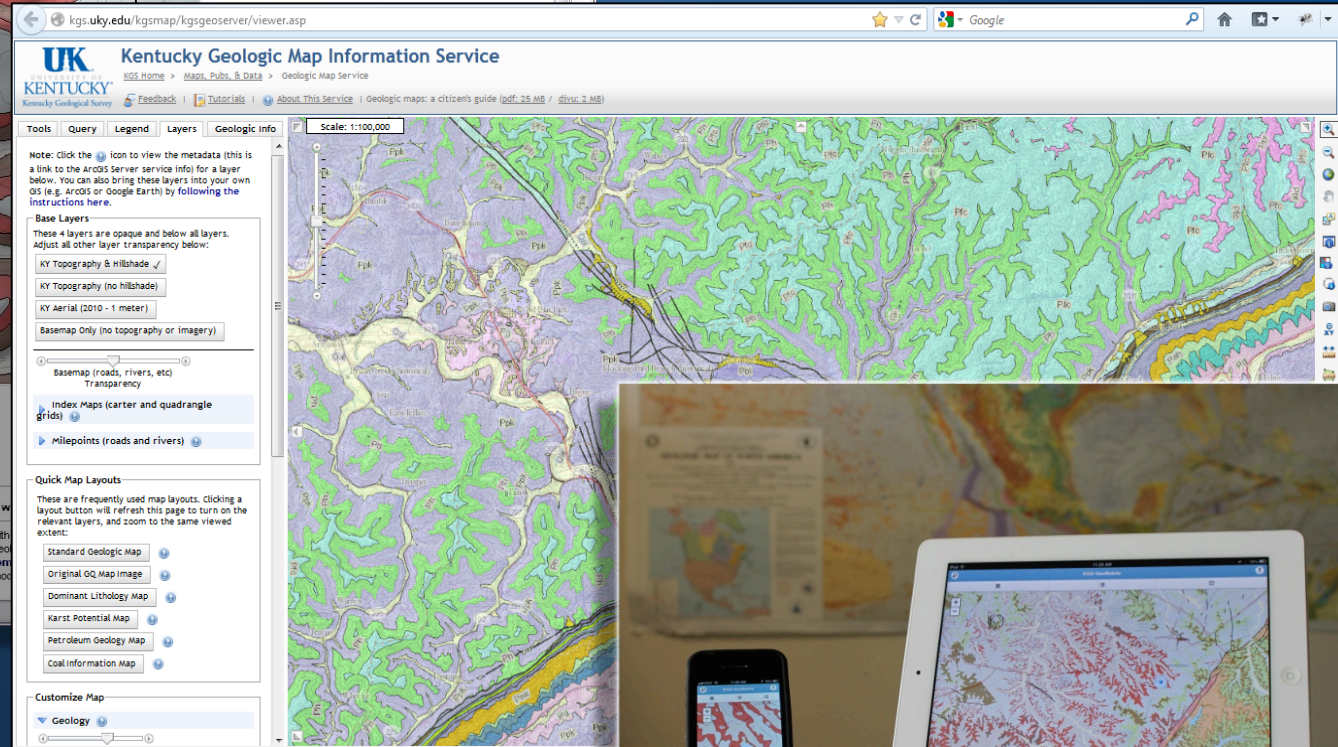
Doug Curl  
Kentucky Geological Survey  
University of Kentucky

2013 Digital Mapping Techniques  
Golden, CO

# “Desktop” to Mobile Geologic Map Service



ArcIMS (2005) →

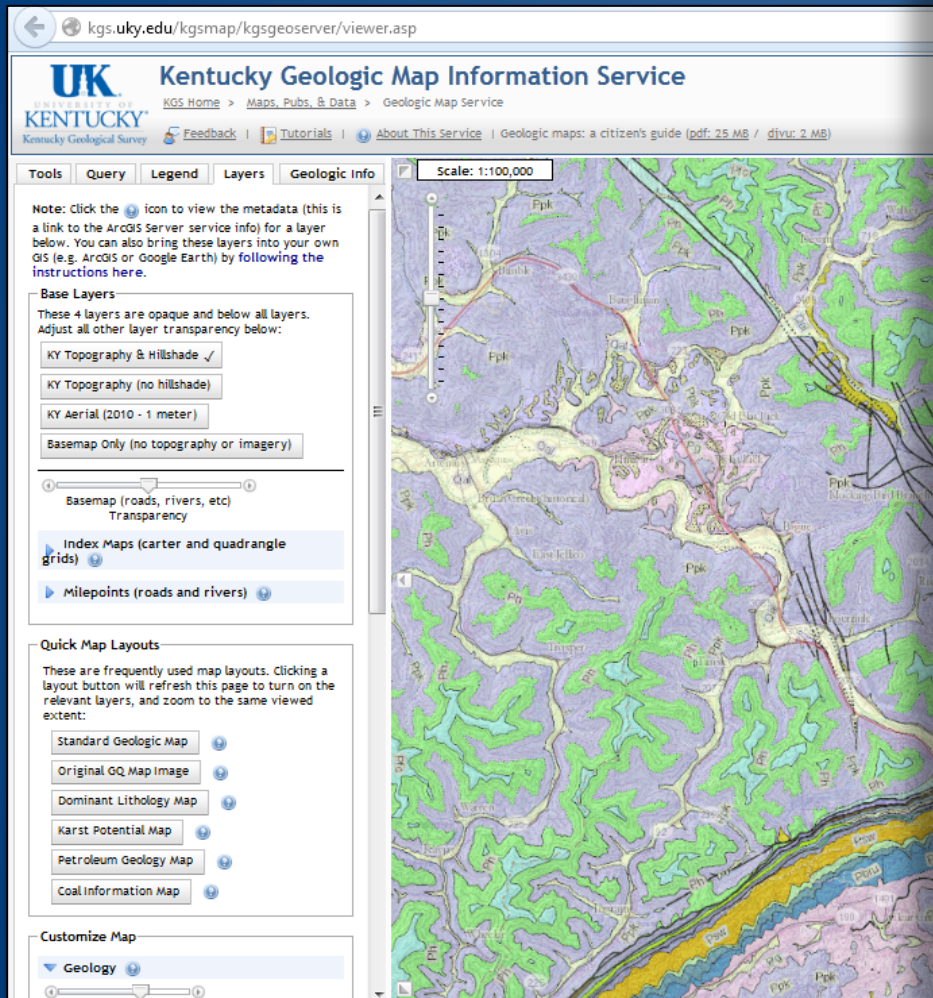


ArcGIS Server (2011) →



Mobile ArcGIS Server (2012)

# Ingredients: current KGS web map services



## The “Back-End”:

- **Web Server:**
  - IIS (Microsoft Server 2008)
- **ArcGIS Server**
  - **Geologic Units**
    - Lithologic Units
    - Karst Units
  - Water Wells & Springs
  - Petroleum Data
  - Coal Information
  - Core Locations
  - Outcrops
  - Image locations
  - Landslide locations
- **KY Division of Geographic Info**
  - Basemaps and Imagery
  - ArcGIS Server Dynamic and Imagery Services
- **ESRI**
  - Basemaps and Imagery
  - ArcGIS Server Dynamic Services
- **SQL Server**
  - Geologic descriptions
  - Geologic legend data

# Ingredients: current KGS web map services

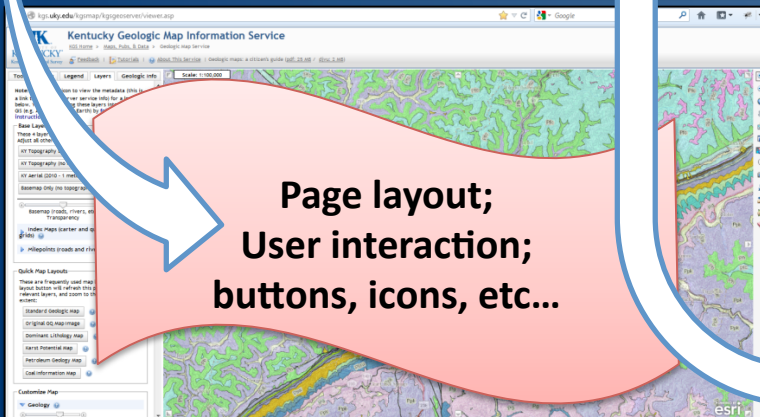
## The “Front-End”:

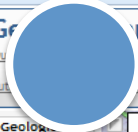
- **HTML programming:**
  - HTML, Javascript, CSS
  - Dojo framework
  - jQuery framework
- **ArcGIS Server Javascript API**
- **ASP (Active Server Pages)**
  - Yes, we still do...

Page layout;  
User interaction;  
buttons, icons, etc...

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Browser address bar: kgs.uky.edu/kgsmmap/kgsgeserver/viewer.asp

Page Title: Kentucky Geological Survey Map Information Service

Navigation: Tools | Query | Legend | Layers | Geologic

Scale: 1:100,000

Note: Click the icon to view the metadata (this is a link to the ArcGIS Server service info) for a layer below. You can also bring these layers into your own GIS (e.g. ArcGIS or Google Earth) by following the instructions here.

Base Layers

These 4 layers are opaque and below all layers. Adjust all other layer transparency below:

- KY Topography & Hillshade
- KY Topography (no hillshade)
- KY Aerial (2010 - 1 meter)
- Basemap Only (no topograph)

Basemap (road Transp)

- Index Maps (grids)
- Milepoints (roads)

Quick Map Layouts

These are frequently used layout buttons. Clicking a layout button will refresh relevant layers, and zoom to the extent:

- 
- 
- 
- 
- 
- 

Customize Map

- 

Can you make this mobile?



# Decision: stand-alone or web-enabled?



## Stand-alone (native):

(Apple iOS, Android, Windows, etc...)

### Pros:

- native to device (quick)
- store data on device
- distribute via app stores\*

### Cons:

- what platform(s)?
- who's gonna program?
- ***development time***

## Web-enabled (Javascript):

(any device with a browser)

### Pros:

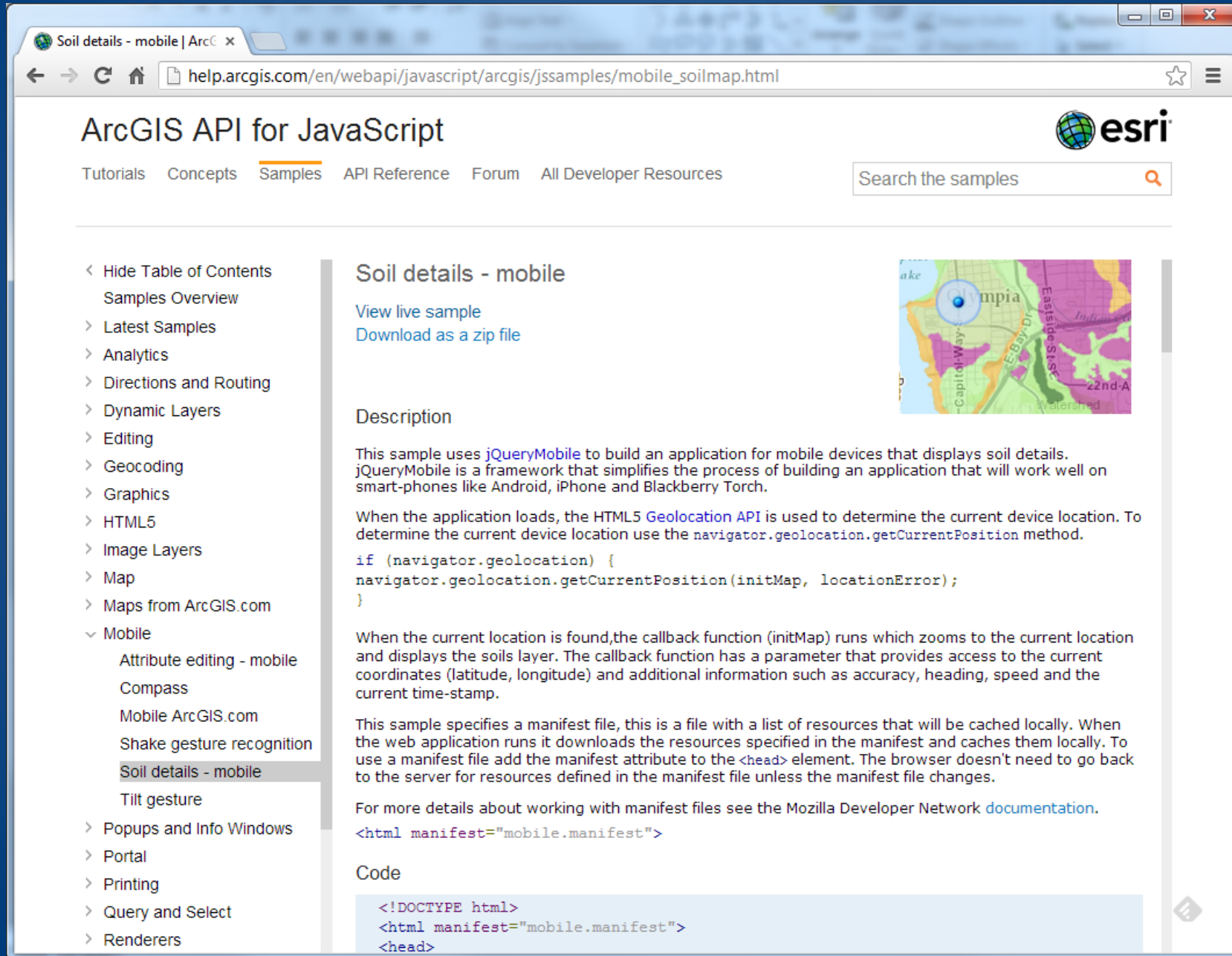
- cross-platform
- ***KGS can actually do it***
- development time
- no app stores\*
- no installation (web url only)

### Cons:

- cross-platform to a point (older devices)
- cannot store data on device
- network dependent

\* Turns out you might be able to distribute any type via app stores

# Starts with a sample: ArcGIS API for Javascript



The screenshot shows a web browser window displaying the ArcGIS API for JavaScript website. The browser's address bar shows the URL: `help.arcgis.com/en/webapi/javascript/arcgis/jssamples/mobile_soilmap.html`. The page title is "Soil details - mobile | ArcGIS". The main heading is "ArcGIS API for JavaScript" with the Esri logo to the right. Below the heading is a navigation menu with links for "Tutorials", "Concepts", "Samples", "API Reference", "Forum", and "All Developer Resources". A search box labeled "Search the samples" is also present. On the left side, there is a table of contents with a tree view. The "Mobile" section is expanded, and "Soil details - mobile" is selected. The main content area displays the details for the "Soil details - mobile" sample, including a "View live sample" and "Download as a zip file" link, a description, and code snippets. A small map image is shown in the top right of the content area.

Soil details - mobile

[View live sample](#)  
[Download as a zip file](#)

### Description

This sample uses [jQueryMobile](#) to build an application for mobile devices that displays soil details. jQueryMobile is a framework that simplifies the process of building an application that will work well on smart-phones like Android, iPhone and Blackberry Torch.

When the application loads, the HTML5 [Geolocation API](#) is used to determine the current device location. To determine the current device location use the `navigator.geolocation.getCurrentPosition` method.

```
if (navigator.geolocation) {  
  navigator.geolocation.getCurrentPosition(initMap, locationError);  
}
```

When the current location is found, the callback function (`initMap`) runs which zooms to the current location and displays the soils layer. The callback function has a parameter that provides access to the current coordinates (latitude, longitude) and additional information such as accuracy, heading, speed and the current time-stamp.

This sample specifies a manifest file, this is a file with a list of resources that will be cached locally. When the web application runs it downloads the resources specified in the manifest and caches them locally. To use a manifest file add the manifest attribute to the `<head>` element. The browser doesn't need to go back to the server for resources defined in the manifest file unless the manifest file changes.

For more details about working with manifest files see the Mozilla Developer Network [documentation](#).

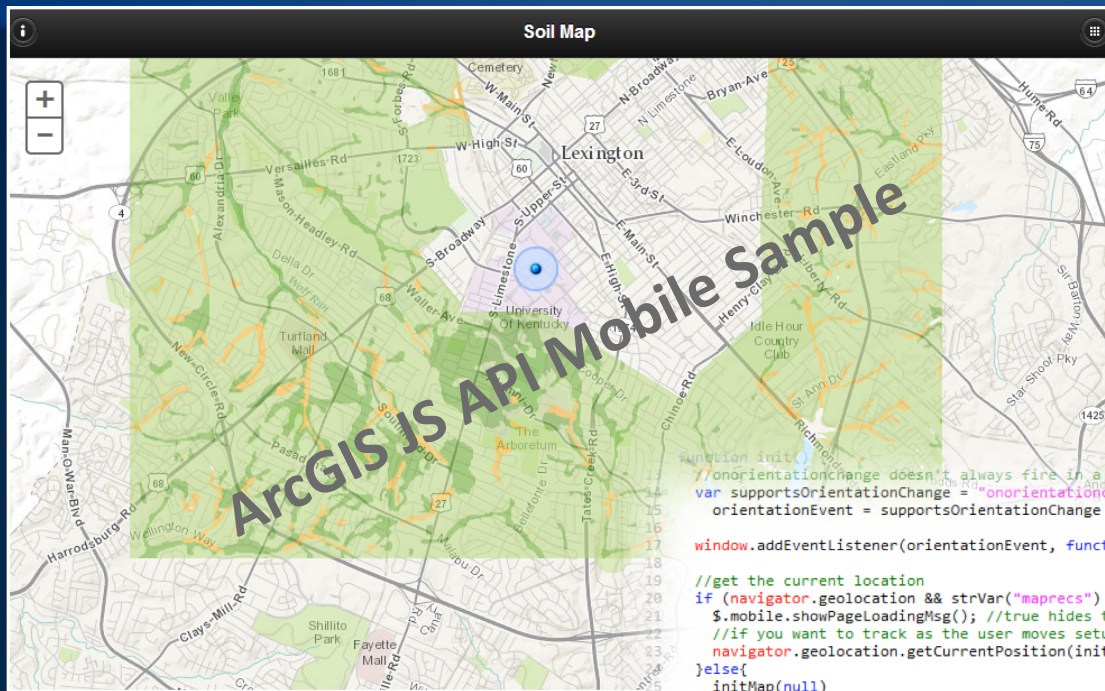
```
<html manifest="mobile.manifest">
```

### Code

```
<!DOCTYPE html>  
<html manifest="mobile.manifest">  
<head>
```



# ArcGIS JS API for Javascript does the map configuration / handling



For mobile: JS Code not drastically different from “desktop” application code

```
function init() {
  //orientationchange doesn't always fire in a timely manner in Android so check for both orientationchange and resize
  var supportsOrientationChange = "onorientationchange" in window,
      orientationEvent = supportsOrientationChange ? "orientationchange" : "resize";
  window.addEventListener(orientationEvent, function () {orientationChanged();}, false);

  //get the current location
  if (navigator.geolocation && strVar("mapprec") != "true"){
    $.mobile.showPageLoadingMsg(); //true hides the dialog
    //if you want to track as the user moves setup navigator.geolocation.watchPosition
    navigator.geolocation.getCurrentPosition(initMap,initLocErr);
  }else{
    initMap(null)
  }
}

function initMap(location){
  //identify proxy page to use if the toJson payload to the geometry service is greater than 2000 characters.
  //If this null or not available the project and lengths operation will not work. Otherwise it will do a http post to the proxy.
  esriConfig.defaults.io.proxyUrl = "/arcgisserver/proxy/proxy.ashx";
  esriConfig.defaults.io.alwaysUseProxy = false;
  idParams = new esri.tasks.IdentifyParameters();

  //create a mobile popup
  popup = new esri.dijit.PopupMobile(null, dojo.create("div"));
  map = new esri.Map("map",{basemap:"streets",infoWindow:popup});
  //zoom to the map extent of the state:
  var stateExtent = new esri.geometry.Extent(-10042705.3649355,4215951.78300879,-9058457.44311185,4937733.59234617,
      new esri.SpatialReference({wkid:102100}));

  dojo.connect(map,"onLoad",function(){
    if(location){
      zoomToLocation(location);
    }else{
      map.setExtent(stateExtent)
    }
  });
  resizeMap();
  //hookup jquery
  $(document).ready(jQueryReady);
});

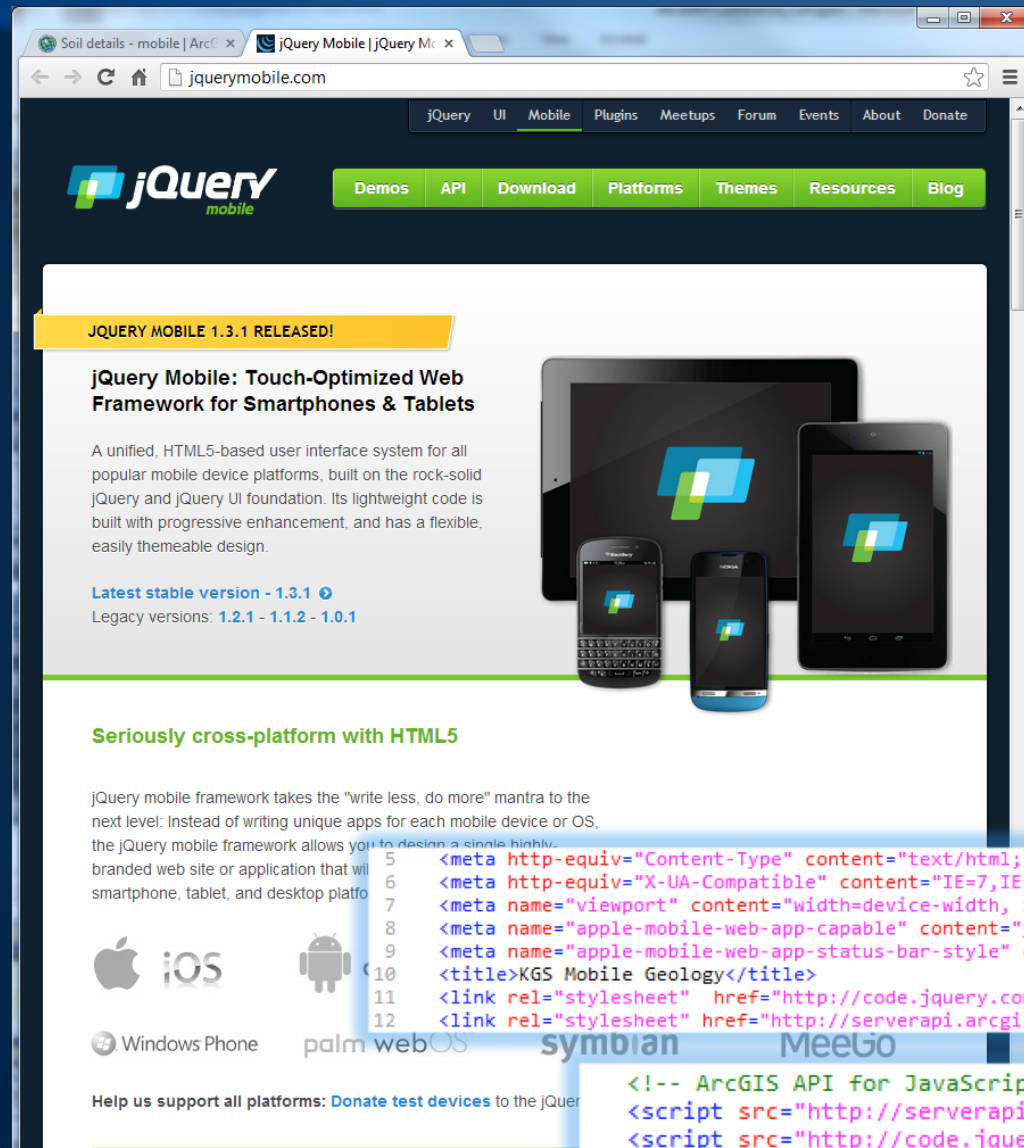
dojo.connect(geocoder, "onSelect", function(result){$('#findLoc').dialog('close')});

arcGISTopo = initTileLayer("http://server.arcgisonline.com/ArcGIS/rest/services/USA_Topo_Maps/MapServer","arcGISBase",false,1.0);
map.addLayer(arcGISTopo);

//base and geology:
KGS_Geo = initDynaLayer("http://kgs.uky.edu/arcgis/rest/services/KY_Geo/MapServer","KGS_Geo",true,0.65);
map.addLayer(KGS_Geo);

var lidar = false;
```

# jQuery Mobile: free cross-platform goodness



Soil details - mobile | ArcGIS x jQuery Mobile | jQuery M x  
jquerymobile.com

jQuery UI Mobile Plugins Meetups Forum Events About Donate

jQuery mobile

Demos API Download Platforms Themes Resources Blog

**JQUERY MOBILE 1.3.1 RELEASED!**

### jQuery Mobile: Touch-Optimized Web Framework for Smartphones & Tablets

A unified, HTML5-based user interface system for all popular mobile device platforms, built on the rock-solid jQuery and jQuery UI foundation. Its lightweight code is built with progressive enhancement, and has a flexible, easily themeable design.

**Latest stable version - 1.3.1**  
Legacy versions: 1.2.1 - 1.1.2 - 1.0.1

### Seriously cross-platform with HTML5

jQuery mobile framework takes the "write less, do more" mantra to the next level: Instead of writing unique apps for each mobile device or OS, the jQuery mobile framework allows you to design a single highly-branded web site or application that will run on any smartphone, tablet, and desktop platform.

```
5 <meta http-equiv="Content-Type" content="text/html; charset=utf-8"/>
6 <meta http-equiv="X-UA-Compatible" content="IE=7,IE=9" />
7 <meta name="viewport" content="width=device-width, initial-scale=1, maximum-scale=1, user-scalable=no">
8 <meta name="apple-mobile-web-app-capable" content="yes">
9 <meta name="apple-mobile-web-app-status-bar-style" content="translucent-black">
10 <title>KGS Mobile Geology</title>
11 <link rel="stylesheet" href="http://code.jquery.com/mobile/1.0/jquery.mobile-1.0.min.css">
12 <link rel="stylesheet" href="http://serverapi.arcgisonline.com/jsapi/arcgis/3.3/js/esri/css/esri.css">
```

Apple iOS Android Windows Phone palm webOS symbian MeeGo

Help us support all platforms: [Donate](#) [test devices](#) to the jQuery

jQuery mobile manages all mobile browser compatibility:

So – no need to do this:

- Cross-platform layouts
- Touch capability
- Develop mobile icons & buttons

```
<!-- ArcGIS API for JavaScript and jQuery Mobile-->
<script src="http://serverapi.arcgisonline.com/jsapi/arcgis/3.3compact"> </script>
<script src="http://code.jquery.com/jquery-1.6.4.min.js"></script>
<script src="http://code.jquery.com/mobile/1.0/jquery.mobile-1.0.js"></script>
```



Calendar



Weather



Notes



Maps



Google Maps



App Store



Books



Newsstand



Photography



play



Settings



Remote



Tabs HD



How to Cook Everything



Spotify



Calculator



Google Reader



Facebook



Flipboard



Safari



Mail



Chrome



Photos



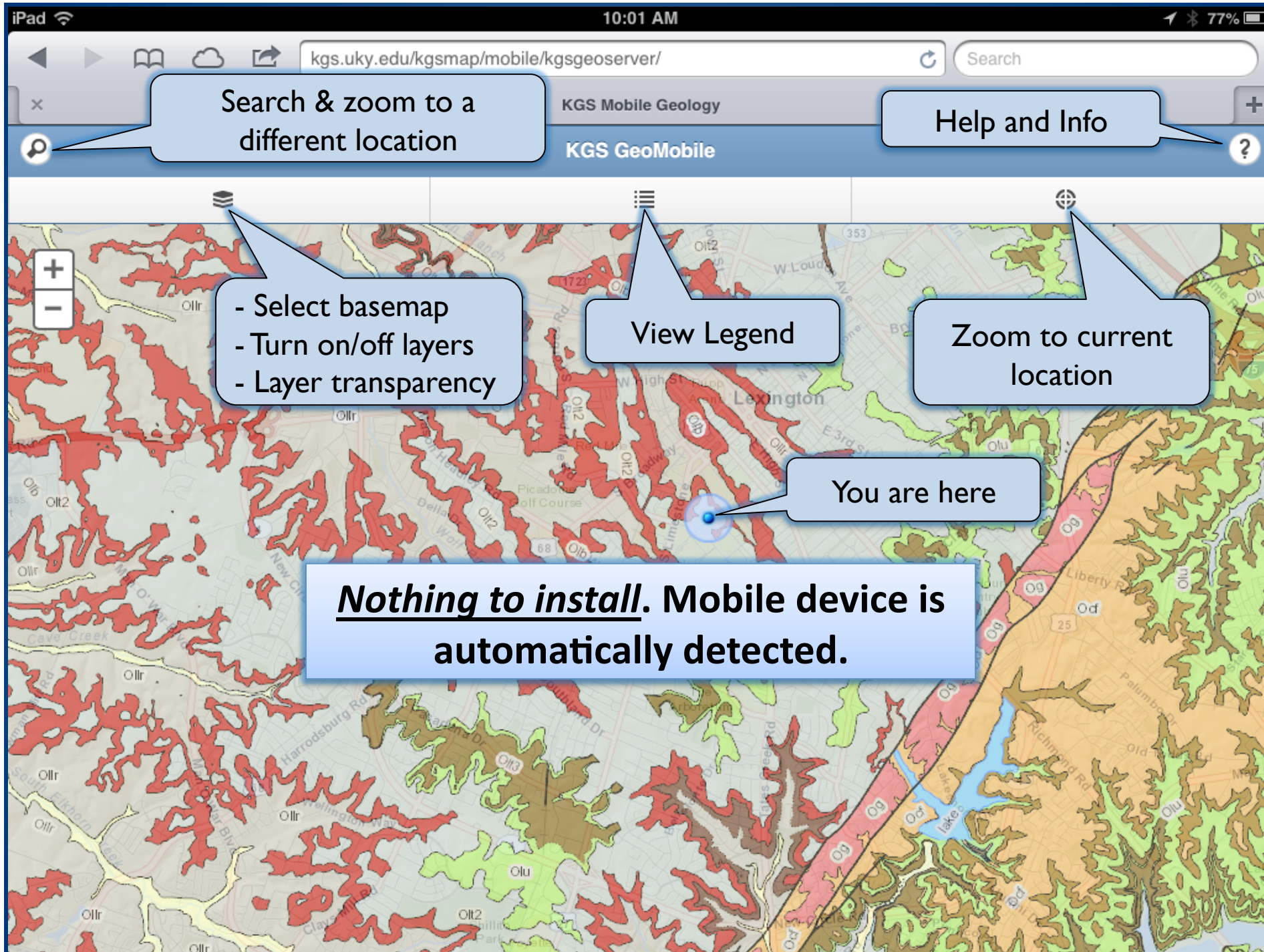
Twitter

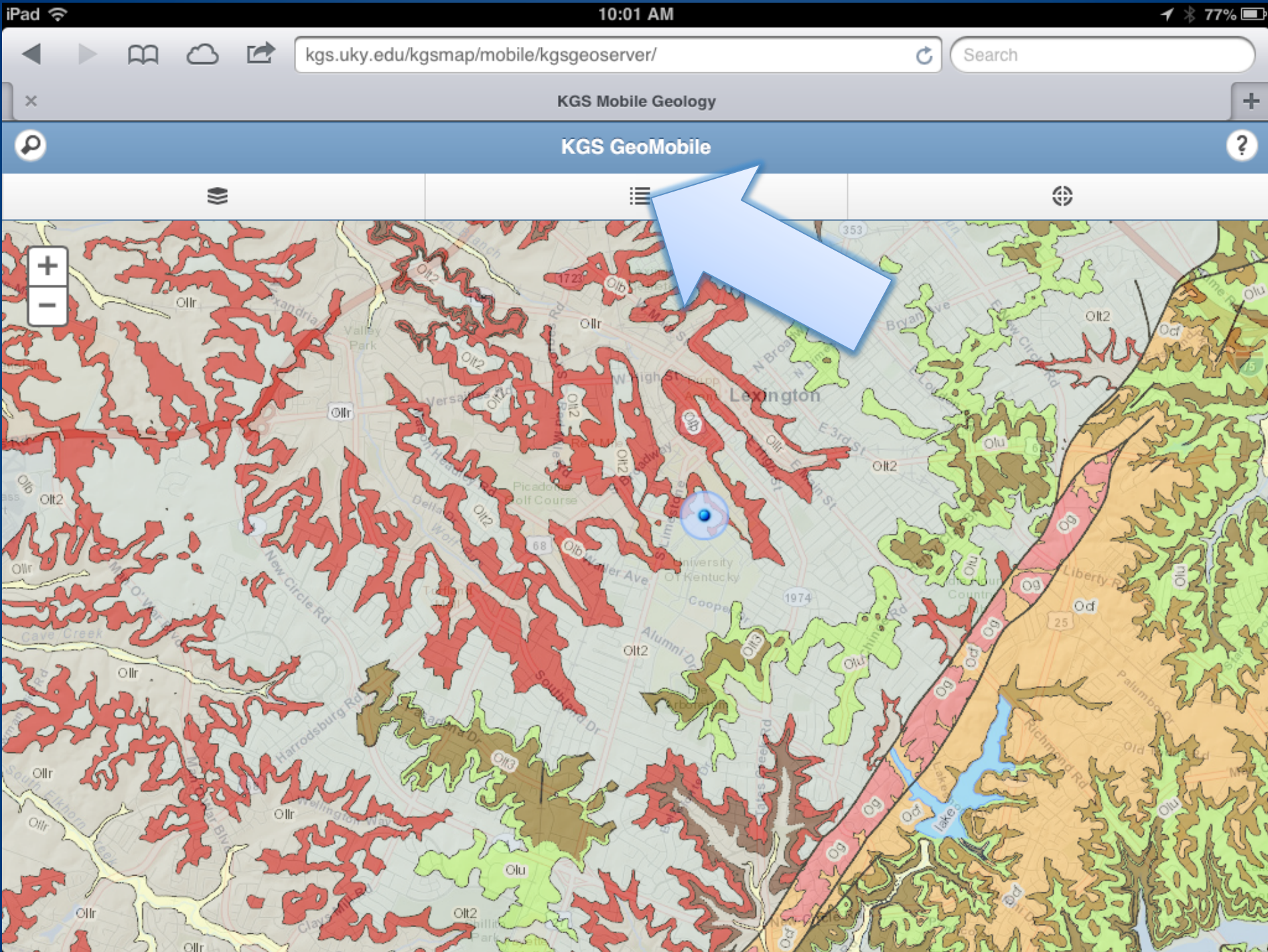


GarageBand



Music





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kgs.uky.edu/kgsmmap/mobile/kgsgeoserver/#&ui Search

Legend

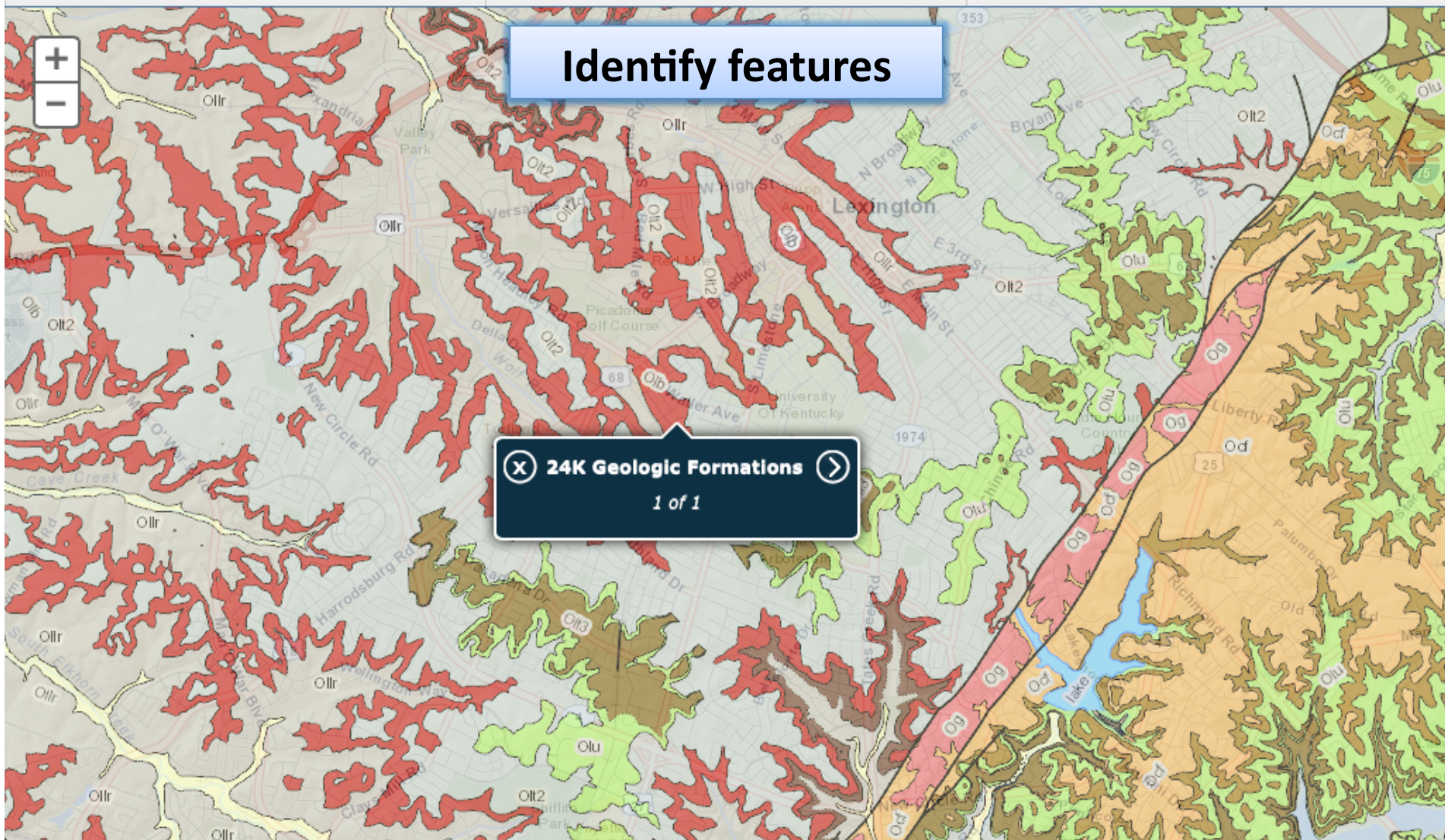
**Legend**

**Geologic Units 1:24,000 scale data (detailed geology)**  
This legend includes all units from the 1:24,000 quadrangles in the current view. Some units on the legend may not appear on the map.

Qal	<b>Alluvium</b> (Quaternary - Quaternary)
QTf	<b>High-level fluvial deposits</b> (Tertiary - Quaternary)
DSu	<b>Devonian (?) and Silurian (?) undifferentiated</b> (Lower Silurian - Upper Devonian)
Od	<b>Drakes Formation</b> (Upper Ordovician - Upper Ordovician)
Og	<b>Garrard Siltstone</b> (Middle Ordovician - Upper Ordovician)
Ocf	<b>Clays Ferry Formation</b> (Middle Ordovician - Upper Ordovician)
Olu	<b>Upper part of Lexington Limestone</b> (Lower Ordovician - Middle Ordovician)
Olt4	<b>Tanglewood Limestone Member (4)</b> (Lower Ordovician - Middle Ordovician)
Olt3	<b>Tanglewood Limestone Member (3)</b> (Lower Ordovician - Middle Ordovician)
Olt2	<b>Tanglewood Limestone Member (2)</b> (Lower Ordovician - Middle Ordovician)
Olb	<b>Brannon Member</b> (Lower Ordovician - Middle Ordovician)
Olt1	<b>Tanglewood Limestone Member (1)</b> (Lower Ordovician - Middle Ordovician)
Ollr	<b>Lower part of Lexington Limestone</b> (Lower Ordovician - Middle Ordovician)

Identify features

X 24K Geologic Formations 1 of 1



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kgs.uky.edu/kgsmap/mobile/kgsgeoserver/ Search

KGS Mobile Geology

1 of 1

### 24K Geologic Formations

**Map Symbol:** Olb  
**KGS Formation Code:** 365BRNN  
**Geologic Quadrangle Number:** 600  
**Formation Name:** Brannon Member  
**KGS Formation Sort Code:** 3651100  
**Youngest Age:** Middle Ordovician  
**Oldest Age:** Middle Ordovician  
**24K Quadrangle:** Lexington West  
**100K Quadrangle:** Lexington  
**County:** Fayette

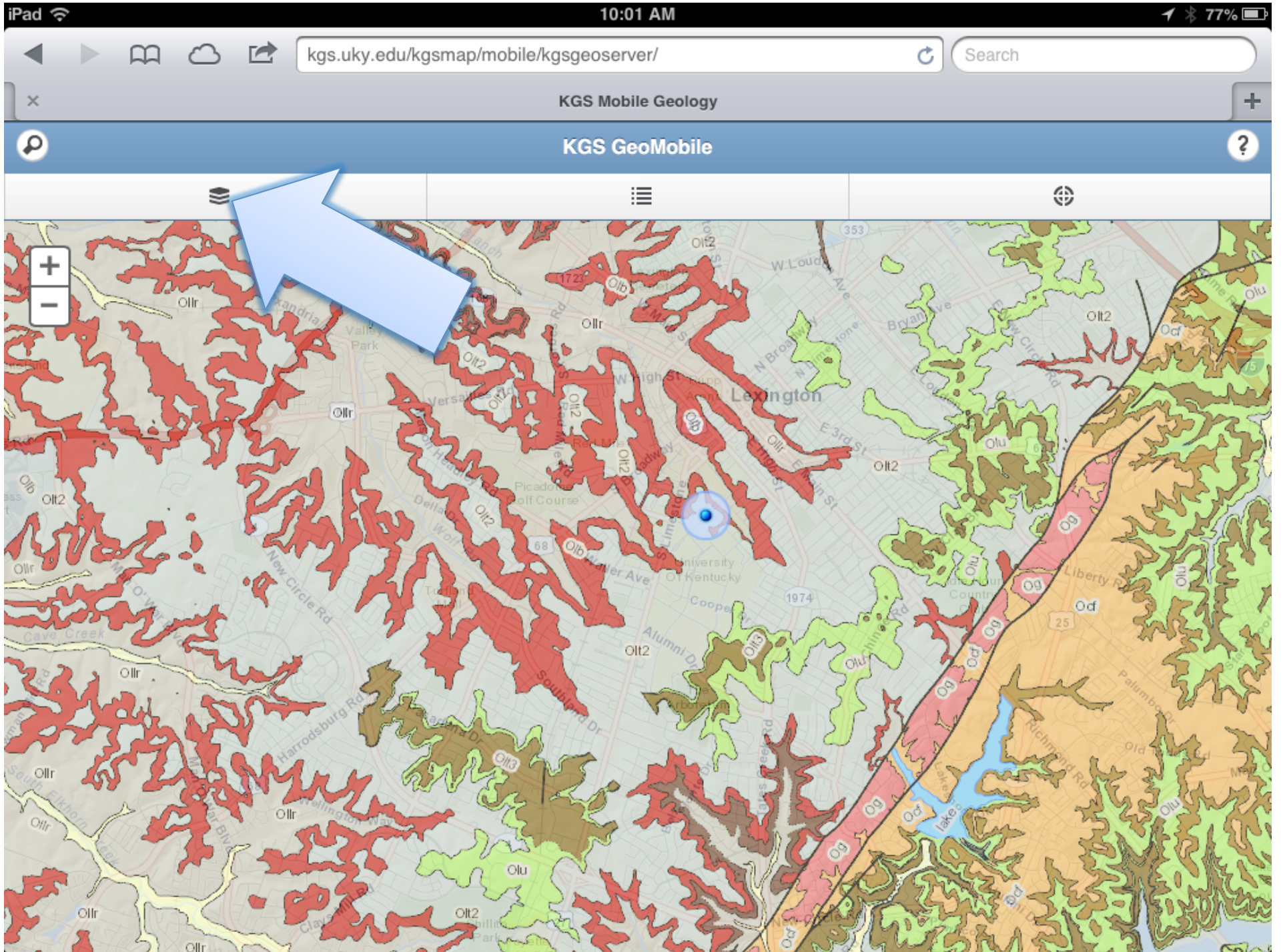
Hide Geologic Description

**Description Source:**  
Geologic map of the Lexington West quadrangle, Fayette and Scott Counties, Kentucky  
• [view stratigraphic column \(.pdf\) for this quadrangle: GQ-600](#)

**Brannon Member**  
Olb (Lower Ordovician - Middle Ordovician)  
**USGS Unit Info:** [GEOLEX \(id: 605\)](#)  
Mapped or described as these unit(s) on the original GQ:

**BRANNON MEMBER**  
**USGS Unit Info:** [GEOLEX \(id: 605\)](#)  
**Primary Lithology:** Limestone and shale  
Limestone and shale: Limestone, light-gray to light-brownish-gray, microgranular, argillaceous; in part silty with thin beds of medium-dark-gray shale; interbeds of clastic limestone locally present; convolute bedding and flow rolls are common in thicker beds, as along New Circle Road at Frankfort Pike, and along railroad cut beneath Virginia Street overpass; chert occurs as thin beds and as nodules; thin beds of swelling bentonite locally occur near base; springs occur at top, but are more common near contact with underlying bioclastic and granular phosphatic limestones. Weathers to a yellowish clayey soil containing abundant porcelaneous chert and siltstone fragments. Unit thin and pinches out





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kgs.uky.edu/kgsmmap/mobile/kgsgeserver/#&ui Search

Layer Selection

Layer Selection

Base Layer:

- ESRI Street Map
- US Topo & Hillshade
- Aerial Imagery

Geologic Map:

Transparency:

- 24K Geologic Faults
- 24K Structure Contours
- 24K Geologic Contacts
- 24K Coal Beds
- 24K Non Coal Beds

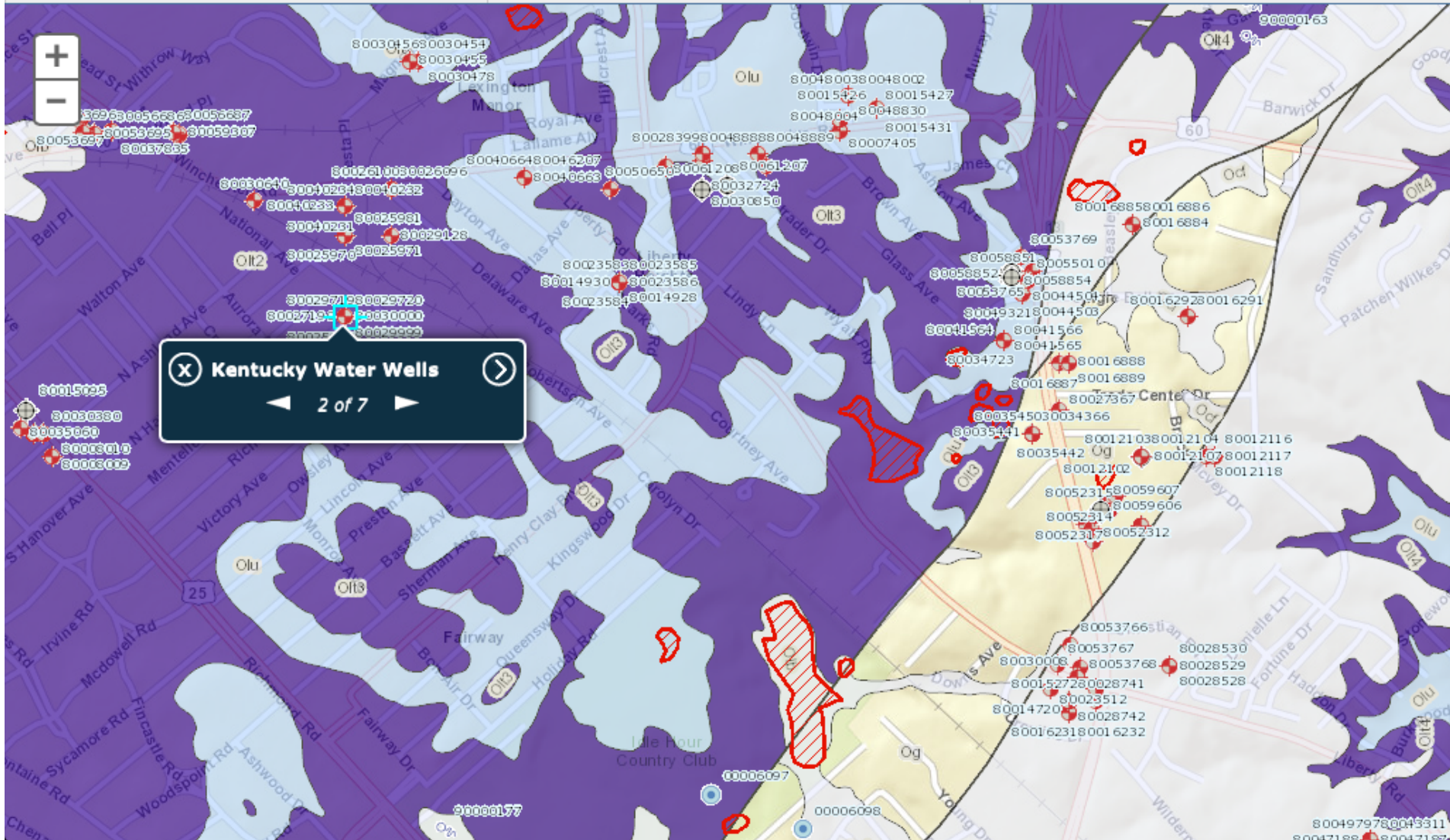
- Geologic Formations
- Karst Potential
- Dominant Lithology
- Turn Off Formations

Coal:

- Coal Boreholes
- Coal Thickness

Oil and Gas:

- KY Oil & Gas Wells
- Oil & Gas Deviated Wells
- KY Oil & Gas Fields



## Lessons Learned:

- **Detect device & redirect from a desktop application**
  - saves URL confusion
- **Keep it lightweight!**
  - easy to overload with functionality
- **“Touchability” is sometimes quirky**
- **No data / map caching on device**
  - off network use not possible

## Future Development:

- **Hybrid native / javascript application?**
  - put on app stores
- **Native application?**
  - data caching



**Contact:**  
Doug Curl  
doug@uky.edu



Poster session – demo application

<http://kgs.uky.edu/geomap>