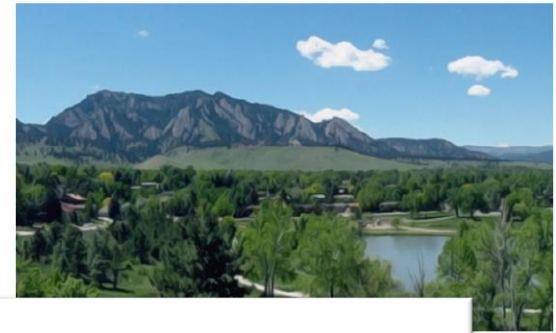
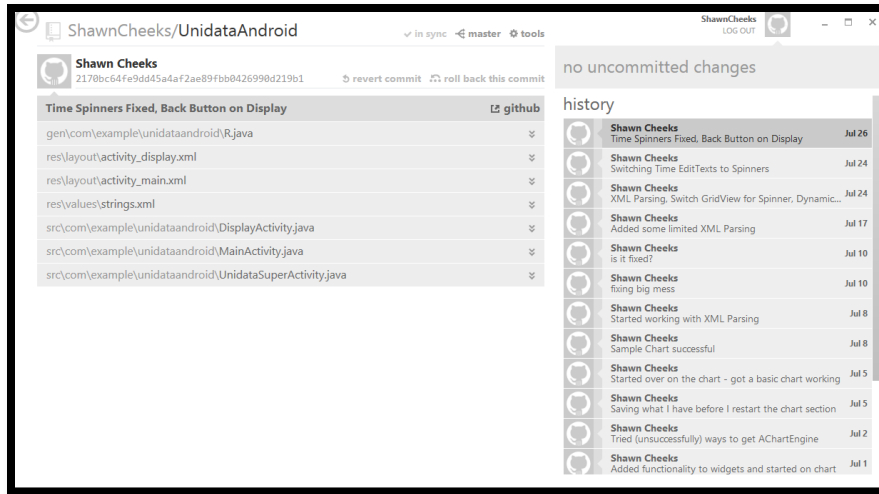


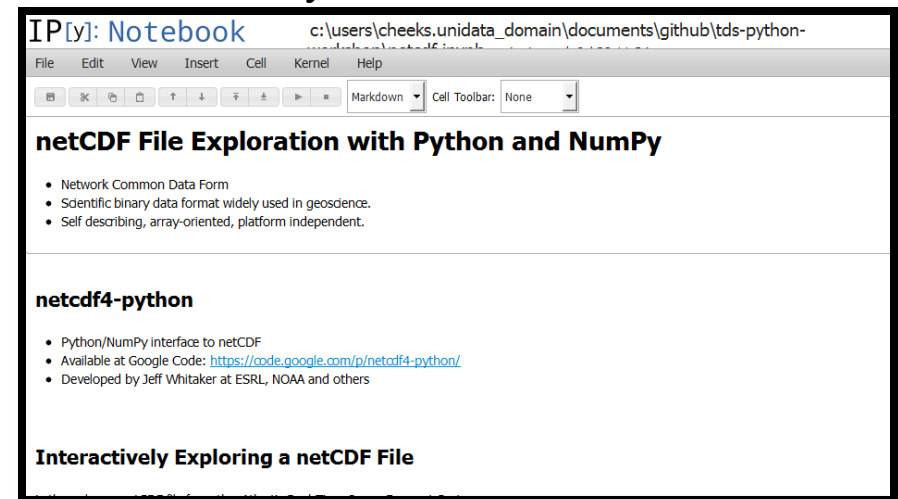
“What I Did This Summer”





GitHub

iPython Notebook





FINDING A PROJECT



- Met with Arnaud Dumont from RAL
- Weather Data in the Cockpit
- FAA Funded Research & Tablet App to Provide Weather Data to Pilots
- WebApp using PhoneGap

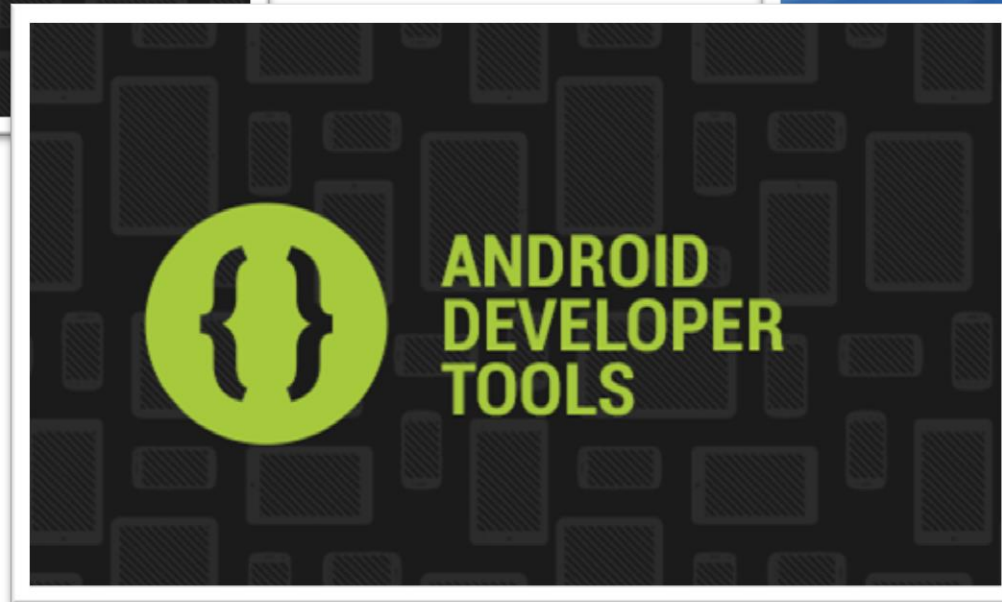
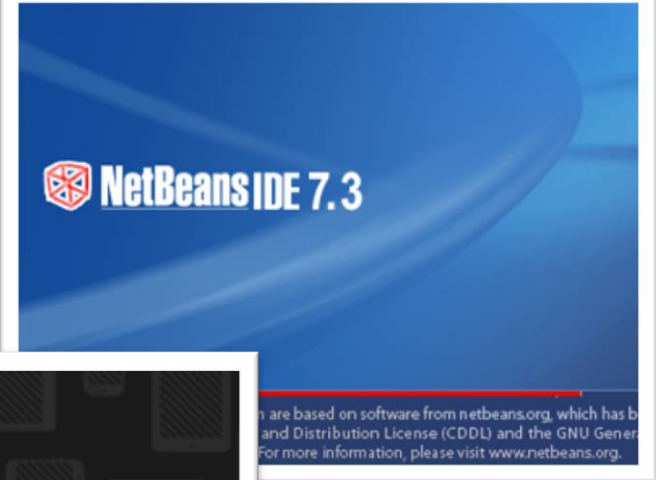


unidata

SETTLING ON ANDROID



ANDROID



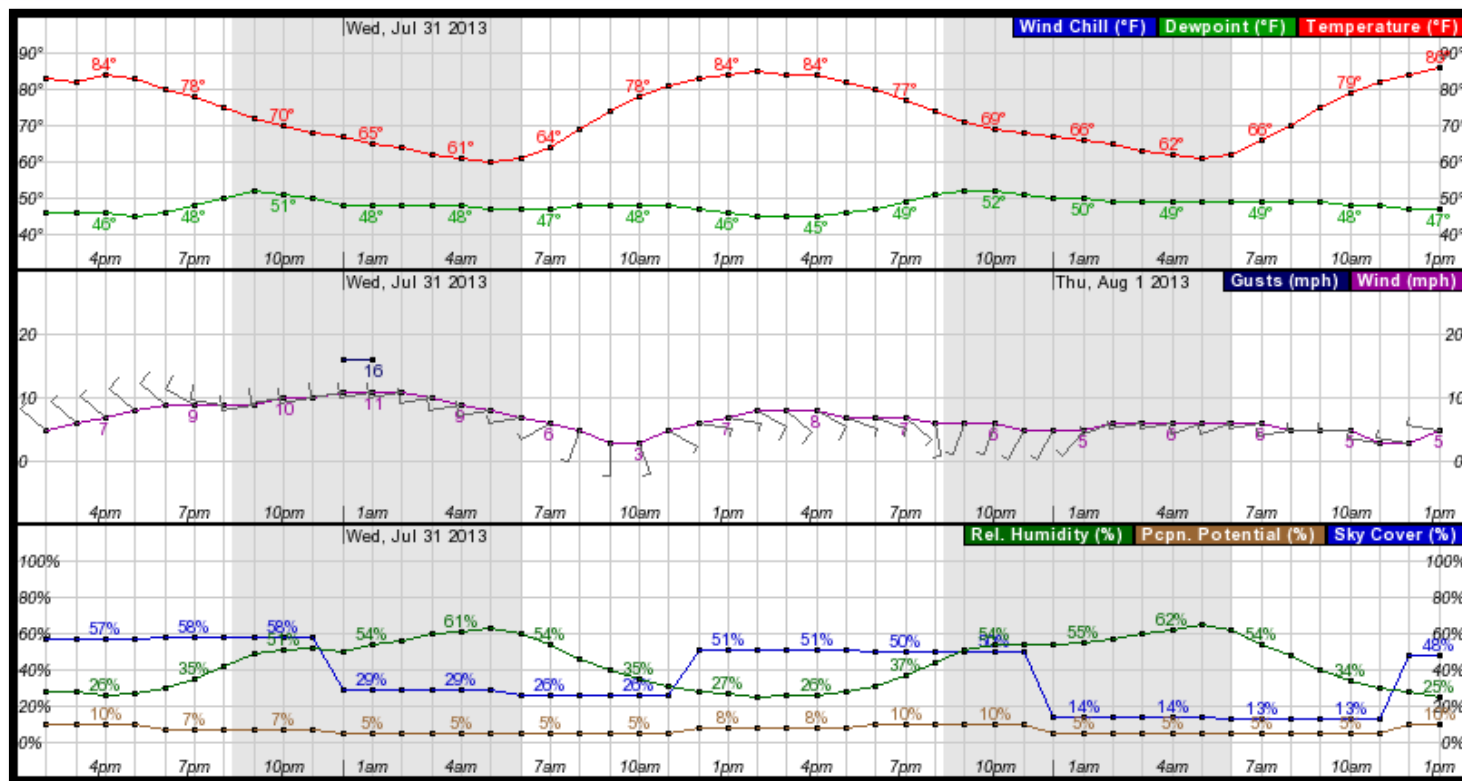


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SETTLING ON ANDROID



ANDROID



Time Series Forecast by NWS



unidata

ATTEMPTS AT NETCDF



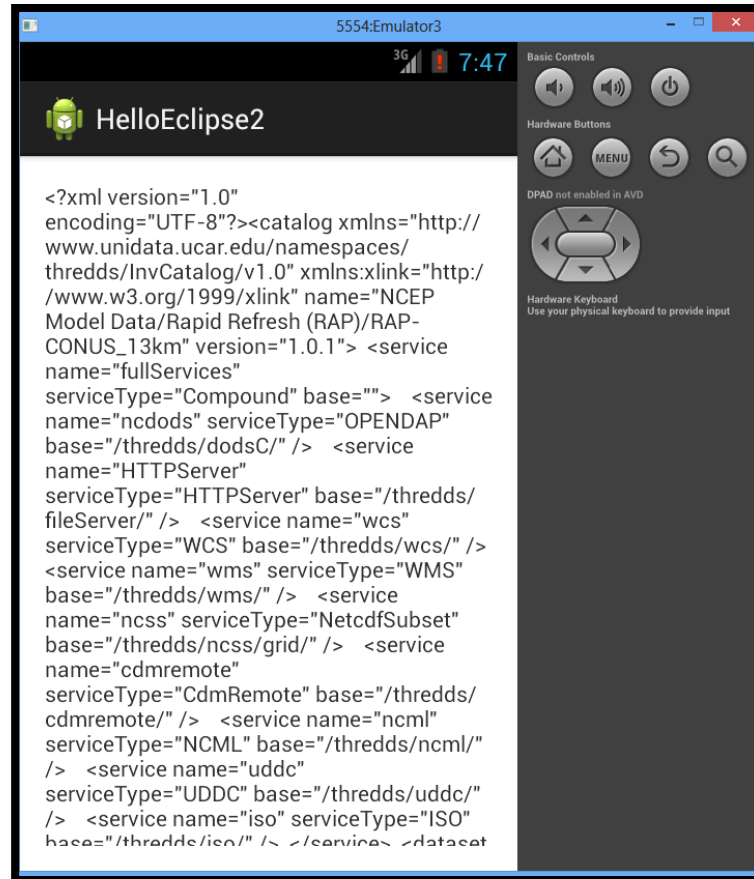
ANDROID

```
try {
    String remoteDataset =
        "thredds:resolve:http://thredds.ucar.edu/thredds/catalog/grib/NCEP/RAP/CONUS_13km/files/latest.xml";
    NetcdfFile ncd = NetcdfDataset.openFile(remoteDataset, null);
    List<Attribute> globalAttrs = ncd.getGlobalAttributes();

    String testMessage = "";
    for (Attribute attr : globalAttrs) {
        testMessage = testMessage + "\n" + attr;
    }
    ncd.close();
    hello.setText(testMessage);
} catch (IOException e) {
    e.printStackTrace();
}
```

“Too many methods: 111248; max is 65536”

FORMATTING A URL

A screenshot of an Android emulator window titled "5554:Emulator3". The window displays a mobile interface with a status bar at the top showing "3G", signal strength, and the time "7:47". Below the status bar is a header with an Android icon and the text "HelloEclipse2". The main content area displays an XML document. The XML is a catalog with a namespace "http://www.unidata.ucar.edu/namespaces/thredds/InvCatalog/v1.0" and a link to "http://www.w3.org/1999/xlink" with the name "NCEP Model Data/Rapid Refresh (RAP)/RAP-CONUS_13km" and version "1.0.1". It contains several service entries with names like "fullServices", "ncdods", "HTTPServer", "wcs", "wms", "ncss", "cdmremote", "ncml", "uddc", and "iso". The right side of the emulator window shows a control panel with "Basic Controls" (volume, power), "Hardware Buttons" (home, menu, back, search), and a "DPAD" section with a directional pad icon. A note says "DPAD not enabled in AVD" and "Hardware Keyboard Use your physical keyboard to provide input".

```
<?xml version="1.0"
encoding="UTF-8"?><catalog xmlns="http://
www.unidata.ucar.edu/namespaces/
thredds/InvCatalog/v1.0" xmlns:xlink="http:/
/www.w3.org/1999/xlink" name="NCEP
Model Data/Rapid Refresh (RAP)/RAP-
CONUS_13km" version="1.0.1"> <service
name="fullServices"
serviceType="Compound" base=""> <service
name="ncdods" serviceType="OPENDAP"
base="/thredds/dodsC/" /> <service
name="HTTPServer"
serviceType="HTTPServer" base="/thredds/
fileServer/" /> <service name="wcs"
serviceType="WCS" base="/thredds/wcs/" />
<service name="wms" serviceType="WMS"
base="/thredds/wms/" /> <service
name="ncss" serviceType="NetcdfSubset"
base="/thredds/ncss/grid/" /> <service
name="cdmremote"
serviceType="CdmRemote" base="/thredds/
cdmremote/" /> <service name="ncml"
serviceType="NCML" base="/thredds/ncml/"
/> <service name="uddc"
serviceType="UDDC" base="/thredds/uddc/"
/> <service name="iso" serviceType="ISO"
base="/thredds/iso/" /> </service> </catalog>
```

Example XML from URL in Emulator

NCSS Grids As Point Data ([Gridded Dataset](#))

Dataset: /thredds/ncss/grid/grib/NCEP/GFS/CONUS_80km/best ([Gridded Dataset Description](#))

Base Time: 2013-07-16T00:00:00Z

You must select at least one Variable and a Lat/Lon location.

Select Variable(s):

Variables with Time coordinate time

- ☐ Convective_Available_Potential_Energy_surface = Convective Available Potential Energy @ Ground or water surface
- ☐ Convective_inhibition_surface = Convective inhibition @ Ground or water surface
- ☐ Pressure_reduced_to_MSL_msl = Pressure reduced to MSL @ Mean sea level
- ☐ Pressure_surface = Pressure @ Ground or water surface

with Vertical Levels (height_above_ground) : 2.0 m

- ☐ Relative_humidity_height_above_ground = Relative humidity @ Specified height level above ground
- ☐ Temperature_height_above_ground = Temperature @ Specified height level above ground

with Vertical Levels (height_above_ground1) : 10.0 m

- ☐ u-component_of_wind_height_above_ground = u-component of wind @ Specified height level above ground
- ☐ v-component_of_wind_height_above_ground = v-component of wind @ Specified height level above ground

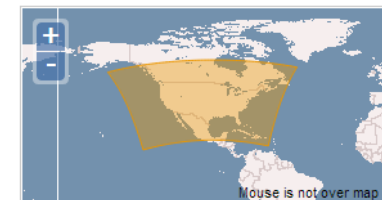
with Vertical Levels (isobaric) : 100.0 150.0 200.0 250.0 300.0 350.0 400.0 450.0 500.0 525.0 550.0 575.0 600.0 625.0 650.0 675.0 700.0 725.0 750.0 775.0 800.0 825.0 850.0 875.0 900.0 925.0 950.0 975.0 1000.0 hPa

- ☐ Geopotential_height_isobaric = Geopotential height @ Isobaric surface
- ☐ Relative_humidity_isobaric = Relative humidity @ Isobaric surface
- ☐ Temperature_isobaric = Temperature @ Isobaric surface
- ☐ u-component_of_wind_isobaric = u-component of wind @ Isobaric surface
- ☐ v-component_of_wind_isobaric = v-component of wind @ Isobaric surface

with Vertical Levels (isobaric2) : 250.0 500.0 700.0 850.0 hPa

- ☐ Absolute_vorticity_isobaric = Absolute vorticity @ Isobaric surface

Choose Lat/Lon Location:



Latitude:

Longitude:

Within Bounding Box:

north

57.4843

west -153.5889 -48.5984 east

11.7476

south

Choose Time Subset:

Time range Single time

Starting: 2013-07-16T00:00:00Z

Ending: 2013-08-09T18:00:00Z

[reset to full extension](#)

NetCDF Subset Service Request Form

Data Request Needs

- Product Type
 - Product
 - Variable(s)
-

- Location
 - Lat
 - Lon
-

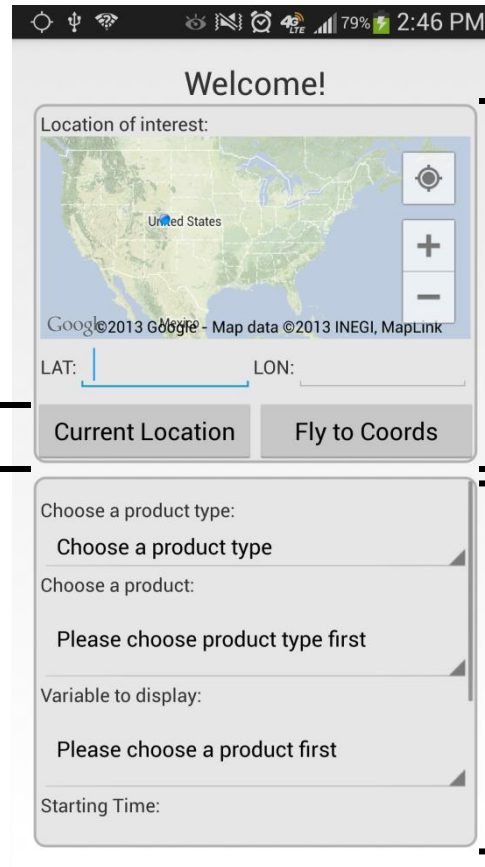
- Time
 - Start
 - End

Satisfied By

Spinners (hardcoded)

Google Maps and
Location Detection

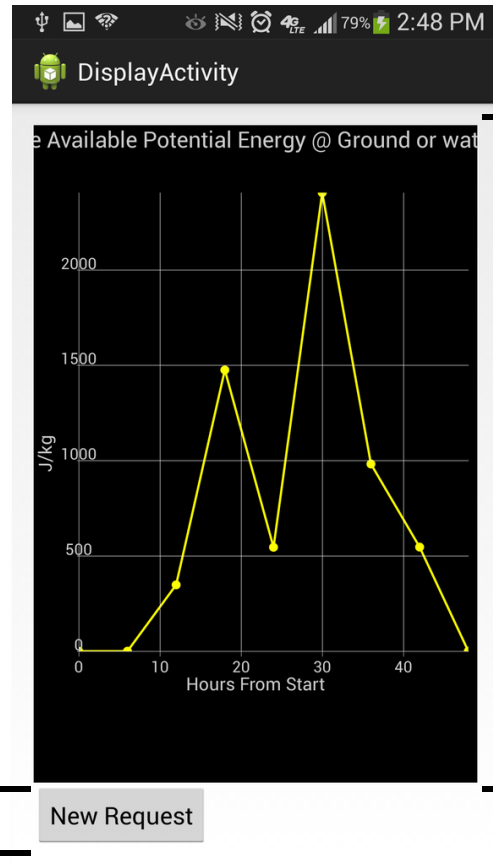
Spinners (adaptive)



GOOGLE MAPS

ANDROID WIDGETS

LOCATION SERVICES



ACHARTENGINE



BUTTON

New Request

⌂ ⓘ 🔒 📶 🔋 79% 2:46 PM

Welcome!

Location of interest:

Google ©2013 Google - Map data ©2013 INEGI, MapLink

LAT: LON:

Current Location Fly to Coords

Choose a product type:

Choose a product type

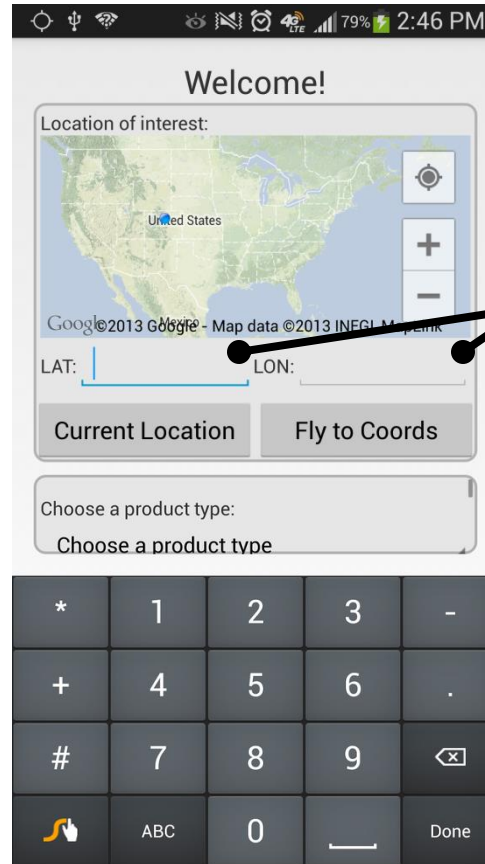
Choose a product:

Please choose product type first

Variable to display:

Please choose a product first


Starting Time:



Lat & Lon are EditTexts, so the user may enter in coordinates manually

Welcome!

Location of interest:



LAT: 40.03508 LON: -105.24346

Current Location Fly to Coords

Choose a product type:

Choose a product type

Choose a product:

Please choose product type first

Variable to display:


Please choose a product first

Starting Time:

“Current Location” takes location and auto-fills the Lat & Lon variables

Welcome!

Location of interest:



LAT: LON:

Choose a product type:

Choose a product:


Variable to display:

Starting Time:

“Fly to Coords” zooms & centers on the entered Lat & Lon

Welcome!

Location of interest:



LAT: LON:

Choose a product type:

Choose a product:

Variable to display:


Starting Time:

Only first spinner is unlocked

Other spinners require answers from earlier spinners

Welcome!

Location of interest:



LAT: 40.03508 LON: -105.24346

Current Location Fly to Coords

Choose a product type:

Choose a product type

Choose a product type


NCEP Model Data

Please choose a product first

Starting Time:


First is the “product type”

Currently hardcoded for only NCEP Model Data

 Saving screenshot...

Welcome!

Location of interest:



LAT: 40.03508 LON: -105.24346

Current Location Fly to Coords

Choose a product type:

NCEP Model Data

Choose a product:

Choose an NCEP model product

Choose an NCEP model product

GFS CONUS 80km

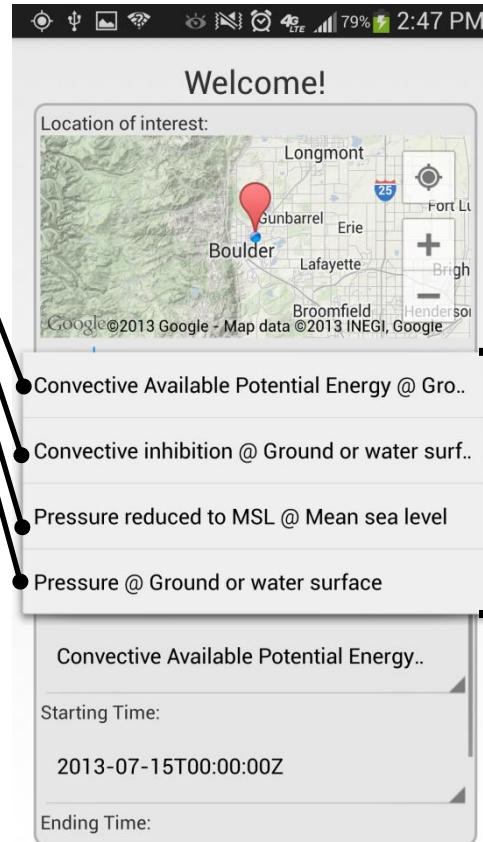
Once type is selected, the actual product is chosen

Currently hardcoded for GFS CONUS 80km model


```

+ <axis type="int" axisType="Time" shape="99" name="time">
+ <axis type="int" axisType="Time" shape="79" name="time1">
+ <axis type="int" axisType="Time" shape="98" name="time2">
+ <axis type="int" axisType="Time" shape="155" name="time3">
+ <axis type="int" axisType="Time" shape="59" name="time4">
+ <axis type="float" axisType="GeoX" shape="93" name="x">
+ <axis type="float" axisType="GeoY" shape="65" name="y">
- <gridSet name="time y x">
+ <projectionBox>
+ <axisRef name="time"/>
+ <axisRef name="y"/>
+ <axisRef name="x"/>
+ <coordTransRef name="LambertConformal_Projection"/>
+ <grid type="float" shape="time y x">
+ <name="Convective_Available_Potential_Energy_surface">
+ <desc="Convective Available Potential Energy @ Ground or water surface">
+ <grid type="float" shape="time y x" name="Convective_inhibition_surface">
+ <desc="Convective inhibition @ Ground or water surface">
+ <grid type="float" shape="time y x">
+ <name="Pressure_reduced_to_MSL_msl" desc="Pressure reduced to MSL @ Mean sea level">
+ <grid type="float" shape="time y x" name="Pressure_surface">
+ <desc="Pressure @ Ground or water surface">
</gridSet>
+ <gridSet name="time1 y x">
+ <gridSet name="time3 y x">
+ <gridSet name="time4 y x">
+ <gridSet name="time height_above_ground y x">
+ <gridSet name="time height_above_ground1 y x">
+ <gridSet name="time isobaric y x">
+ <gridSet name="time isobaric2 y x">
+ <gridSet name="time layer_between_two_pressure_difference_from_ground_layer y x">
+ <gridSet name="time layer_between_two_pressure_difference_from_ground_layer1 y x">
+ <gridSet name="time layer_between_two_sigmas_layer y x">
+ <gridSet name="time2 isobaric1 y x">
+ <coordTransform name="LambertConformal_Projection" transformType="Projection">


```



- Once product is selected, XMLPullParser takes over
- Parses the XML Doc for the product and returns the “time y x” variables
- The spinner is populated by the “time y x” variables

Welcome!

Location of interest:



LAT: 40.03508 LON: -105.24346

Current Location Fly to Coords

Convective Available Potential Energy..

Starting Time:

2013-07-15T00:00:00Z

Ending Time:

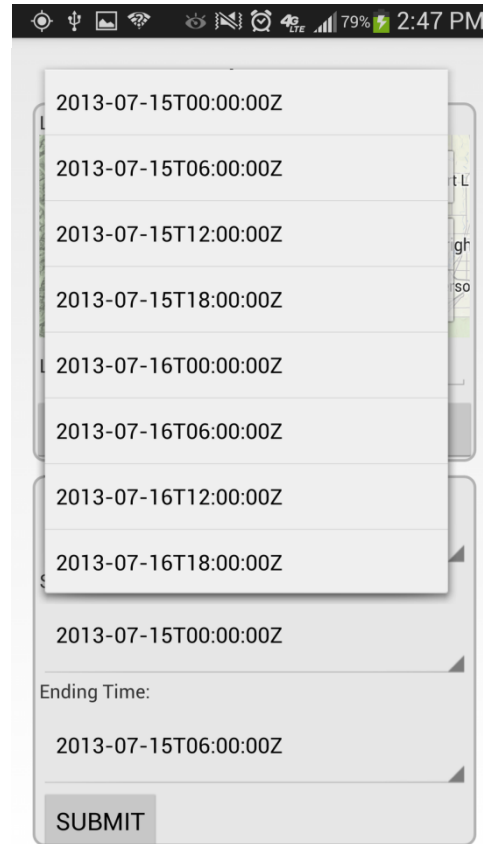
2013-07-15T06:00:00Z

SUBMIT

- The time options are also obtained from XML
- Starting time is defined by the time variable
- Time options are then incremented accordingly
- Ending time is at least one increment after selected start time

```


+ <axis type="float" axisType="Pressure" shape="29" name="isobaric">
+ <axis type="float" axisType="Pressure" shape="9" name="isobaric1">
+ <axis type="float" axisType="Pressure" shape="4" name="isobaric2">
+ <axis type="float" axisType="Pressure" shape="6"
name="layer_between_two_pressure_difference_from_ground_layer">
+ <axis type="float" axisType="Pressure" shape="1"
name="layer_between_two_pressure_difference_from_ground_layer1">
+ <axis type="float" axisType="GeoZ" shape="1"
name="layer_between_two_sigmas_layer">
- <axis type="int" axisType="Time" shape="99" name="time">
  <attribute name="units" value="Hour since 2013-07-15T00:00:00Z"/>
  <attribute name="standard_name" value="time"/>
  <attribute name="long_name" value="product valid at RT + P1"/>
  <attribute name="CoordinateAxisType" value="Time"/>
  <values npts="99" increment="6.0" start="0.0"/>
</axis>
+ <axis type="int" axisType="Time" shape="79" name="time1">
+ <axis type="int" axisType="Time" shape="98" name="time2">
+ <axis type="int" axisType="Time" shape="155" name="time3">
+ <axis type="int" axisType="Time" shape="59" name="time4">
+ <axis type="float" axisType="GeoX" shape="93" name="x">
+ <axis type="float" axisType="GeoY" shape="65" name="y">
+ <gridSet name="time y x">
+ <gridSet name="time1 y x">
+ <gridSet name="time3 y x">
+ <gridSet name="time4 y x">
  
```


A screenshot of an Android application interface. At the top, a status bar shows various icons and the time '2:47 PM'. The main screen displays a list of ISO 8601 timestamps: '2013-07-15T00:00:00Z', '2013-07-15T06:00:00Z', '2013-07-15T12:00:00Z', '2013-07-15T18:00:00Z', '2013-07-16T00:00:00Z', '2013-07-16T06:00:00Z', '2013-07-16T12:00:00Z', and '2013-07-16T18:00:00Z'. Below this list is a section labeled 'Ending Time:' with a dropdown menu showing '2013-07-15T06:00:00Z'. At the bottom, there is a 'SUBMIT' button.

- Lots of time choices

Welcome!

Location of interest:



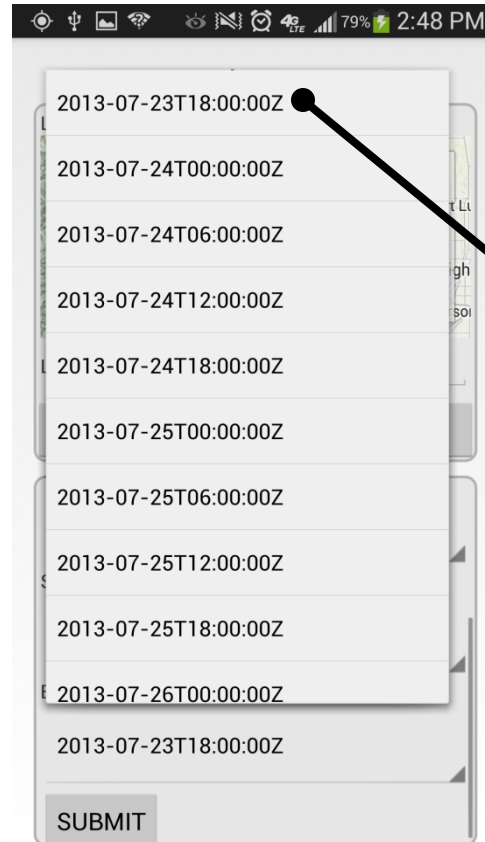
LAT: LON:

Convective Available Potential Energy..

Starting Time:

Ending Time:

Again, the ending time automatically sets itself to be at least one frame after the starting time

A screenshot of an Android application interface. At the top is a status bar with icons for connectivity and battery, showing 79% and 2:48 PM. Below is a scrollable list of ISO 8601 timestamps. A black dot is placed on the first item, and a line points from it to the explanatory text on the right. At the bottom of the list is a "SUBMIT" button.


2013-07-23T18:00:00Z
2013-07-24T00:00:00Z
2013-07-24T06:00:00Z
2013-07-24T12:00:00Z
2013-07-24T18:00:00Z
2013-07-25T00:00:00Z
2013-07-25T06:00:00Z
2013-07-25T12:00:00Z
2013-07-25T18:00:00Z
2013-07-26T00:00:00Z
2013-07-23T18:00:00Z

SUBMIT

The earliest end time choice is one increment after the selected start time

Welcome!

Location of interest:



LAT: LON:

Convective Available Potential Energy..

Starting Time:

Ending Time:

Now that all fields are completed...



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FINDING A PROJECT



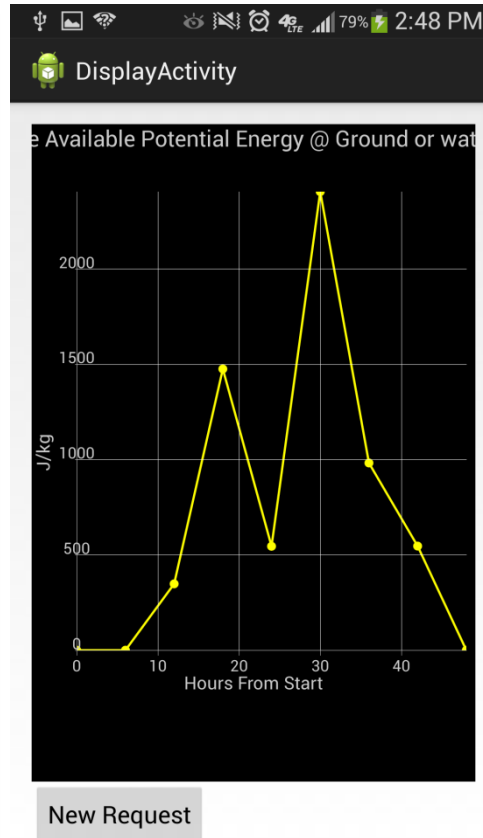
ANDROID

```
String a,b,c,d,e;
a=modelVariables[spinMainVariables.getSelectedItemPosition()].getName();
b=etMainLat.getText().toString();
c=etMainLon.getText().toString();
d=spinMainTimeStart.getSelectedItem().toString().replace(":", "%3A");
e=spinMainTimeEnd.getSelectedItem().toString().replace(":", "%3A");

super.setURL("http://thredds.ucar.edu/thredds/ncss/grid/grib/NCEP/GFS/CONUS_80km/best" +
    "?var=" + a +
    "&latitude=" + b +
    "&longitude=" + c +
    "&time_start=" + d +
    "&time_end=" + e +
    "&vertCoord=&accept=xml");
```

- The app creates a URL request to the server and calls the DisplayActivity

```
<?xml version="1.0" encoding="UTF-8"?>
- <grid dataset="/data/ldm/pub/native/grid/NCEP/GFS/CONUS_80km/GFS-CONUS_80km.ncx">
- <point>
  <data name="date">2013-07-23T12:00:00Z</data>
  <data name="lat" units="degrees_north">40.03508</data>
  <data name="lon" units="degrees_east">-105.24346</data>
  <data name="Convective_Available_Potential_Energy_surface" units="J/kg">0.0</data>
</point>
- <point>
  <data name="date">2013-07-23T18:00:00Z</data>
  <data name="lat" units="degrees_north">40.03508</data>
  <data name="lon" units="degrees_east">-105.24346</data>
  <data name="Convective_Available_Potential_Energy_surface" units="J/kg">0.0</data>
</point>
- <point>
  <data name="date">2013-07-24T00:00:00Z</data>
  <data name="lat" units="degrees_north">40.03508</data>
  <data name="lon" units="degrees_east">-105.24346</data>
  <data name="Convective_Available_Potential_Energy_surface" units="J/kg">348.0</data>
</point>
- <point>
  <data name="date">2013-07-24T06:00:00Z</data>
  <data name="lat" units="degrees_north">40.03508</data>
  <data name="lon" units="degrees_east">-105.24346</data>
  <data name="Convective_Available_Potential_Energy_surface" units="J/kg">1475.0</data>
</point>
- <point>
  <data name="date">2013-07-24T12:00:00Z</data>
  <data name="lat" units="degrees_north">40.03508</data>
  <data name="lon" units="degrees_east">-105.24346</data>
  <data name="Convective_Available_Potential_Energy_surface" units="J/kg">545.0</data>
</point>
- <point>
  <data name="date">2013-07-24T18:00:00Z</data>
  <data name="lat" units="degrees_north">40.03508</data>
  <data name="lon" units="degrees_east">-105.24346</data>
  <data name="Convective_Available_Potential_Energy_surface" units="J/kg">2405.0</data>
</point>
</grid>
```



- The DisplayActivity uses the XMLPullParser to extract the data.
- The data is stored into a double array
- The times are converted into “hours since” and stored in an int array
- This is then graphed by AChartEngine

KNOWN BUGS

- **Coordinate Boundaries not Enforced**
- **Will Accept Invalid URLs**
- **Landscape Orientation is Map-Only**
- **Native Units Only**
- **Long Variable Names**

- **Documenting Code**
- **Transferring Code**
- **Incorporating Last-Minute Suggestions**

- **More Variables, Models, & Products**
- **Multiple Graphs Simultaneously**
- **Fixing Known Bugs**
- **Finding New Bugs**



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THANKS



ANDROID

