

Composite Satellite Gamma Adjustment Jobsheet

Summary: This jobsheet documents how forecasters can create a multi-channel composite satellite bundle that will combine multiple satellite channels into one display where the R, G, and B gamma settings can be controlled. The instructions below contain a big-picture summary of the process and step-by-step instructions.

Contact: Michael.A.Magsig@noaa.gov

Overview

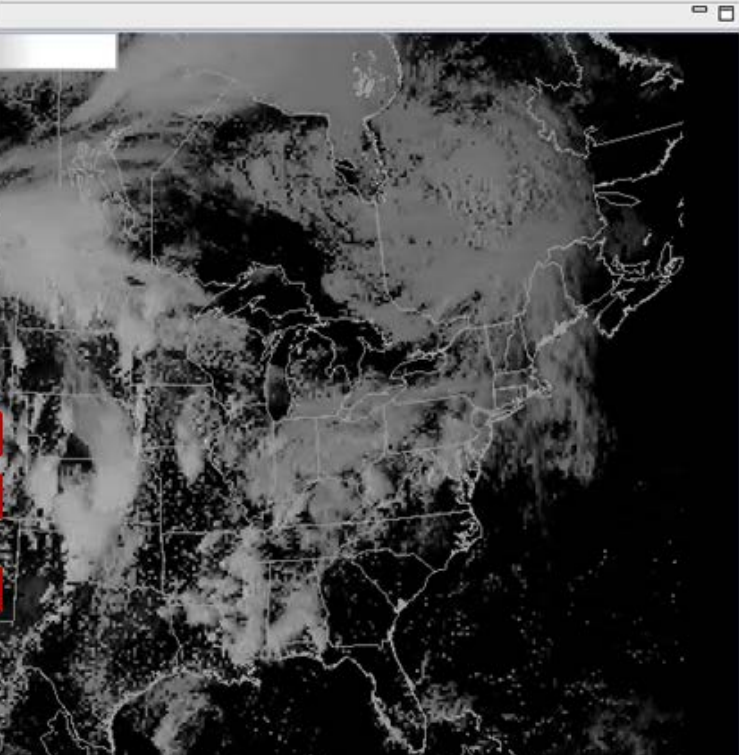
- Identify 3 satellite products for combining that are somewhat independent of each other.
- Load the 3 satellite products in D2D and save using the Save Editor Display.
- Download gammaDCS.xml and open in the Localization Perspective.
- Cut and paste the mapping tags for each product from your 3-satellite bundle into the gammaDCS.xml bundle in the Localization Perspective and change the numberOfFrames tag (sets default number of frames) and groupName tag (sets part of legend text).
- Save the changes and open the bundle copy using Load/Save Displays.
- Modify the gamma settings and copy into a procedure.

Detailed Step-By-Step Instructions

1. **Load 3** of your favorite satellite products that you want to combine into a composite product. While this is ideally targeted toward multi-channel Himawari data and GOES-R data, if you don't have access to those, you can use existing GOES data. For this example we will use GOES WV/IR, 13u, and Visible data for illustration purposes. Some suggestions to prevent any mistakes:
 - a. When cutting and pasting tags recognize that all tags have a beginning tag and an ending tag (e.g. <mapping> followed by </mapping>), so you will want to copy text with beginning and ending tags per the instructions.

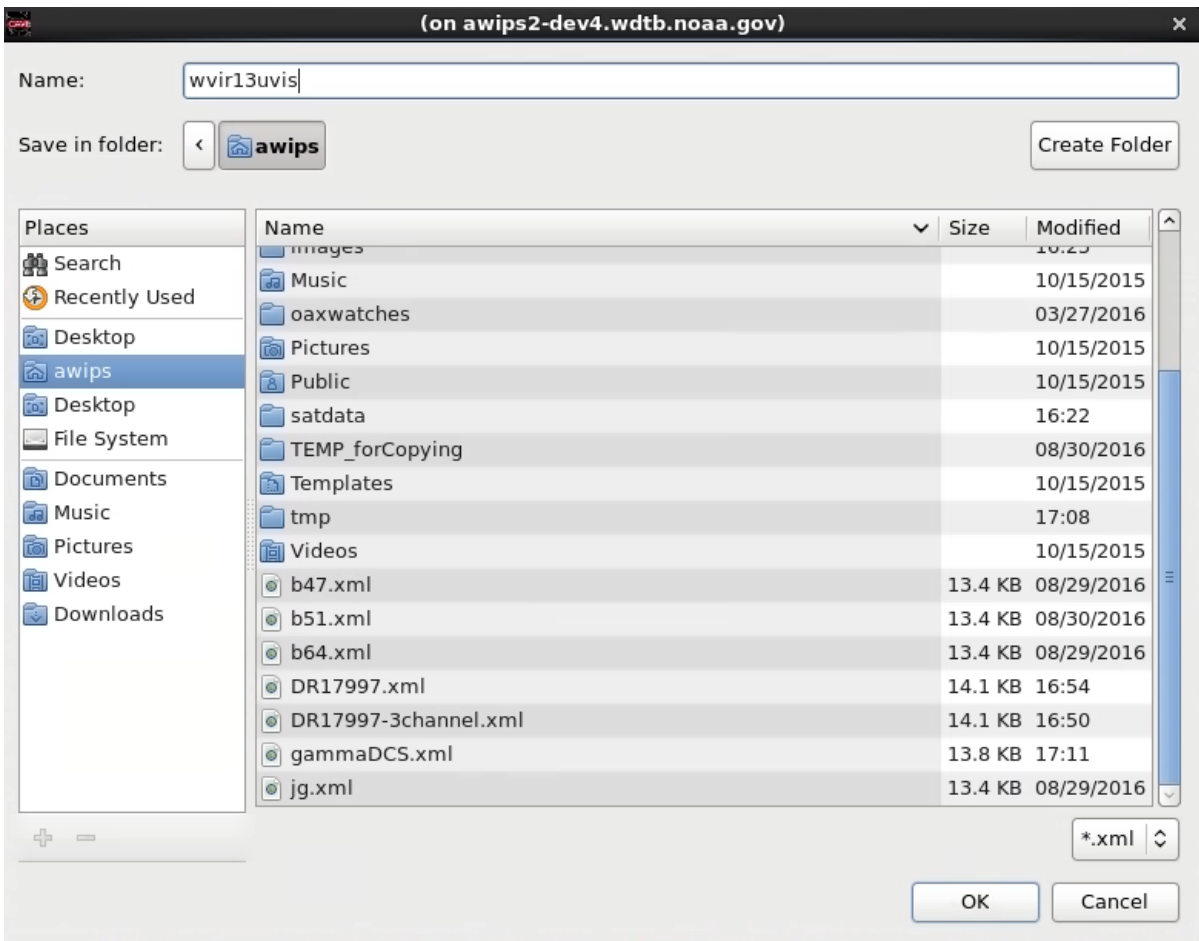
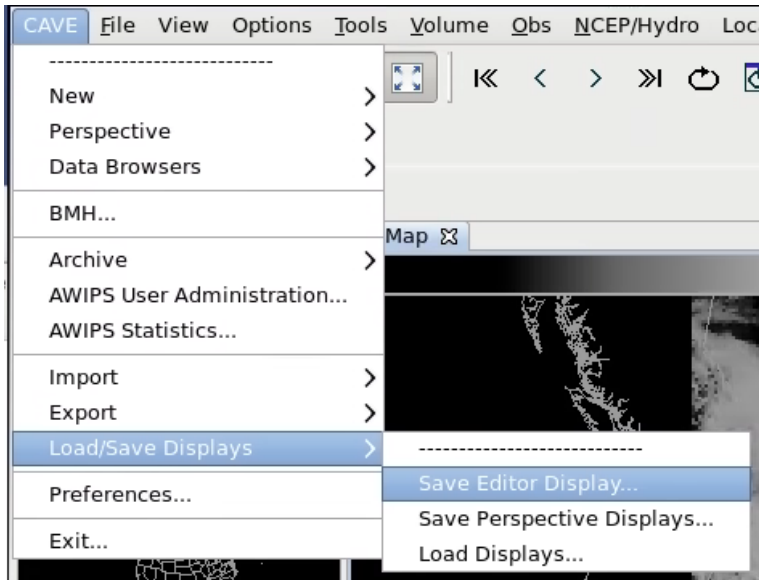
Satellite	koax	tmsp	ktlx	tjua	kddc	Rada

IR Window						--,----
Water Vapor						--,----
Visible						--,----
3.9u					17.0445	
13u					17.0445	
11u-3.9u					17.0445	
11u-13u					--,----	
WV/IR					17.0030	
4 panel (GOES M-Q)					17.0445	
----- POES Imagery -----						
IR Window						--,----
Visible						--,----
3.7u						--,----
11-3.7u						--,----
Sounder Imagery						>
Derived Products Imagery						>
Derived Products Plots						>
NPP Products						>
OCONUS Imagery						>
----- NH/NA/US every image-----						
IR Window					17.0445	
Water Vapor					17.0445	
Visible					17.0345	
3.9u					17.0445	
13u					17.0445	
11u-3.9u					17.0445	
11u-13u					17.0445	
WV/IR					17.0445	
----- 4 Sat Composite -----						
IR Window					17.0000	
Water Vapor					17.0000	
Visible					17.0000	
WV/IR					17.0000	

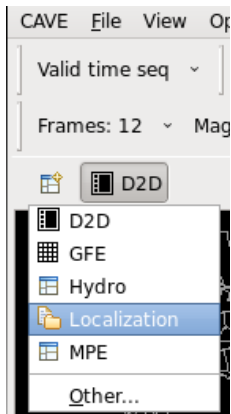


GOES-15 Visible Imagery GOES-13 Visible Imagery Sat 22:00Z 16-May-15
 GOES-15(P) Imager 13 micron (IR) GOES-13(N) Imager 13 micron (IR) Sat 22:00Z 16-May-15
 * GOES-15(P) IR in WV Satellite GOES-13(N) IR in WV Satellite Sat 22:00Z 16-May-15

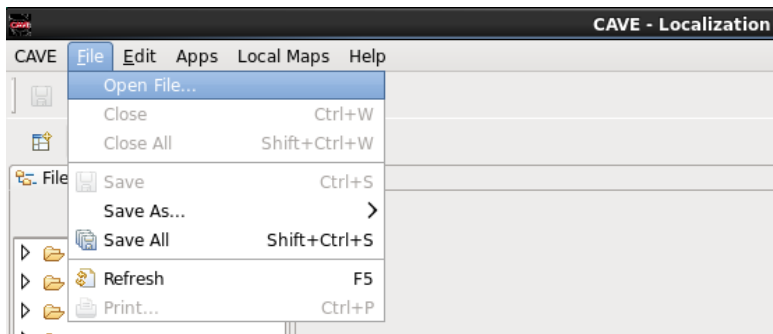
- Under the CAVE menu select the **Load/Save Displays** submenu and the **Save Editor Display** submenu. In the popup menu **enter a new name** for your procedure (e.g. wvir13uvis) and click **OK**. Note it will automatically assign a *.xml extension to the file.



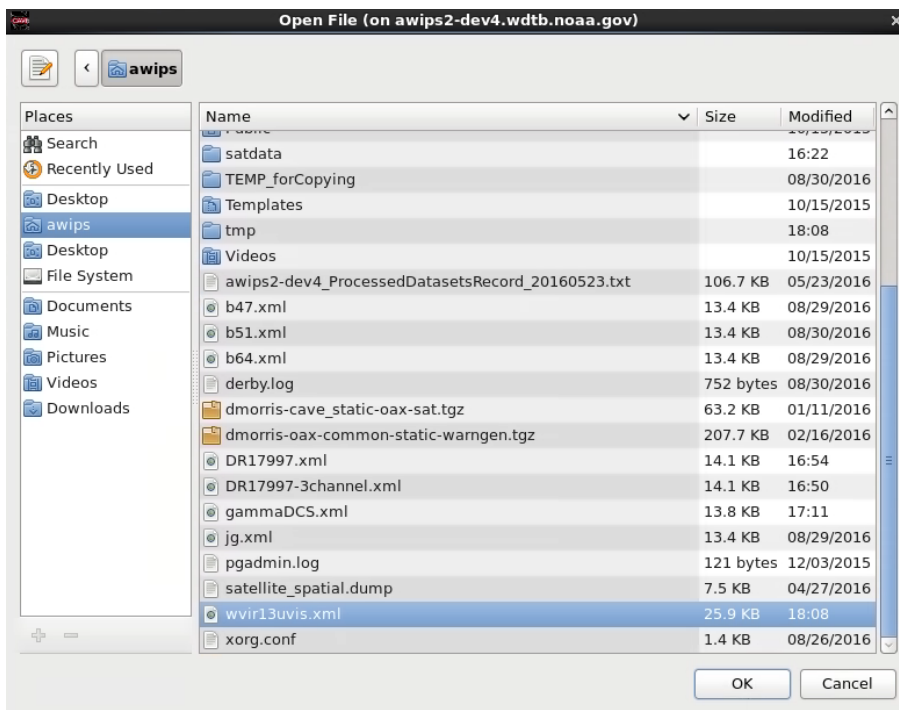
3. Load the **localization perspective** from the open perspective bar.



4. Under the **File** menu in the Localization Perspective select **Open File**.

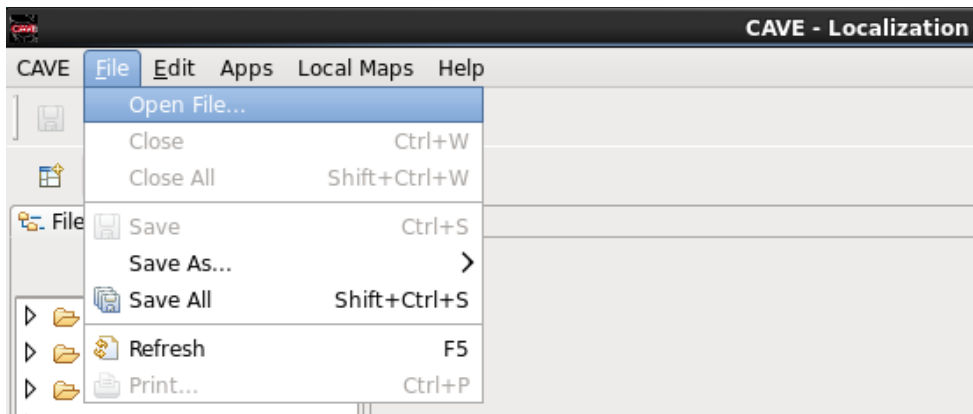


5. **Select** the filename you entered in step #2 (e.g. wvir13uvis.xml) and click **OK**.

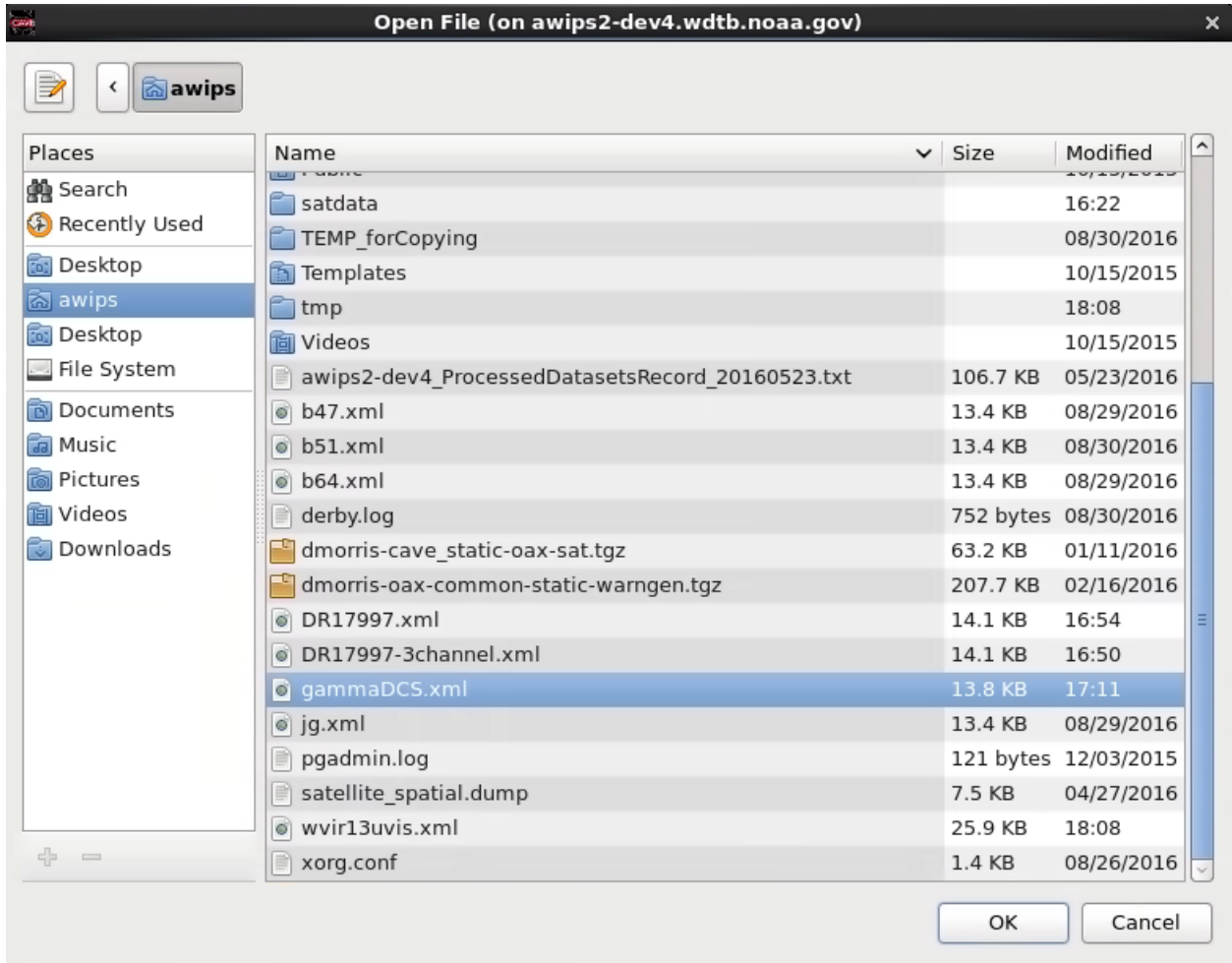


```
1 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2 <bundle name="Map">
3   <displayList>
4     <displays xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" >
5       <descriptor xsi:type="mapDescriptor">
6         <resource>
7           <loadProperties loadWithoutData="true">
8             <resourceType>PLAN_VIEW</resourceType>
9             <perspectiveProperty xsi:type="d2dLoadProperties" >
10            <capabilities>
11              <capability xsi:type="colorMapCapability">
12                <colorMapParameters colorMapName="Sat/IR/IR WV">
13                  <persisted/>
14                </colorMapParameters>
15              </capability>
16              <capability xsi:type="imagingCapability" conf>
17                <capability xsi:type="colorableCapability" co>
18              </capabilities>
19            </loadProperties>
20            <properties isVisible="true" isHoverOn="false" isMapI>
21              <pdProps minDisplayWidth="0" maxDisplayWidth="100>
22            </properties>
23            <resourceData xsi:type="satBlendedResourceData" timeI>
24              <metadataMap>
25                <mapping key="creatingEntity">
26                  <constraint constraintType="LIKE" constraintValue="GOES%"/>
27                </mapping>
28                <mapping key="pluginName">
29                  <constraint constraintType="EQUALS" constraintValue="satellite"/>
30                </mapping>
31                <mapping key="physicalElement">
32                  <constraint constraintType="IN" constraintValue="satDivWVIR"/>
33                </mapping>
34                <mapping key="sectorID">
35                  <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
36                </mapping>
37              </metadataMap>
38            </resourceData>
39          </resource>
40        </displays>
41      </descriptor>
42    </displayList>
43  </bundle>
```

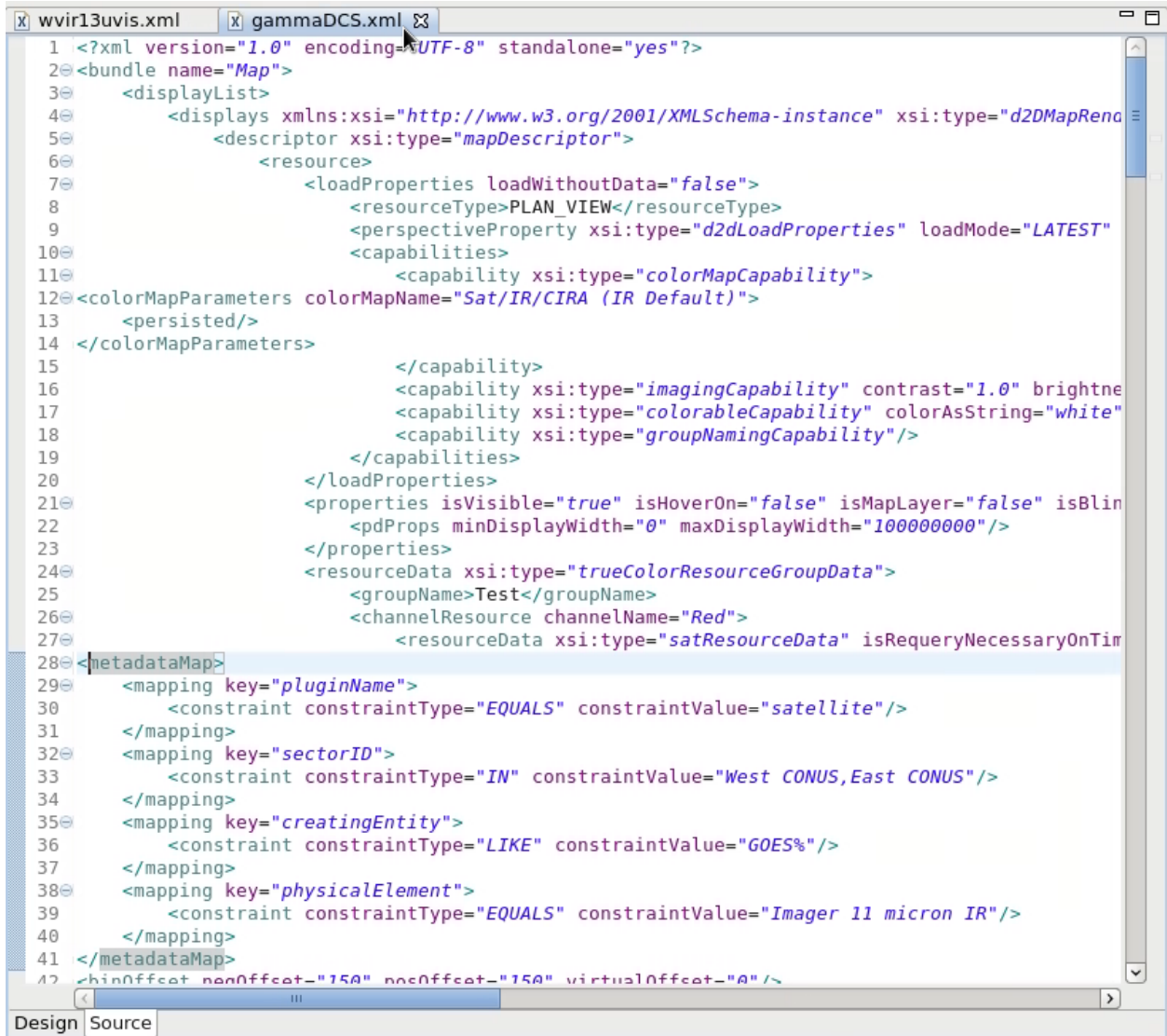
6. Under the **File** menu in the Localization Perspective select **Open File**.



7. **Download** the **gammaDCS.xml** file from the [gamma adjustment VLab page](#), **select** the file, and click **OK**.

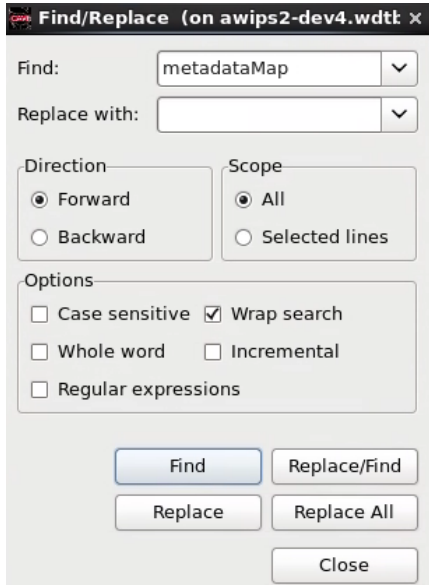


- Identify the `<metadataMap>` tag on line 28, and put your cursor on that tag. Notice the beginning and ending tag will highlight grey (may need to scroll down slightly). In the next step you will be replacing the 4 mapping tags from your other bundle you saved.



```
1 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2 <bundle name="Map">
3   <displayList>
4     <displays xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:type="d2DMapRender"
5       <descriptor xsi:type="mapDescriptor">
6         <resource>
7           <loadProperties loadWithoutData="false">
8             <resourceType>PLAN_VIEW</resourceType>
9             <perspectiveProperty xsi:type="d2dLoadProperties" loadMode="LATEST"
10              <capabilities>
11                <capability xsi:type="colorMapCapability">
12<colorMapParameters colorMapName="Sat/IR/CIRA (IR Default)">
13  <persisted/>
14 </colorMapParameters>
15                </capability>
16                <capability xsi:type="imagingCapability" contrast="1.0" brightne
17                <capability xsi:type="colorableCapability" colorAsString="white"
18                <capability xsi:type="groupNamingCapability"/>
19              </capabilities>
20            </loadProperties>
21            <properties isVisible="true" isHoverOn="false" isMapLayer="false" isBlin
22              <pdProps minDisplayWidth="0" maxDisplayWidth="100000000"/>
23            </properties>
24            <resourceData xsi:type="trueColorResourceGroupData">
25              <groupName>Test</groupName>
26              <channelResource channelName="Red">
27                <resourceData xsi:type="satResourceData" isRequeryNecessaryOnTim
28<metadataMap>
29  <mapping key="pluginName">
30    <constraint constraintType="EQUALS" constraintValue="satellite"/>
31  </mapping>
32  <mapping key="sectorID">
33    <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
34  </mapping>
35  <mapping key="creatingEntity">
36    <constraint constraintType="LIKE" constraintValue="GOES%"/>
37  </mapping>
38  <mapping key="physicalElement">
39    <constraint constraintType="EQUALS" constraintValue="Imager 11 micron IR"/>
40  </mapping>
41 </metadataMap>
42  <binOffset nonOffset="-150" posOffset="-150" virtualOffset="0"/>
```


9. Click on the **tab** for your 3 satellite product bundle (e.g. **wvir13uvis.xml**), and click **Ctrl + f** to launch the Find/Replace tool. Enter **metadataMap** and click the **Find button**. Notice the 4 **<mapping>** tags in the metadataMap tag and the physicalElement mapping key identifies the product (e.g. satDivWVIR is the WV/IR blend).



```
1 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2 <bundle name="Map">
3   <displayList>
4     <displays xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:type="
5       <descriptor xsi:type="mapDescriptor">
6         <resource>
7           <loadProperties loadWithoutData="true">
8             <resourceType>PLAN_VIEW</resourceType>
9             <perspectiveProperty xsi:type="d2dLoadProperties" load=
10            <capabilities>
11              <capability xsi:type="colorMapCapability">
12<colorMapParameters colorMapName="Sat/IR/IR WV">
13  <persisted/>
14 </colorMapParameters>
15              </capability>
16              <capability xsi:type="imagingCapability" contrast="
17              <capability xsi:type="colorableCapability" colorAsS
18            </capabilities>
19          </loadProperties>
20          <properties isVisible="true" isHoverOn="false" isMapLayer="
21            <pdProps minDisplayWidth="0" maxDisplayWidth="10000000
22          </properties>
23          <resourceData xsi:type="satBlendedResourceData" timeMatchM
24            <metadataMap>
25              <mapping key="creatingEntity">
26 <constraint constraintType="LIKE" constraintValue="GOES%"/>
27              </mapping>
28              <mapping key="pluginName">
29 <constraint constraintType="EQUALS" constraintValue="satellite"/>
30              </mapping>
31              <mapping key="physicalElement">
32 <constraint constraintType="IN" constraintValue="satDivWVIR"/>
33              </mapping>
34              <mapping key="sectorID">
35 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
36              </mapping>
37            </metadataMap>
38          </resource>
39            </loadProperties loadWithoutData="true">
```


10. Select the 4 **<mapping>** tags inside the **<metadataMap>** tag, and copy them into your clipboard (**Ctrl + C**). You should see the **<metadataMap>** tag above your selection and the **</metadataMap>** tag below your selection.

```
1 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2 <bundle name="Map">
3   <displayList>
4     <displays xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:type="
5       <descriptor xsi:type="mapDescriptor">
6         <resource>
7           <loadProperties loadWithoutData="true">
8             <resourceType>PLAN_VIEW</resourceType>
9             <perspectiveProperty xsi:type="d2dLoadProperties" loadW
10            <capabilities>
11              <capability xsi:type="colorMapCapability">
12                <colorMapParameters colorMapName="Sat/IR/IR WV">
13                  <persisted/>
14                </colorMapParameters>
15              </capability>
16              <capability xsi:type="imagingCapability" contrast="
17              <capability xsi:type="colorableCapability" colorAss
18            </capabilities>
19          </loadProperties>
20          <properties isVisible="true" isHoverOn="false" isMapLayer="
21            <pdProps minDisplayWidth="0" maxDisplayWidth="100000000
22          </properties>
23          <resourceData xsi:type="satBlendedResourceData" timeMatchMc
24          <metadataMap>
25            <mapping key="creatingEntity">
26              <constraint constraintType="LIKE" constraintValue="GOES%"/>
27            </mapping>
28            <mapping key="pluginName">
29              <constraint constraintType="EQUALS" constraintValue="satellite"/>
30            </mapping>
31            <mapping key="physicalElement">
32              <constraint constraintType="IN" constraintValue="satDivWVIR"/>
33            </mapping>
34            <mapping key="sectorID">
35              <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
36            </mapping>
37          </metadataMap>
38          <resource>
39            <loadProperties loadWithoutData="true">
```

- Click on the **gammaDCS.xml** tab and select the 4 mapping tags to replace by left-clicking and dragging the mouse from the beginning of line 29 to the end of line 40. Then **Ctrl + V** to paste the new mapping tags over these lines. Notice the **channelName="Red"** on line 26. You have just assigned the satDivWVIR product to the Red channelName.

```

1 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2 <bundle name="Map">
3   <displayList>
4     <displays xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:type="d2DMapRenderable">
5       <descriptor xsi:type="mapDescriptor">
6         <resource>
7           <loadProperties loadWithoutData="false">
8             <resourceType>PLAN_VIEW</resourceType>
9             <perspectiveProperty xsi:type="d2dLoadProperties" loadMode="LATEST">
10              <capabilities>
11                <capability xsi:type="colorMapCapability">
12                  <colorMapParameters colorMapName="Sat/IR/CIRA (IR Default)">
13                    <persisted/>
14                  </colorMapParameters>
15                </capability>
16                <capability xsi:type="imagingCapability" contrast="1.0" brightness="1.0">
17                  <capability xsi:type="colorableCapability" colorAsString="white">
18                    <capability xsi:type="groupNamingCapability"/>
19                  </capabilities>
20                </loadProperties>
21              <properties isVisible="true" isHoverOn="false" isMapLayer="false" isBlind="false">
22                <pdProps minDisplayWidth="0" maxDisplayWidth="100000000"/>
23              </properties>
24            <resourceData xsi:type="trueColorResourceGroupData">
25              <groupName>Test</groupName>
26              <channelResource channelName="Red">
27                <resourceData xsi:type="satResourceData" isRequireNecessaryOnTime/>
28            </resourceData>
29          </display>
30        </descriptor>
31      </displays>
32    </displayList>
33  </bundle>
34  </displayList>
35  </displayList>
36  </displayList>
37  </displayList>
38  </displayList>
39  </displayList>
40  </displayList>
41 </displayList>
42 </displayList>
43 </displayList>
44 </displayList>
45 </displayList>
46 </displayList>
47 </displayList>
48 </displayList>
49 </displayList>
50 </displayList>
51 </displayList>
52 </displayList>
53 </displayList>
54 </displayList>
55 </displayList>
56 </displayList>
57 </displayList>
58 </displayList>
59 </displayList>
60 </displayList>
61 </displayList>
62 </displayList>
63 </displayList>
64 </displayList>
65 </displayList>
66 </displayList>
67 </displayList>
68 </displayList>
69 </displayList>
70 </displayList>
71 </displayList>
72 </displayList>
73 </displayList>
74 </displayList>
75 </displayList>
76 </displayList>
77 </displayList>
78 </displayList>
79 </displayList>
80 </displayList>
81 </displayList>
82 </displayList>
83 </displayList>
84 </displayList>
85 </displayList>
86 </displayList>
87 </displayList>
88 </displayList>
89 </displayList>
90 </displayList>
91 </displayList>
92 </displayList>
93 </displayList>
94 </displayList>
95 </displayList>
96 </displayList>
97 </displayList>
98 </displayList>
99 </displayList>
100 </displayList>

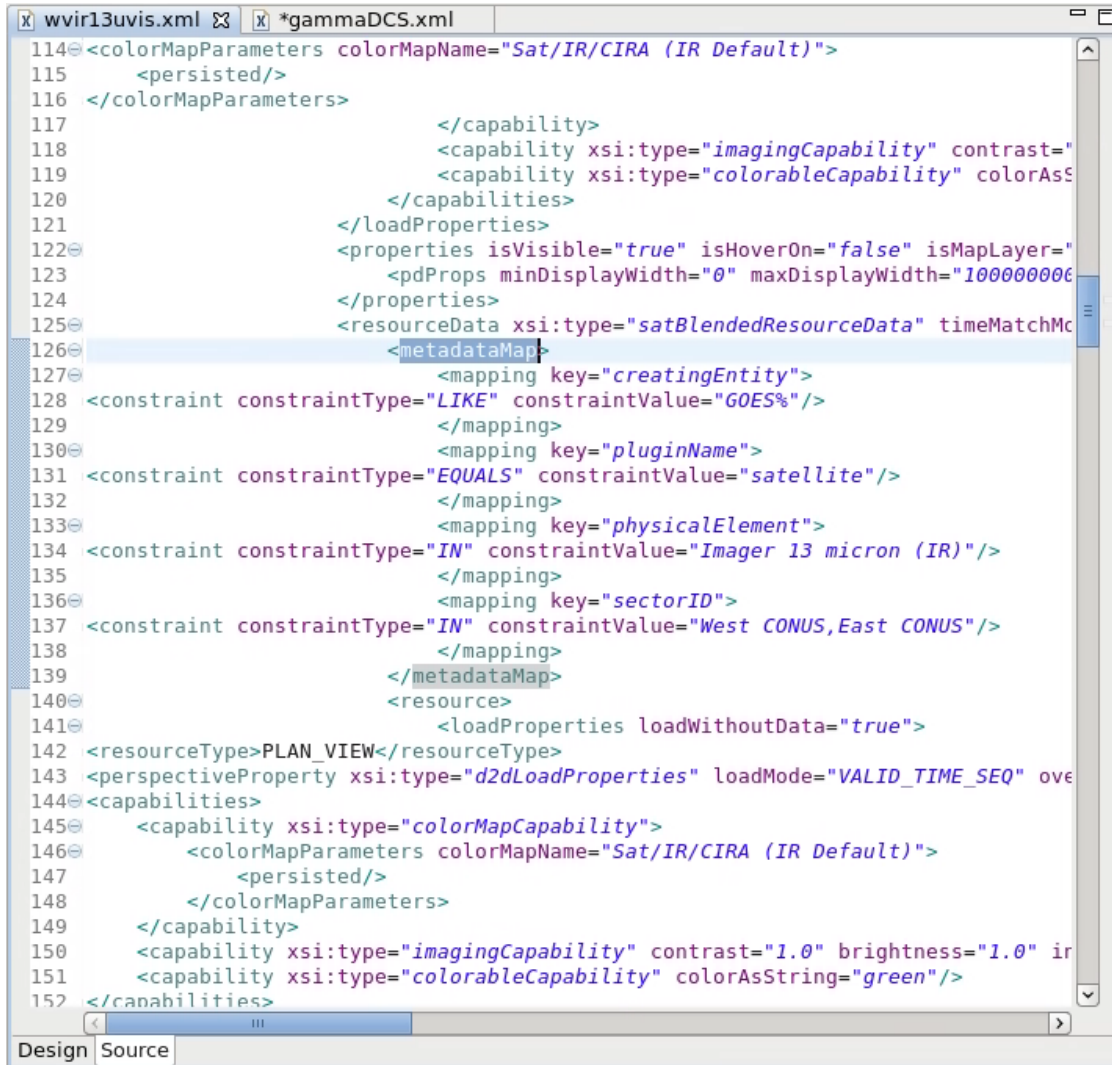
```

```

1 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2 <bundle name="Map">
3   <displayList>
4     <displays xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:type="d2DMapRenderable">
5       <descriptor xsi:type="mapDescriptor">
6         <resource>
7           <loadProperties loadWithoutData="false">
8             <resourceType>PLAN_VIEW</resourceType>
9             <perspectiveProperty xsi:type="d2dLoadProperties" loadMode="LATEST">
10              <capabilities>
11                <capability xsi:type="colorMapCapability">
12                  <colorMapParameters colorMapName="Sat/IR/CIRA (IR Default)">
13                    <persisted/>
14                  </colorMapParameters>
15                </capability>
16                <capability xsi:type="imagingCapability" contrast="1.0" brightness="1.0">
17                  <capability xsi:type="colorableCapability" colorAsString="white">
18                    <capability xsi:type="groupNamingCapability"/>
19                  </capabilities>
20                </loadProperties>
21              <properties isVisible="true" isHoverOn="false" isMapLayer="false" isBlind="false">
22                <pdProps minDisplayWidth="0" maxDisplayWidth="100000000"/>
23              </properties>
24            <resourceData xsi:type="trueColorResourceGroupData">
25              <groupName>Test</groupName>
26              <channelResource channelName="Red">
27                <resourceData xsi:type="satResourceData" isRequireNecessaryOnTime/>
28            </resourceData>
29          <mapping key="creatingEntity">
30            <constraint constraintType="LIKE" constraintValue="GOES%"/>
31          </mapping>
32          <mapping key="pluginName">
33            <constraint constraintType="EQUALS" constraintValue="satellite"/>
34          </mapping>
35          <mapping key="physicalElement">
36            <constraint constraintType="IN" constraintValue="satDivWVIR"/>
37          </mapping>
38          <mapping key="sectorID">
39            <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
40          </mapping>
41        </display>
42      </descriptor>
43    </displays>
44  </displayList>
45  </displayList>
46  </displayList>
47  </displayList>
48  </displayList>
49  </displayList>
50  </displayList>
51  </displayList>
52  </displayList>
53  </displayList>
54  </displayList>
55  </displayList>
56  </displayList>
57  </displayList>
58  </displayList>
59  </displayList>
60  </displayList>
61  </displayList>
62  </displayList>
63  </displayList>
64  </displayList>
65  </displayList>
66  </displayList>
67  </displayList>
68  </displayList>
69  </displayList>
70  </displayList>
71  </displayList>
72  </displayList>
73  </displayList>
74  </displayList>
75  </displayList>
76  </displayList>
77  </displayList>
78  </displayList>
79  </displayList>
80  </displayList>
81  </displayList>
82  </displayList>
83  </displayList>
84  </displayList>
85  </displayList>
86  </displayList>
87  </displayList>
88  </displayList>
89  </displayList>
90  </displayList>
91  </displayList>
92  </displayList>
93  </displayList>
94  </displayList>
95  </displayList>
96  </displayList>
97  </displayList>
98  </displayList>
99  </displayList>
100 </displayList>

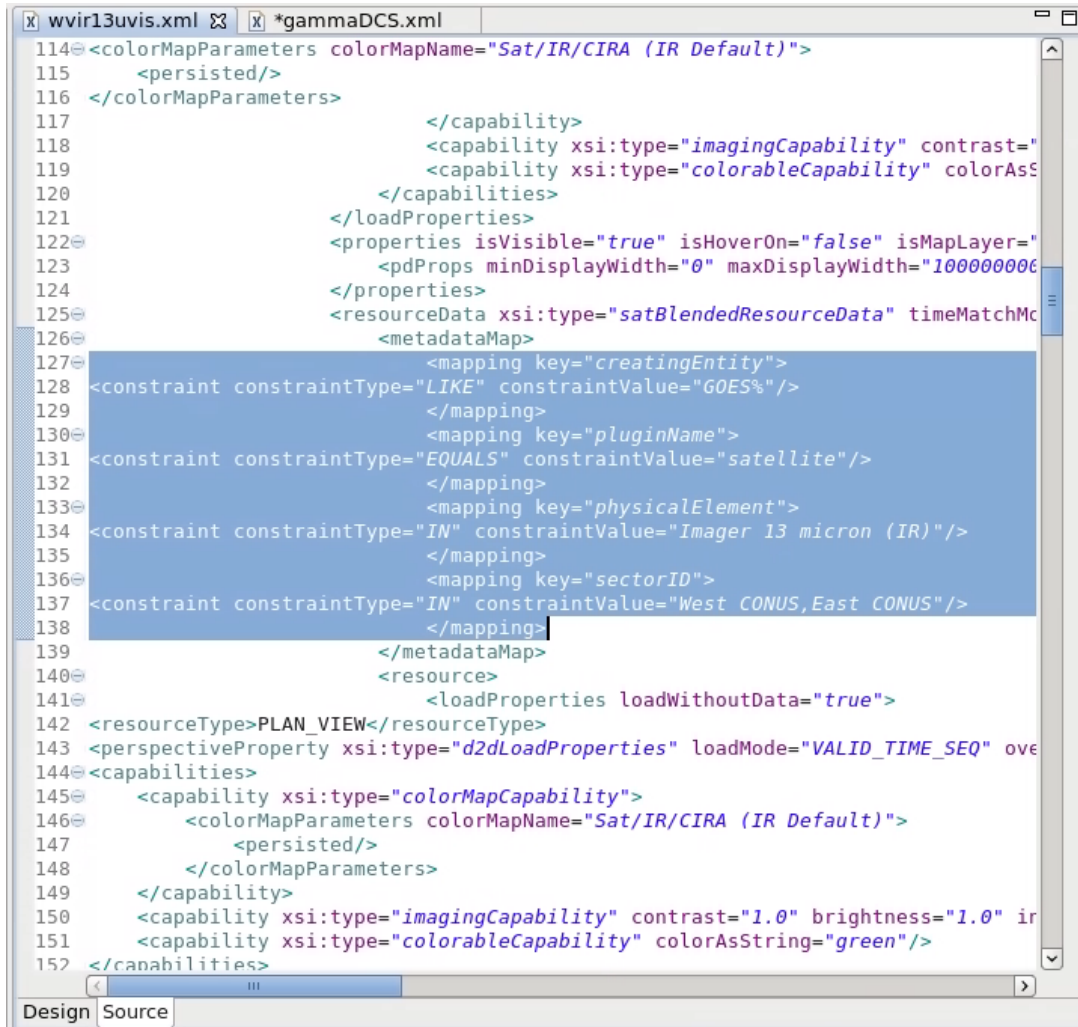
```

12. Click on your **3-product satellite bundle** (e.g. **wvir13uvis.xml**), and find the next **<metadataMap>** tag using the **Find** tool (**Ctrl + F**). You will see multiple metadataMap tags for each product (“physicalElement”). Keep clicking the **Find** button until your **physicalElement** key changes to your next product (e.g. **Imager 13 micron (IR)**).



```
114 <colorMapParameters colorMapName="Sat/IR/CIRA (IR Default)">
115   <persisted/>
116 </colorMapParameters>
117   </capability>
118   <capability xsi:type="imagingCapability" contrast="
119   <capability xsi:type="colorableCapability" colorAsS
120 </capabilities>
121 </loadProperties>
122 <properties isVisible="true" isHoverOn="false" isMapLayer="
123   <pdProps minDisplayWidth="0" maxDisplayWidth="10000000
124 </properties>
125 <resourceData xsi:type="satBlendedResourceData" timeMatchM
126 <metadataMap>
127   <mapping key="creatingEntity">
128 <constraint constraintType="LIKE" constraintValue="GOES%"/>
129   </mapping>
130   <mapping key="pluginName">
131 <constraint constraintType="EQUALS" constraintValue="satellite"/>
132   </mapping>
133   <mapping key="physicalElement">
134 <constraint constraintType="IN" constraintValue="Imager 13 micron (IR)"/>
135   </mapping>
136   <mapping key="sectorID">
137 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
138   </mapping>
139 </metadataMap>
140 <resource>
141   <loadProperties loadWithoutData="true">
142 <resourceType>PLAN_VIEW</resourceType>
143 <perspectiveProperty xsi:type="d2dLoadProperties" loadMode="VALID_TIME_SEQ" ove
144 <capabilities>
145   <capability xsi:type="colorMapCapability">
146     <colorMapParameters colorMapName="Sat/IR/CIRA (IR Default)">
147       <persisted/>
148     </colorMapParameters>
149   </capability>
150   <capability xsi:type="imagingCapability" contrast="1.0" brightness="1.0" ir
151   <capability xsi:type="colorableCapability" colorAsString="green"/>
152 </capabilities>
```

13. Select the 4 **<mapping>** tags inside the **<metadataMap>** tag, and copy them into your clipboard (**Ctrl + C**). You should see the **<metadataMap>** tag above your selection and the **</metadataMap>** tag below your selection.



```
114 <colorMapParameters colorMapName="Sat/IR/CIRA (IR Default)">
115   <persisted/>
116 </colorMapParameters>
117   </capability>
118   <capability xsi:type="imagingCapability" contrast="
119   <capability xsi:type="colorableCapability" colorAsS
120   </capabilities>
121 </loadProperties>
122 <properties isVisible="true" isHoverOn="false" isMapLayer="
123   <pdProps minDisplayWidth="0" maxDisplayWidth="10000000
124 </properties>
125 <resourceData xsi:type="satBlendedResourceData" timeMatchMc
126 <metadataMap>
127   <mapping key="creatingEntity">
128 <constraint constraintType="LIKE" constraintValue="GOES%"/>
129   </mapping>
130   <mapping key="pluginName">
131 <constraint constraintType="EQUALS" constraintValue="satellite"/>
132   </mapping>
133   <mapping key="physicalElement">
134 <constraint constraintType="IN" constraintValue="Imager 13 micron (IR)"/>
135   </mapping>
136   <mapping key="sectorID">
137 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
138   </mapping>
139 </metadataMap>
140 <resource>
141   <loadProperties loadWithoutData="true">
142 <resourceType>PLAN_VIEW</resourceType>
143 <perspectiveProperty xsi:type="d2dLoadProperties" loadMode="VALID_TIME_SEQ" ove
144 <capabilities>
145   <capability xsi:type="colorMapCapability">
146     <colorMapParameters colorMapName="Sat/IR/CIRA (IR Default)">
147       <persisted/>
148     </colorMapParameters>
149   </capability>
150   <capability xsi:type="imagingCapability" contrast="1.0" brightness="1.0" ir
151   <capability xsi:type="colorableCapability" colorAsString="green"/>
152 </capabilities>
```

14. Click on the **gammaDCS.xml** tab and select the 4 mapping tags by left-clicking and dragging the mouse from the beginning of **line 49** to the end of **line 60**. Then **Ctrl + V** to paste the new mapping tags over these lines. Notice the **channelName="Green"** on line 46. You have just assigned the Imager 11 micron IR product to the Green channelName.

```

30 <constraint constraintType="LIKE" constraintValue="GOES%"/>
31 </mapping>
32 <mapping key="pluginName">
33 <constraint constraintType="EQUALS" constraintValue="satellite"/>
34 </mapping>
35 <mapping key="physicalElement">
36 <constraint constraintType="IN" constraintValue="satDivWVIR"/>
37 </mapping>
38 <mapping key="sectorID">
39 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
40 </mapping>
41 </metadataMap>
42 <binOffset negOffset="150" posOffset="150" virtualOffset="0"/>
43 </resourceData>
44 <channel>RED</channel>
45 </channelResource>
46 <channelResource channelName="Green">
47 <resourceData xsi:type="satResourceData" isRequeryNecessaryOnTin
48 </metadataMap>
49 <mapping key="pluginName">
50 <constraint constraintType="EQUALS" constraintValue="satellite"/>
51 </mapping>
52 <mapping key="sectorID">
53 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
54 </mapping>
55 <mapping key="creatingEntity">
56 <constraint constraintType="LIKE" constraintValue="GOES%"/>
57 </mapping>
58 <mapping key="physicalElement">
59 <constraint constraintType="EQUALS" constraintValue="Imager 11 micron IR"/>
60 </mapping>
61 </metadataMap>
62 <binOffset negOffset="150" posOffset="150" virtualOffset="0"/>
63 </resourceData>
64 <channel>GREEN</channel>
65 </channelResource>
66 <channelResource channelName="Blue">
67 <resourceData xsi:type="satResourceData" isRequeryNecessaryOnTin
68 </metadataMap>
69 <mapping key="pluginName">
70 <constraint constraintType="EQUALS" constraintValue="satellite"/>
71 </mapping>

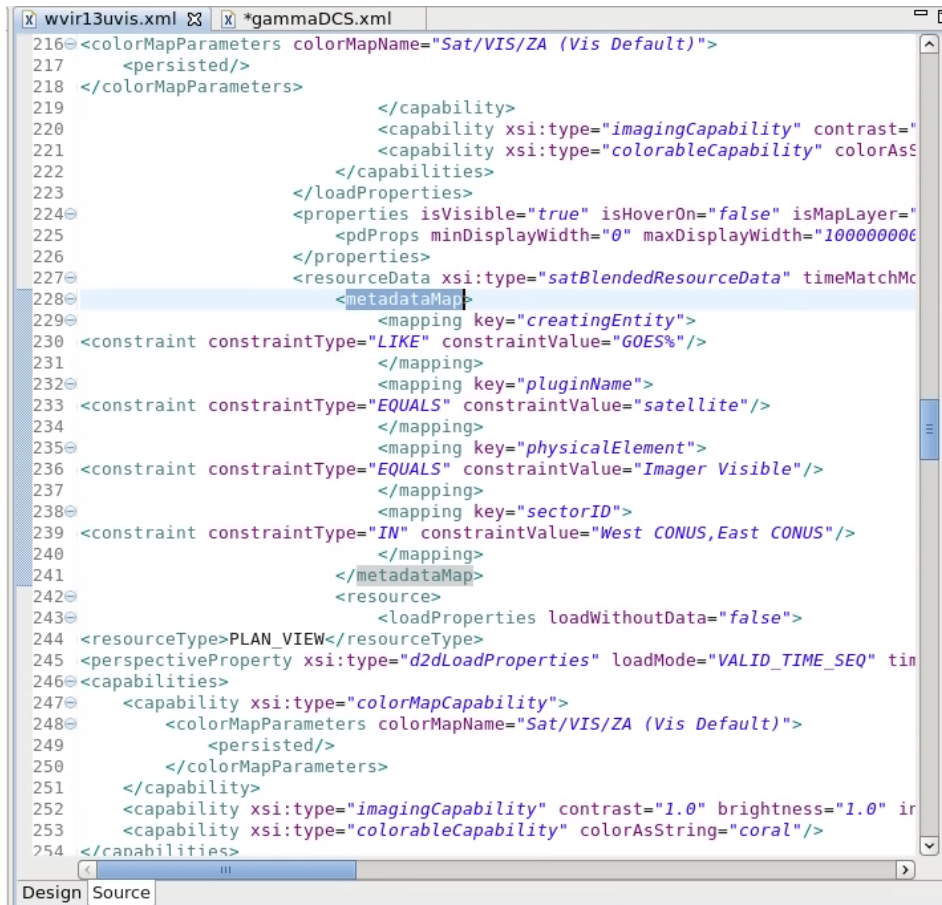
```

```

31 </mapping>
32 <mapping key="pluginName">
33 <constraint constraintType="EQUALS" constraintValue="satellite"/>
34 </mapping>
35 <mapping key="physicalElement">
36 <constraint constraintType="IN" constraintValue="satDivWVIR"/>
37 </mapping>
38 <mapping key="sectorID">
39 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
40 </mapping>
41 </metadataMap>
42 <binOffset negOffset="150" posOffset="150" virtualOffset="0"/>
43 </resourceData>
44 <channel>RED</channel>
45 </channelResource>
46 <channelResource channelName="Green">
47 <resourceData xsi:type="satResourceData" isRequeryNecessaryOnTin
48 </metadataMap>
49 <mapping key="creatingEntity">
50 <constraint constraintType="LIKE" constraintValue="GOES%"/>
51 </mapping>
52 <mapping key="pluginName">
53 <constraint constraintType="EQUALS" constraintValue="satellite"/>
54 </mapping>
55 <mapping key="physicalElement">
56 <constraint constraintType="IN" constraintValue="Imager 13 micron (IR)"/>
57 </mapping>
58 <mapping key="sectorID">
59 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
60 </mapping>
61 </metadataMap>
62 <binOffset negOffset="150" posOffset="150" virtualOffset="0"/>
63 </resourceData>
64 <channel>GREEN</channel>
65 </channelResource>
66 <channelResource channelName="Blue">
67 <resourceData xsi:type="satResourceData" isRequeryNecessaryOnTin
68 </metadataMap>
69 <mapping key="pluginName">
70 <constraint constraintType="EQUALS" constraintValue="satellite"/>
71 </mapping>
72 <mapping key="sectorID">

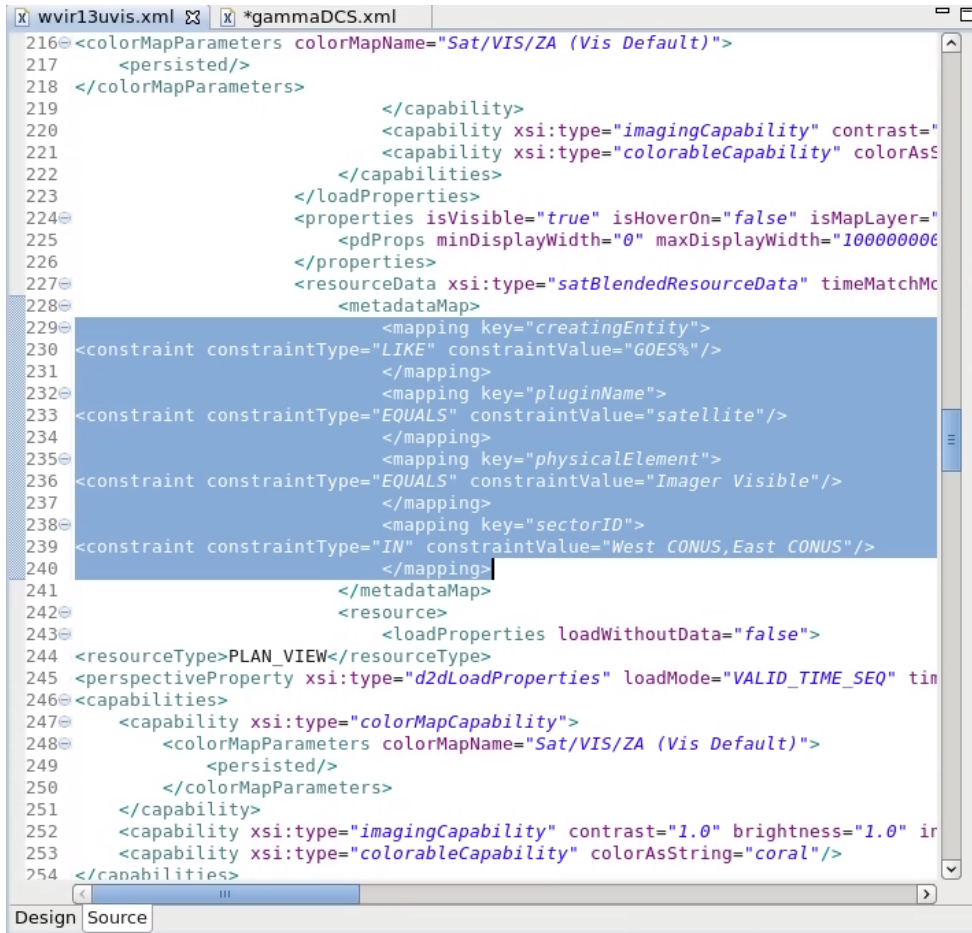
```


15. Click on your **3-product satellite bundle** (e.g. **wvir13uvis.xml**), and find the next **<metadataMap>** tag using the **Find** tool (**Ctrl + F**). You will see multiple metadataMap tags for each product. Keep clicking the **Find** button until your **physicalElement** key changes to your next product (e.g. **Imager Visible**).



```
216 <colorMapParameters colorMapName="Sat/VIS/ZA (Vis Default)">
217   <persisted/>
218 </colorMapParameters>
219   </capability>
220   <capability xsi:type="imagingCapability" contrast="
221     <capability xsi:type="colorableCapability" colorAsS
222   </capabilities>
223 </loadProperties>
224 <properties isVisible="true" isHoverOn="false" isMapLayer="
225   <pdProps minDisplayWidth="0" maxDisplayWidth="10000000
226 </properties>
227 <resourceData xsi:type="satBlendedResourceData" timeMatchM
228 <metadataMap>
229   <mapping key="creatingEntity">
230 <constraint constraintType="LIKE" constraintValue="GOES%"/>
231   </mapping>
232   <mapping key="pluginName">
233 <constraint constraintType="EQUALS" constraintValue="satellite"/>
234   </mapping>
235   <mapping key="physicalElement">
236 <constraint constraintType="EQUALS" constraintValue="Imager Visible"/>
237   </mapping>
238   <mapping key="sectorID">
239 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
240   </mapping>
241 </metadataMap>
242 <resource>
243   <loadProperties loadWithoutData="false">
244 <resourceType>PLAN_VIEW</resourceType>
245 <perspectiveProperty xsi:type="d2dLoadProperties" loadMode="VALID_TIME_SEQ" tin
246 <capabilities>
247   <capability xsi:type="colorMapCapability">
248     <colorMapParameters colorMapName="Sat/VIS/ZA (Vis Default)">
249       <persisted/>
250     </colorMapParameters>
251   </capability>
252   <capability xsi:type="imagingCapability" contrast="1.0" brightness="1.0" ir
253   <capability xsi:type="colorableCapability" colorAsString="coral"/>
254 </capabilities>
```

16. Select the 4 **<mapping>** tags inside the **<metadataMap>** tag, and copy them into your clipboard (**Ctrl + C**). You should see the **<metadataMap>** tag above your selection and the **</metadataMap>** tag below your selection.



```
216 <colorMapParameters colorMapName="Sat/VIS/ZA (Vis Default)">
217   <persisted/>
218 </colorMapParameters>
219   </capability>
220   <capability xsi:type="imagingCapability" contrast="
221   <capability xsi:type="colorableCapability" colorAsS
222   </capabilities>
223 </loadProperties>
224 <properties isVisible="true" isHoverOn="false" isMapLayer="
225   <pdProps minDisplayWidth="0" maxDisplayWidth="10000000
226 </properties>
227 <resourceData xsi:type="satBlendedResourceData" timeMatchMc
228 <metadataMap>
229   <mapping key="creatingEntity">
230 <constraint constraintType="LIKE" constraintValue="GOES%"/>
231   </mapping>
232   <mapping key="pluginName">
233 <constraint constraintType="EQUALS" constraintValue="satellite"/>
234   </mapping>
235   <mapping key="physicalElement">
236 <constraint constraintType="EQUALS" constraintValue="Imager Visible"/>
237   </mapping>
238   <mapping key="sectorID">
239 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
240   </mapping>
241 </metadataMap>
242 <resource>
243   <loadProperties loadWithoutData="false">
244 <resourceType>PLAN_VIEW</resourceType>
245 <perspectiveProperty xsi:type="d2dLoadProperties" loadMode="VALID_TIME_SEQ" tin
246 <capabilities>
247   <capability xsi:type="colorMapCapability">
248     <colorMapParameters colorMapName="Sat/VIS/ZA (Vis Default)">
249       <persisted/>
250     </colorMapParameters>
251   </capability>
252   <capability xsi:type="imagingCapability" contrast="1.0" brightness="1.0" ir
253   <capability xsi:type="colorableCapability" colorAsString="coral"/>
254 </capabilities>
```


17. Click on the **gammaDCS.xml** tab and select the 4 mapping tags by left-clicking and dragging the mouse from the beginning of line 69 to the end of line 80. Then **Ctrl + V** to paste the new mapping tags over these lines. Notice the **channelName="Blue"** on line 66. You have just assigned the Imager Visible product to the Blue channelName.

```

55 <mapping key="physicalElement">
56 <constraint constraintType="IN" constraintValue="Imager 13 micron (IR)"/>
57 </mapping>
58 <mapping key="sectorID">
59 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
60 </mapping>
61 </metadataMap>
62 <binOffset negOffset="150" posOffset="150" virtualOffset="0"/>
63 </resourceData>
64 <channel>GREEN</channel>
65 </channelResource>
66 <channelResource channelName="Blue">
67 <resourceData xsi:type="satResourceData" isRequeryNecessaryOnTir
68 </resourceData>
69 <mapping key="pluginName">
70 <constraint constraintType="EQUALS" constraintValue="satellite"/>
71 </mapping>
72 <mapping key="sectorID">
73 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
74 </mapping>
75 <mapping key="creatingEntity">
76 <constraint constraintType="LIKE" constraintValue="GOES"/>
77 </mapping>
78 <mapping key="physicalElement">
79 <constraint constraintType="EQUALS" constraintValue="Imager 11 micron IR"/>
80 </mapping>
81 </metadataMap>
82 <binOffset negOffset="150" posOffset="150" virtualOffset="0"/>
83 </resourceData>
84 <channel>BLUE</channel>
85 </channelResource>
86 <channelInfo channel="GREEN">
87 <rangeMin>0.0</rangeMin>
88 <rangeMax>254.0</rangeMax>
89 <gamma>1.0</gamma>
90 <unit>IRPixel</unit>
91 </channelInfo>
92 <channelInfo channel="BLUE">
93 <rangeMin>0.0</rangeMin>
94 <rangeMax>254.0</rangeMax>
95 <gamma>1.0</gamma>
96 <unit>IRPixel</unit>

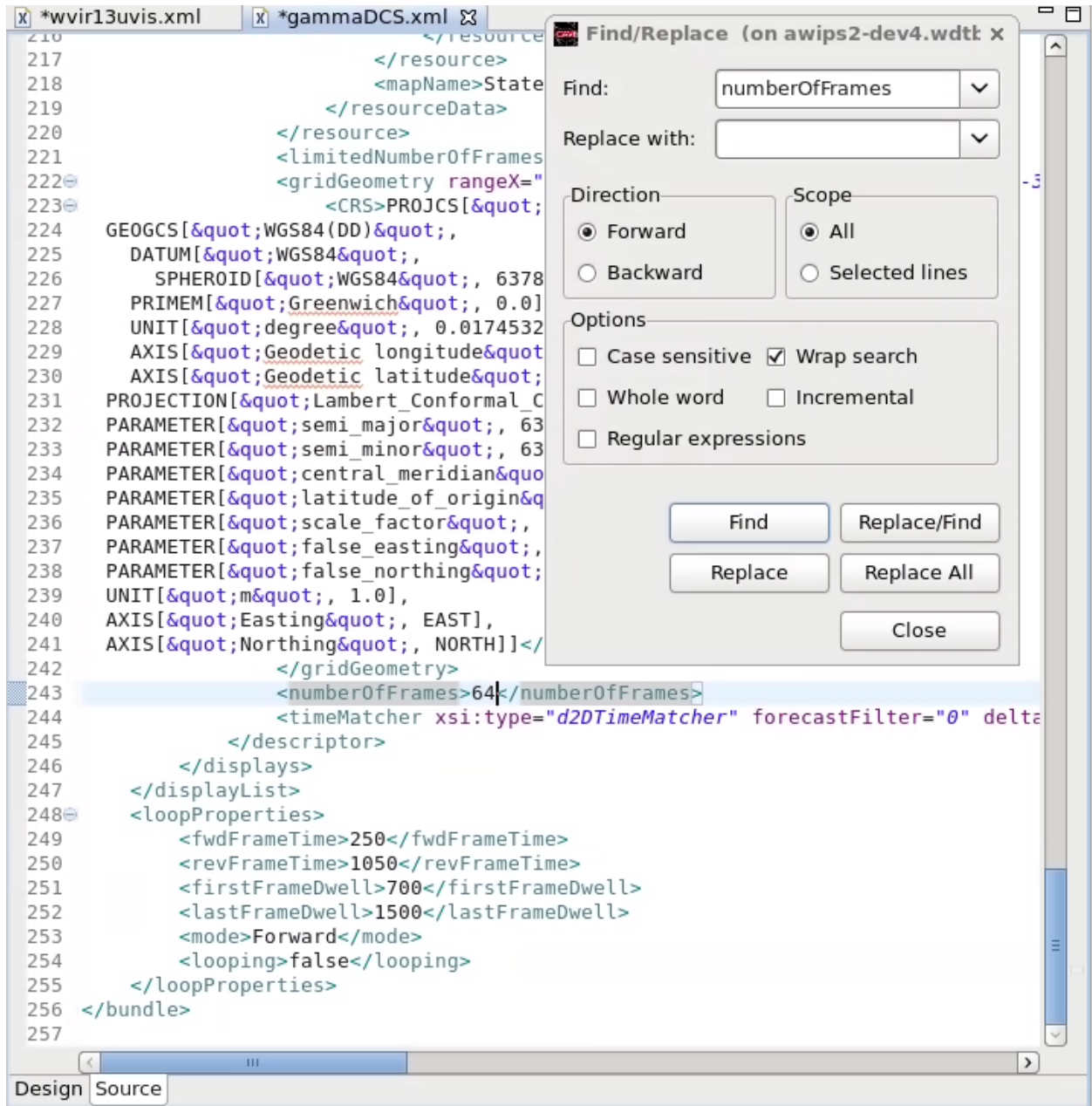
```

```

55 <mapping key="physicalElement">
56 <constraint constraintType="IN" constraintValue="Imager 13 micron (IR)"/>
57 </mapping>
58 <mapping key="sectorID">
59 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
60 </mapping>
61 </metadataMap>
62 <binOffset negOffset="150" posOffset="150" virtualOffset="0"/>
63 </resourceData>
64 <channel>GREEN</channel>
65 </channelResource>
66 <channelResource channelName="Blue">
67 <resourceData xsi:type="satResourceData" isRequeryNecessaryOnTir
68 </resourceData>
69 <mapping key="creatingEntity">
70 <constraint constraintType="LIKE" constraintValue="GOES"/>
71 </mapping>
72 <mapping key="pluginName">
73 <constraint constraintType="EQUALS" constraintValue="satellite"/>
74 </mapping>
75 <mapping key="physicalElement">
76 <constraint constraintType="EQUALS" constraintValue="Imager Visible"/>
77 </mapping>
78 <mapping key="sectorID">
79 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
80 </mapping>
81 </metadataMap>
82 <binOffset negOffset="150" posOffset="150" virtualOffset="0"/>
83 </resourceData>
84 <channel>BLUE</channel>
85 </channelResource>
86 <channelInfo channel="GREEN">
87 <rangeMin>0.0</rangeMin>
88 <rangeMax>254.0</rangeMax>
89 <gamma>1.0</gamma>
90 <unit>IRPixel</unit>
91 </channelInfo>
92 <channelInfo channel="BLUE">
93 <rangeMin>0.0</rangeMin>
94 <rangeMax>254.0</rangeMax>
95 <gamma>1.0</gamma>
96 <unit>IRPixel</unit>

```

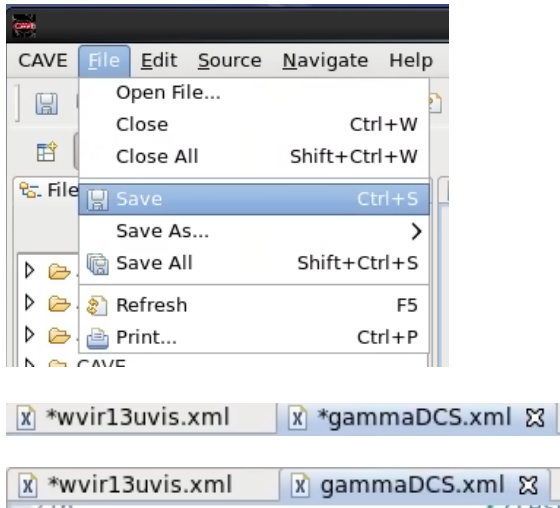
18. In the **Find/Replace** search window, enter **numberOfFrames** in the search tool and **increase** the number of frames to allow a large number of levels and times (e.g. 64 frames).



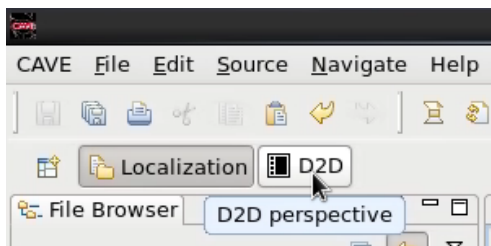
19. Before saving the edits, check the channelNames to make sure that you have correctly pasted in the product mapping tags. In the **Find/Replace** search window, enter **channelResource** in the search tool and click the **Find** button. You should have unique physicalElement keys for each channelResource. In this example I have **channelName=Red** is **satDivWVIR**, **channelName=Green** is **Imager 13 micron (IR)**, and **channelName=Blue** is **Imager Visible**.

```
22         <pdProps minDisplayWidth="0" maxDisplayWidth="10000000"/>
23     </properties>
24     <resourceData xsi:type="trueColorResourceGroupData">
25         <groupName>Test</groupName>
26         <channelResource channelName="Red">
27             <resourceData xsi:type="SatResourceData" isRequeryNecessar
28 <metadataMap>
29             <mapping key="creatingEntity">
30 <constraint constraintType="LIKE" constraintValue="GOES%"/>
31             </mapping>
32             <mapping key="pluginName">
33 <constraint constraintType="EQUALS" constraintValue="satellite"/>
34             </mapping>
35             <mapping key="physicalElement">
36 <constraint constraintType="IN" constraintValue="satDivWVIR"/>
37             </mapping>
38             <mapping key="sectorID">
39 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
40             </mapping>
41 </metadataMap>
42 <binOffset negOffset="150" posOffset="150" virtualOffset="0"/>
43 </resourceData>
44 <channel>RED</channel>
45 </channelResource>
46 </channelResource>
47 <channelResource channelName="Green">
48     <resourceData xsi:type="SatResourceData" isRequeryNecessar
49 <metadataMap>
50     <mapping key="creatingEntity">
51     </mapping>
52     <mapping key="pluginName">
53 <constraint constraintType="EQUALS" constraintValue="satellite"/>
54     </mapping>
55     <mapping key="physicalElement">
56 <constraint constraintType="IN" constraintValue="Imager 13 micron (IR)"/>
57     </mapping>
58     <mapping key="sectorID">
59 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
60     </mapping>
61 </metadataMap>
62 <binOffset negOffset="150" posOffset="150" virtualOffset="0"/>
63 </resourceData>
64 <channel>GREEN</channel>
65 </channelResource>
66 </channelResource>
67 <channelResource channelName="Blue">
68     <resourceData xsi:type="SatResourceData" isRequeryNecessar
69 <metadataMap>
70     <mapping key="creatingEntity">
71     </mapping>
72     <mapping key="pluginName">
73 <constraint constraintType="EQUALS" constraintValue="satellite"/>
74     </mapping>
75     <mapping key="physicalElement">
76 <constraint constraintType="EQUALS" constraintValue="Imager Visible"/>
77     </mapping>
78     <mapping key="sectorID">
79 <constraint constraintType="IN" constraintValue="West CONUS,East CONUS"/>
80     </mapping>
81 </metadataMap>
82 <binOffset negOffset="150" posOffset="150" virtualOffset="0"/>
83 </resourceData>
84 <channel>BLUE</channel>
85 </channelResource>
```

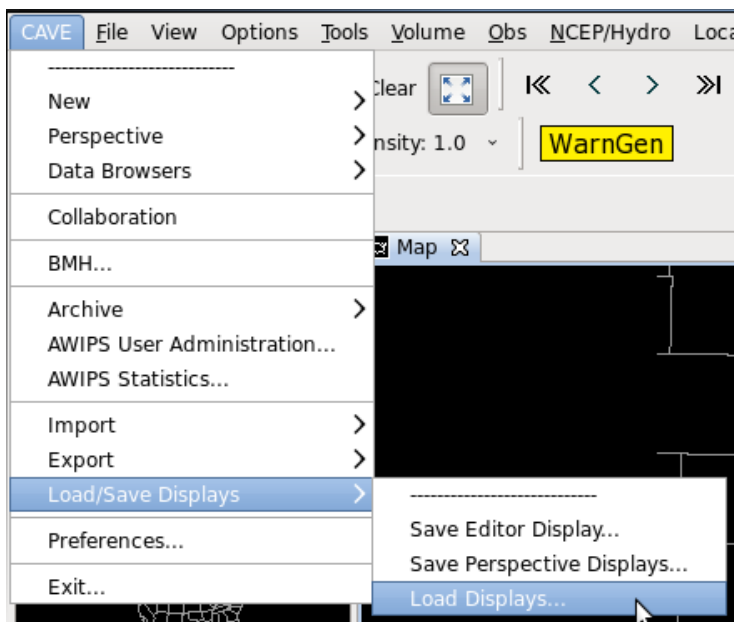
20. Save the file by using **Ctrl+S** or select Save under the File menu in the localization perspective.
You should notice the * next to your gammDCS.xml tab should disappear after saving.



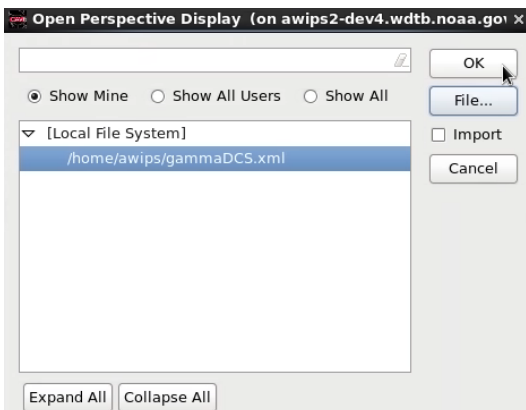
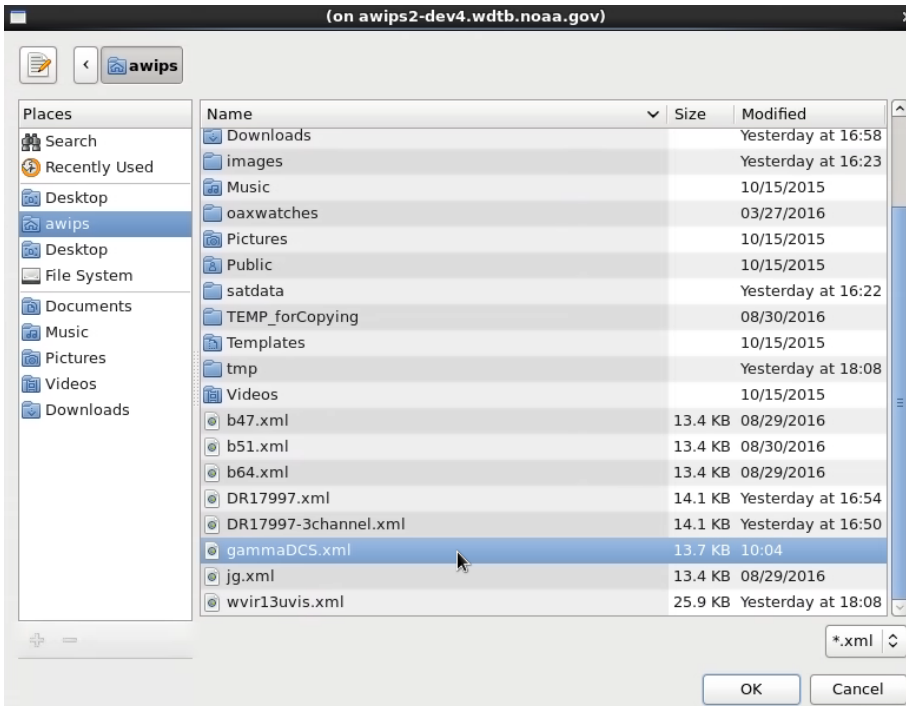
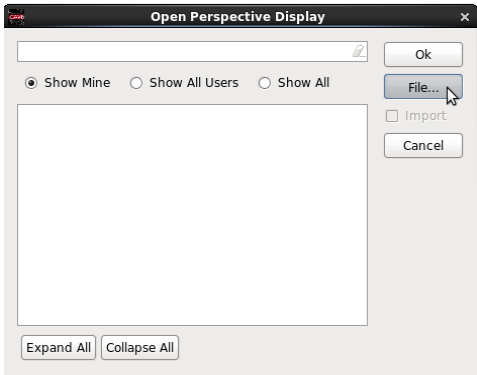
21. Click on the **D2D** perspective button to swap from the localization perspective to the D2D perspective.



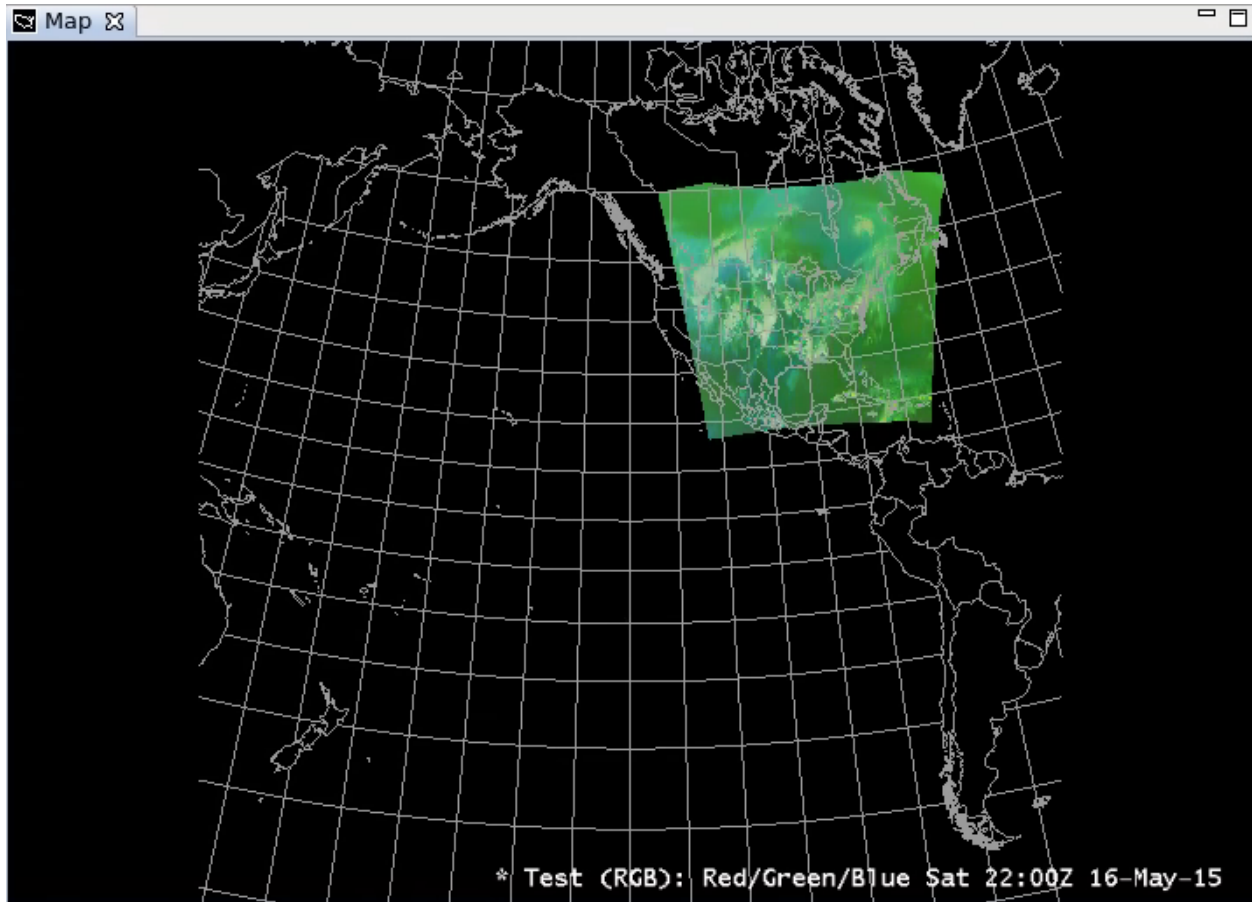
22. Under the **CAVE** menu and **Load/Save Displays**, click on the **Load Displays** menu.



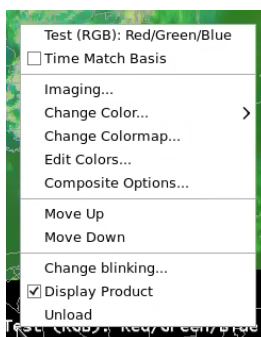
23. In the **Open Perspective Display**, click the **File...** button. In the open select tool, select the name of the xml you saved in the localization perspective (e.g. gammaDCS.xml) and click **OK**. Then click **OK** in the Open Perspective Display.

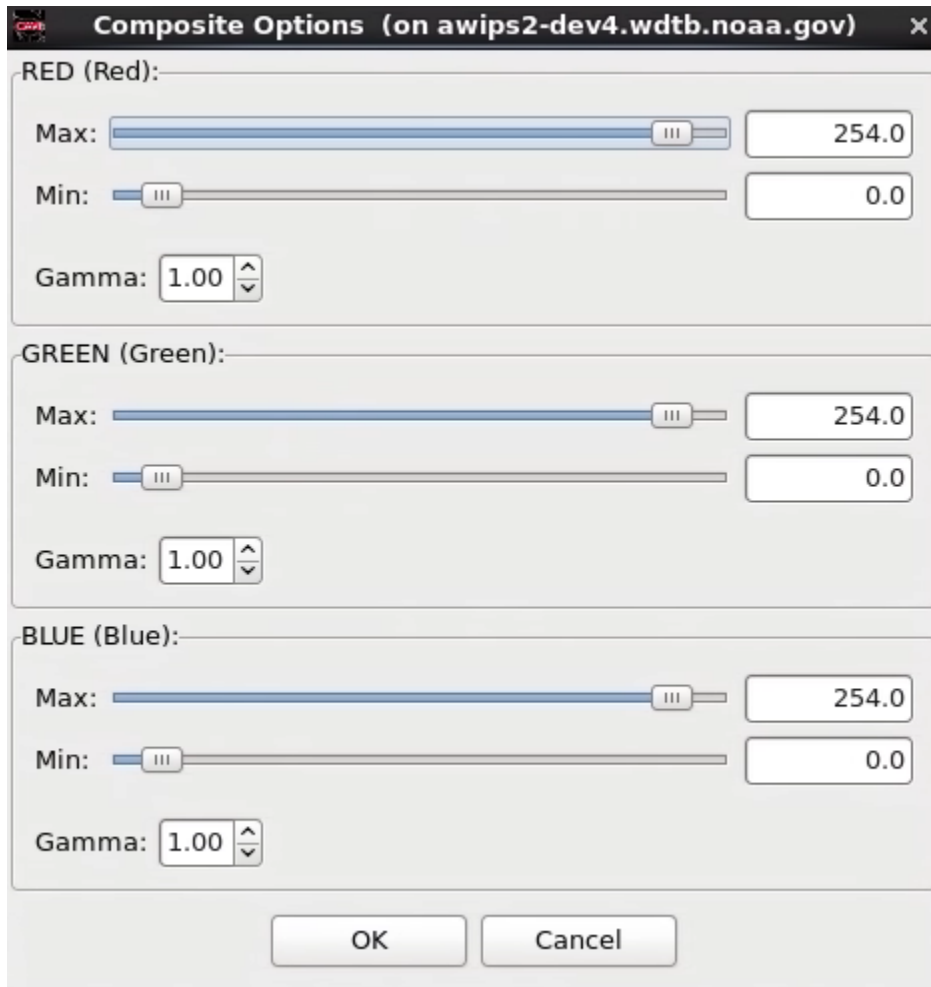


24. Navigate through the combined satellite product frames using the **left** and **right arrow keys**. You may need to click on the text in the legend to toggle the image on.
- Note there is no color table legend in this combined product.
 - Note that when a channel is unavailable for certain time periods, like visible satellite after dark, you may receive errors in Alert Viz. Once you navigate to time where there is data for all 3 products forming the combination, the errors go away.



25. **Right click** on the text legend and select Composite Options to adjust the gamma settings.

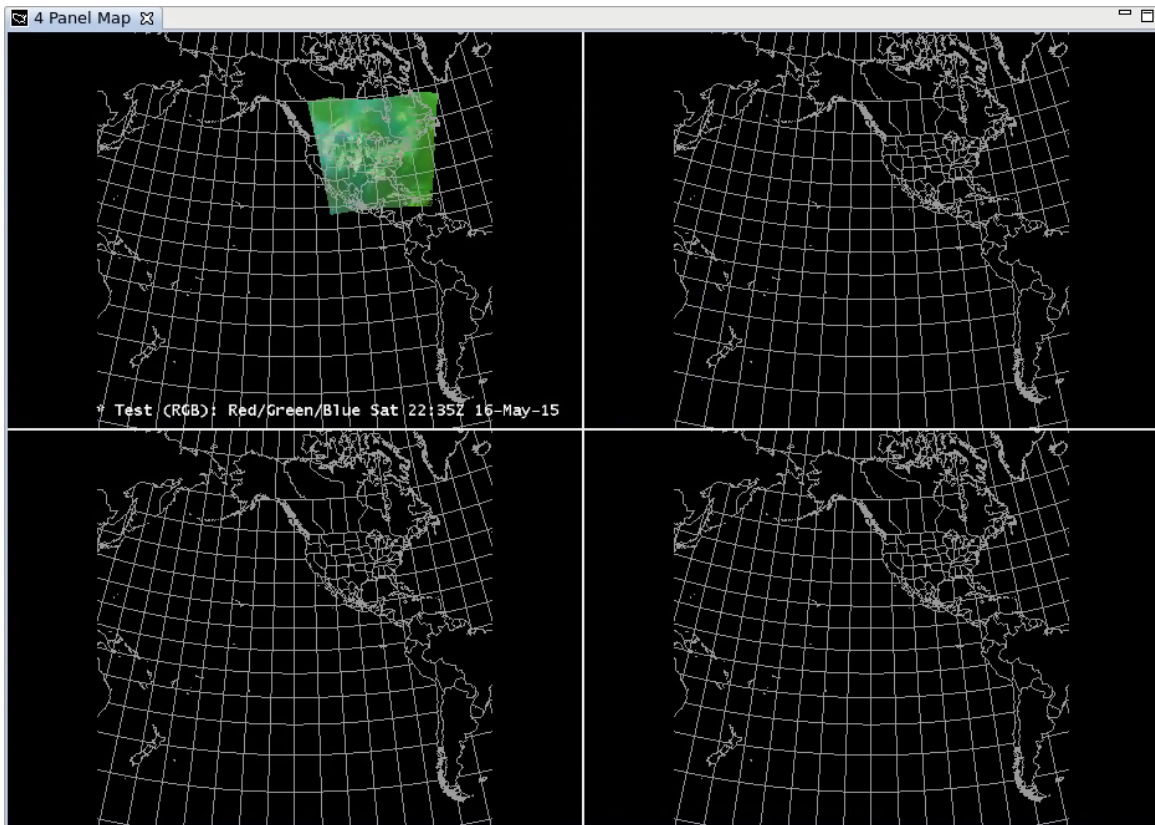
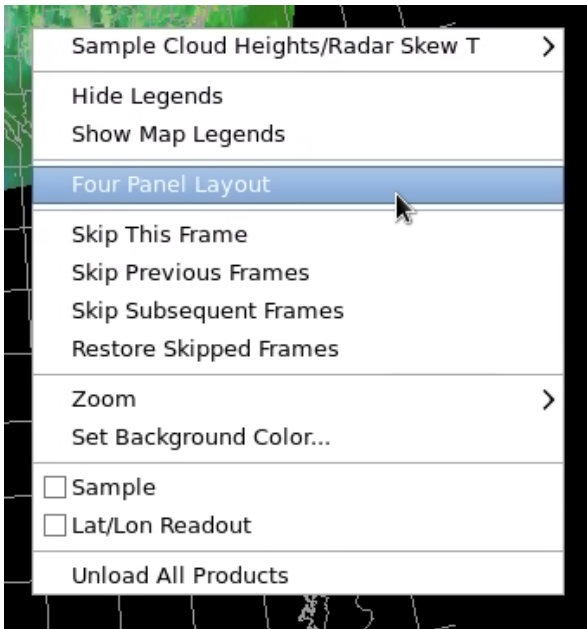




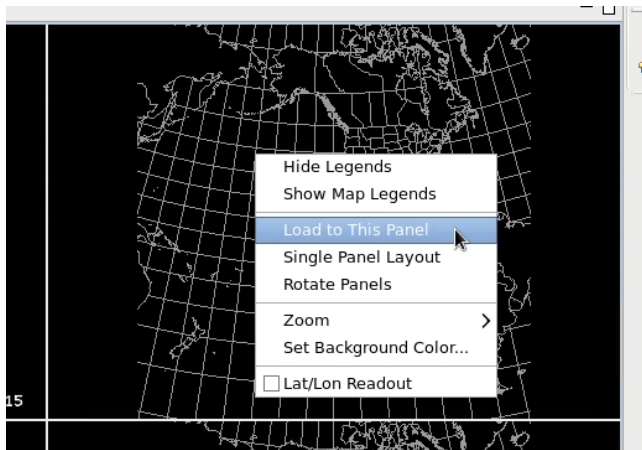
26. By changing the gamma settings of the Red, Green, and Blue channelNames (recall tag names in bundle), you are bringing out contrast in each product feeding the composite. Adjusting gamma less than 1 will bring out more contrast in that product's contribution while raising gamma above 1 will reduce contrast from that product's contribution. **Try adjusting the gamma settings and see how things change.** In the next step we will step through this and compare to the original products.

- a. **channelName=Red** is **satDivWVIR**
- b. **channelName=Green** is **Imager 13 micron (IR)**
- c. **channelName=Blue** is **Imager Visible**

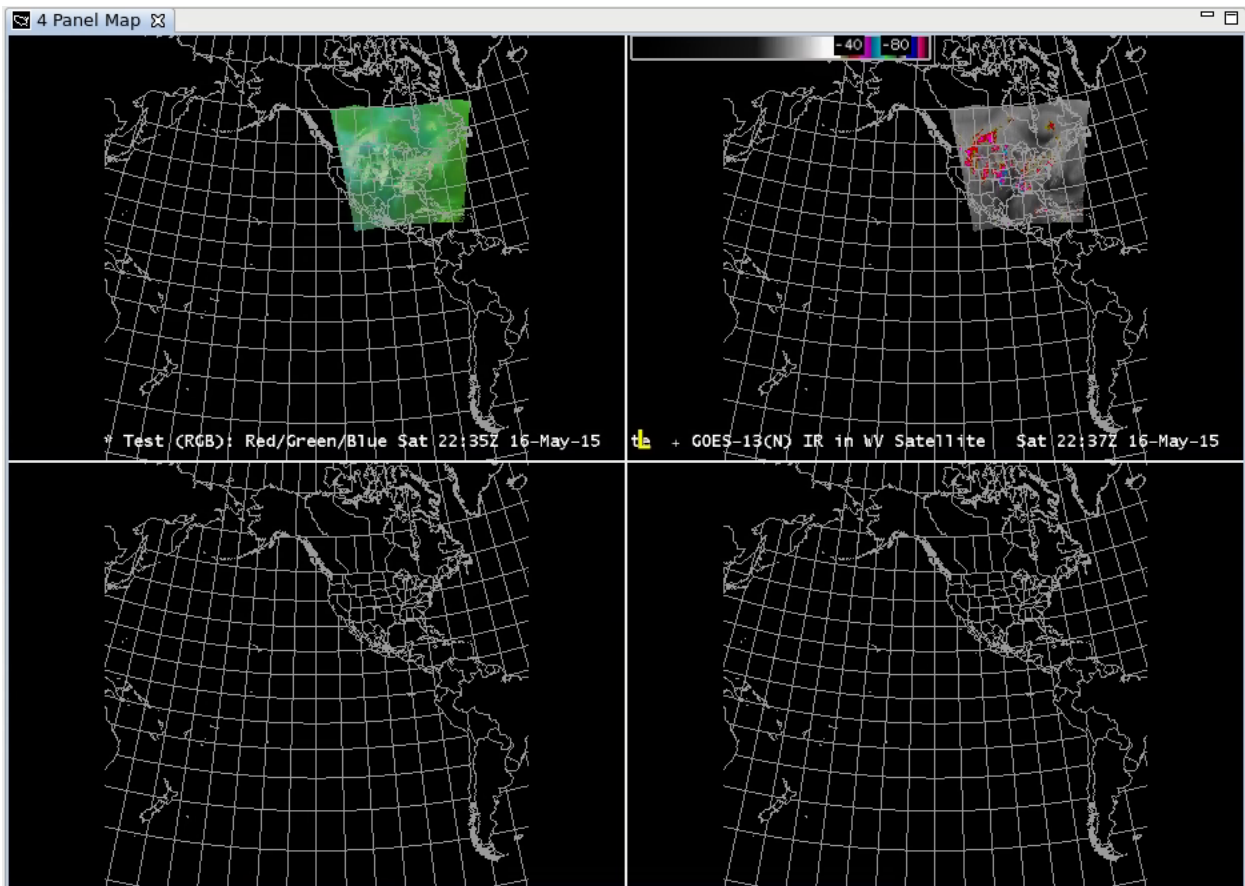
27. Set **gamma** to **1.0** for all three channels (see figure in step 25), **right click** in the main editor, and **select Four Panel Layout**:



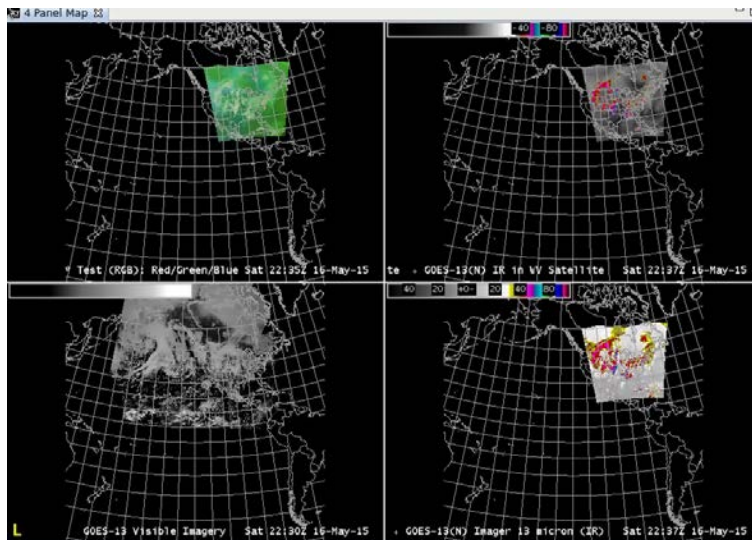
28. Right click in the upper-right panel and select Load to This Panel.



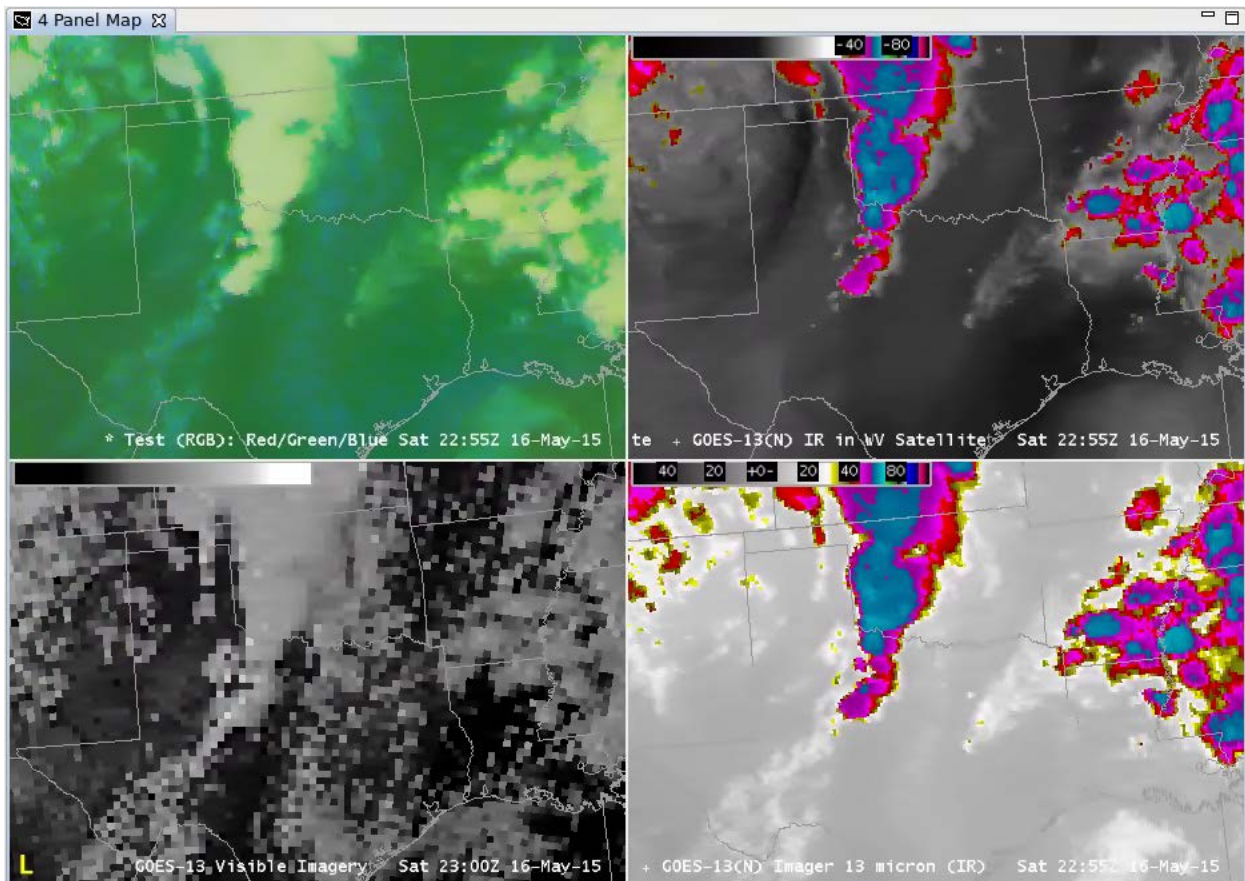
29. Load the product you assigned the Red channel (e.g. WV/IR).



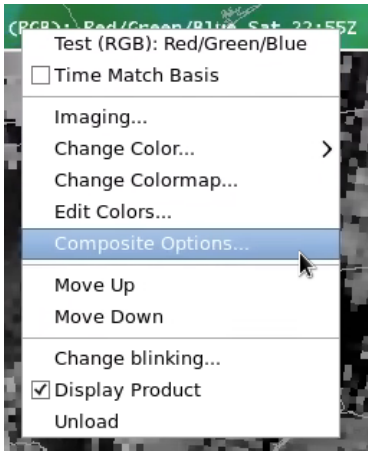
30. **Right click on the lower-right panel** and select **Load to This Panel**. Then **load** the product you assigned the Green channel (e.g. **13u**). **Right click on the lower-left panel** and select **Load to This Panel**. Then **load** the product you assigned the Blue channel (e.g. **Visible**).



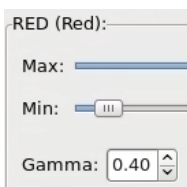
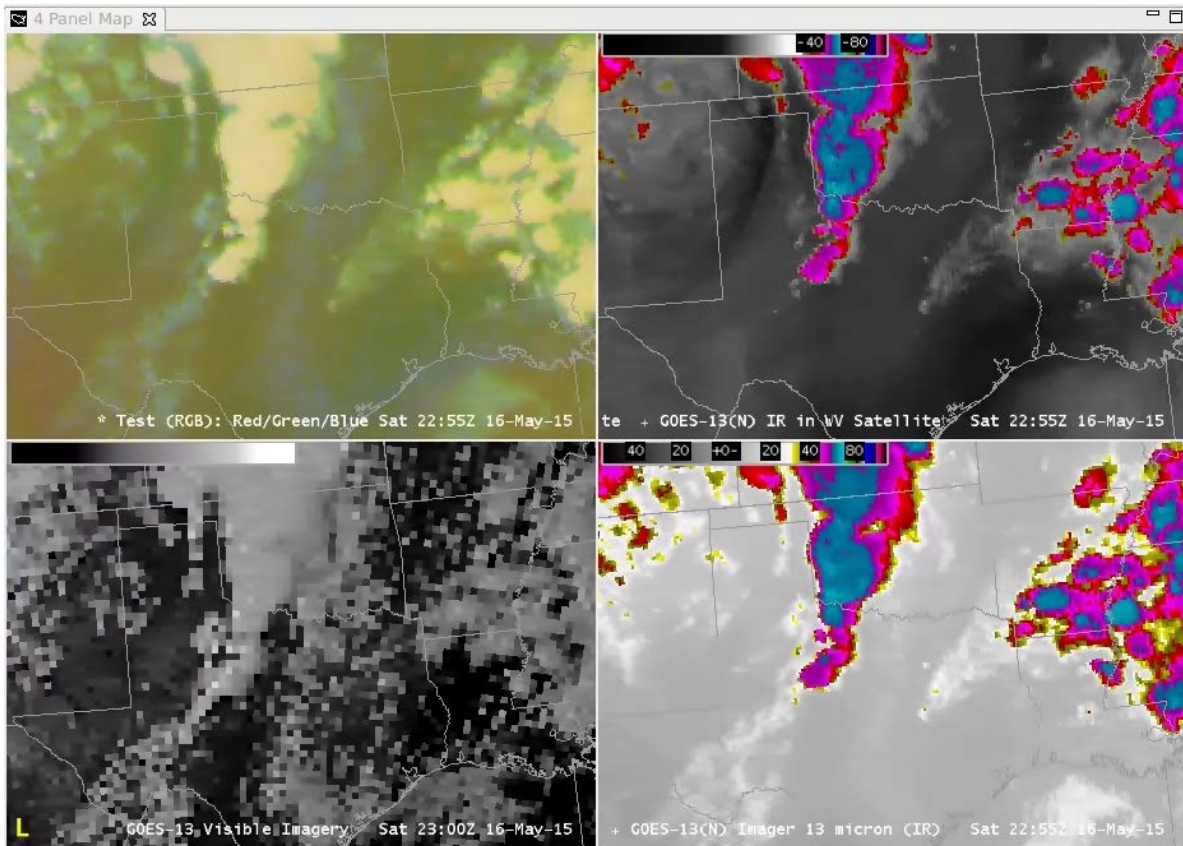
31. Zoom in on some interesting features to evaluate how changing the gamma settings relates to the original data.



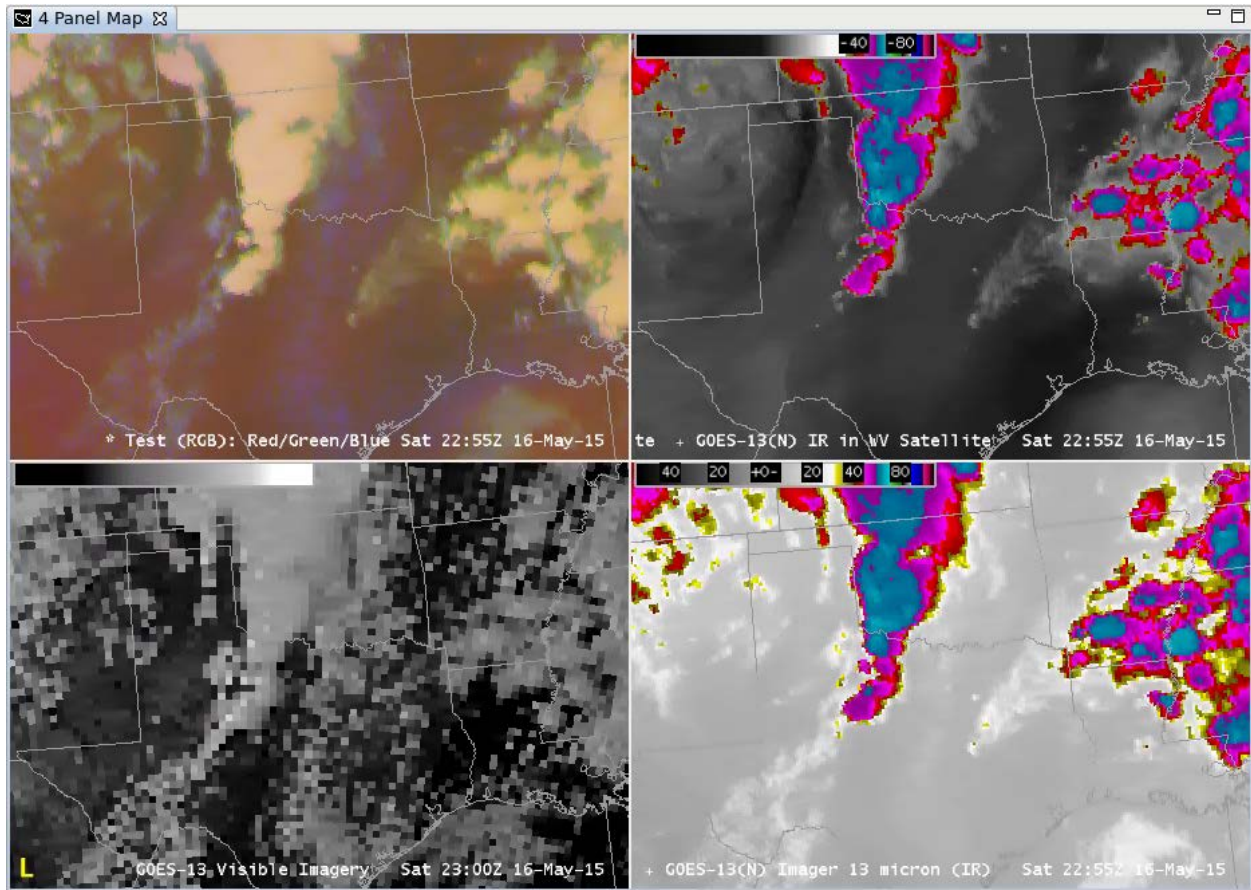
32. Right click on the Test product legend in the upper left panel and select Composite Options.



33. Reduce gamma for the WV/IR "Red channel" to bring out any dry air intrusions (see the dark band in the TX panhandle in image below):



34. **Increase gamma** for the 13u “Green” channel” to decrease contrast from this component (see the change in east TX in the upper-left image below):



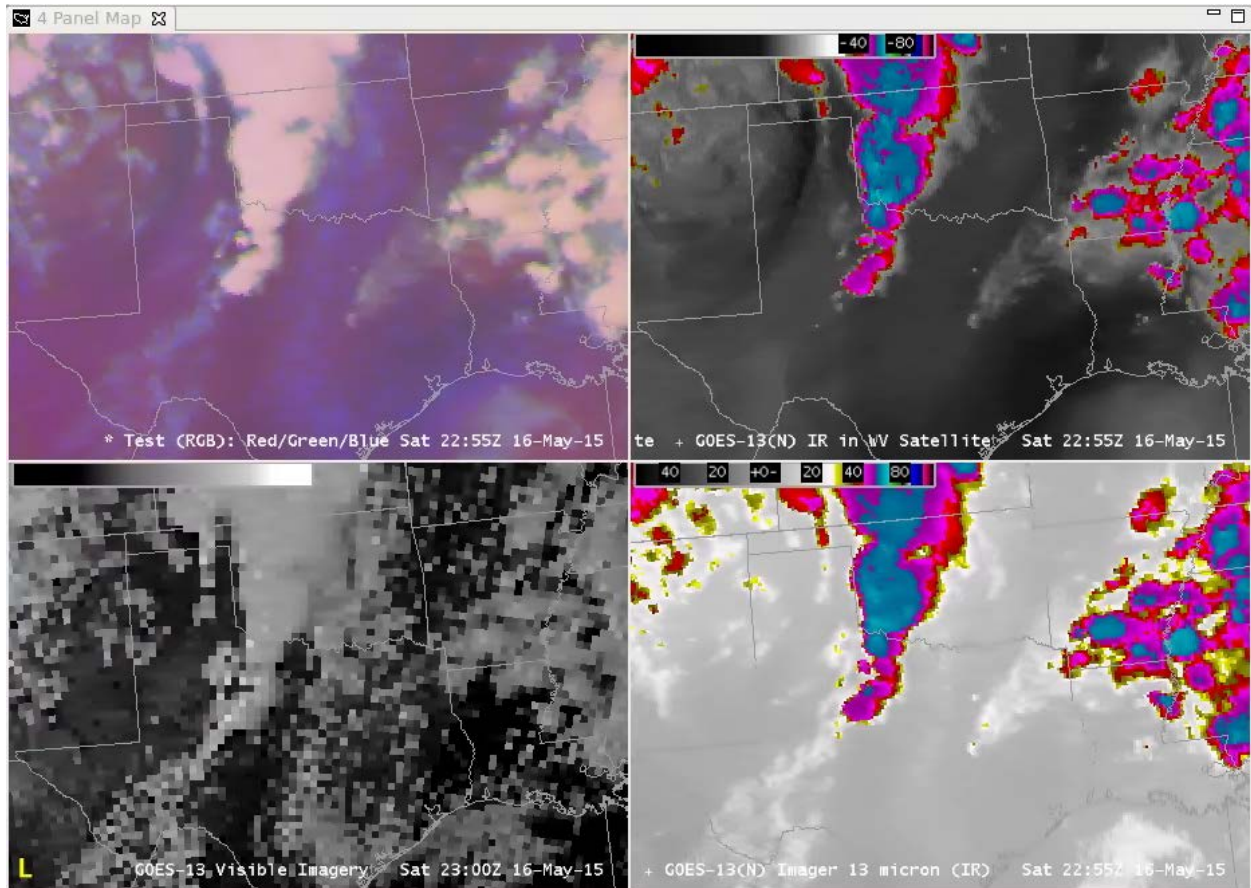
GREEN (Green):

Max:

Min:

Gamma:

35. **Reduce gamma** for the Visible “**Blue** channel” to bring out low-clouds (see the cumulus in south TX in image below):



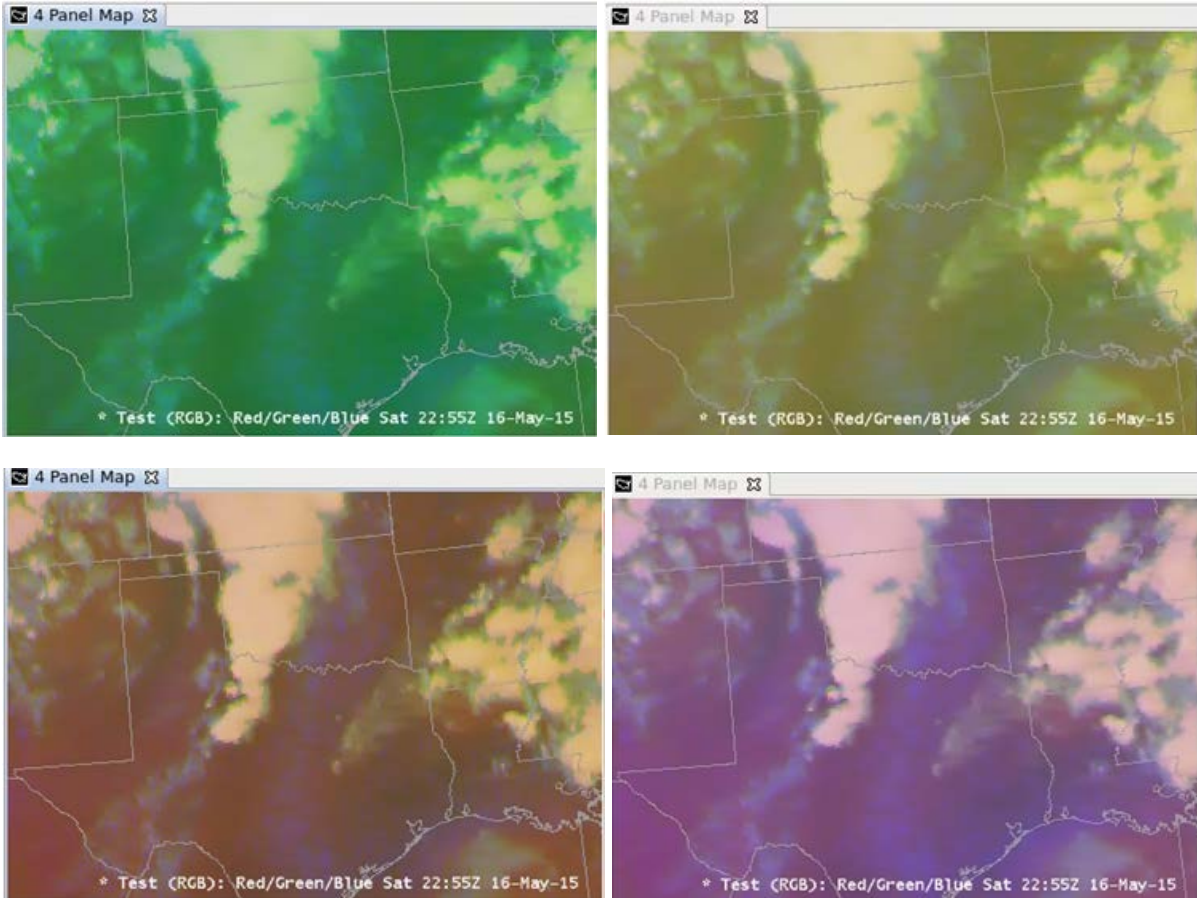
BLUE (Blue):

Max:

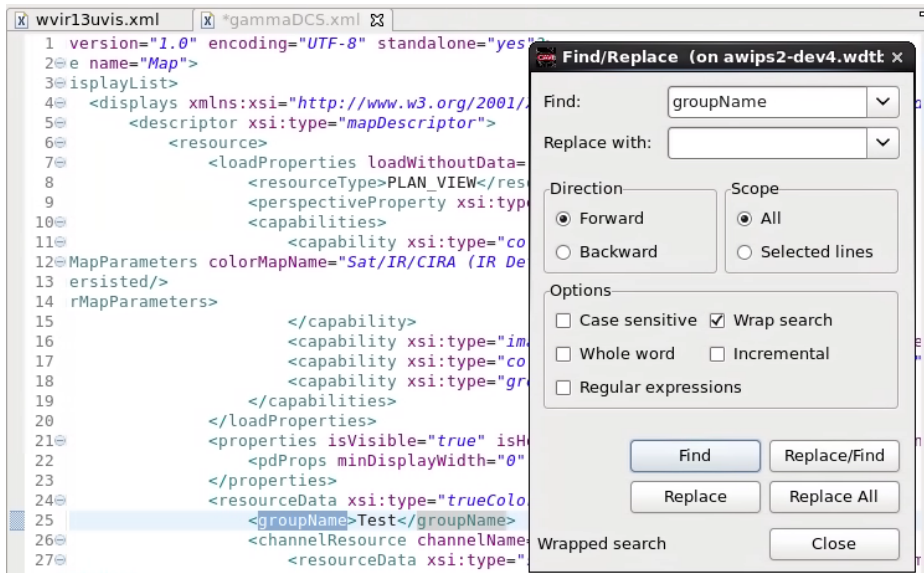
Min:

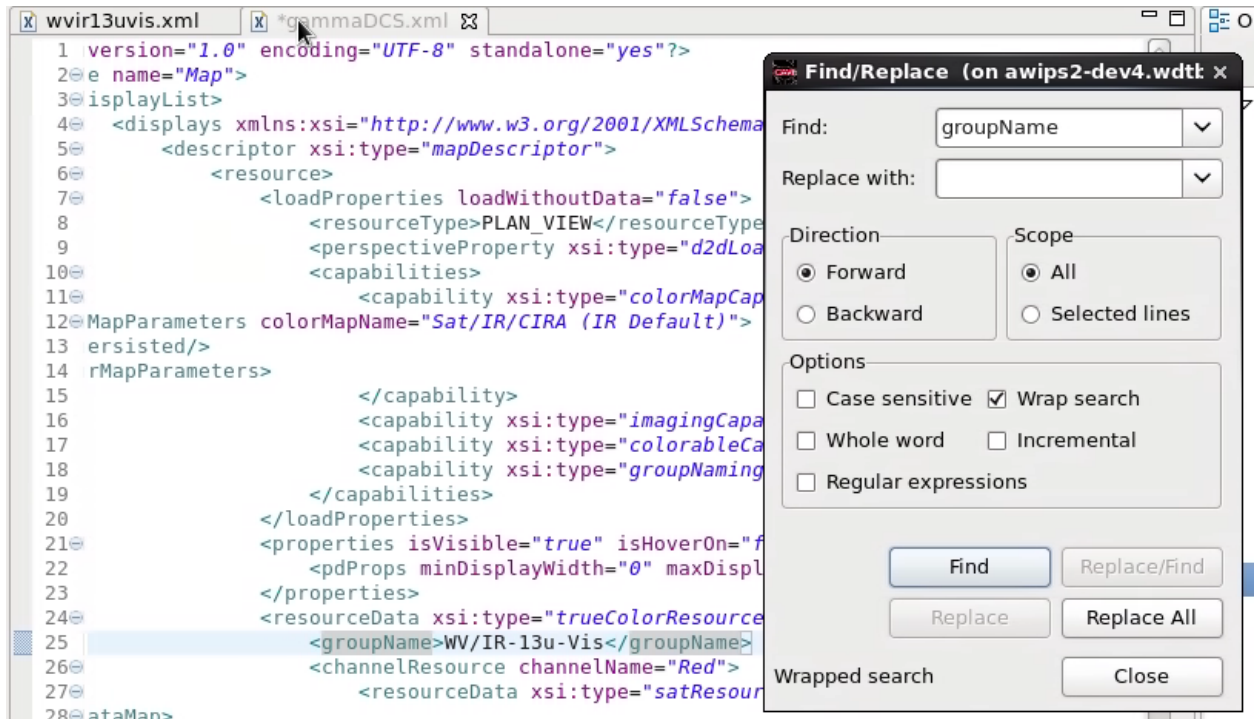
Gamma:

36. Here are the modifications side by side RGB 1,1,1 (upper left), 0.4, 1, 1 (upper right), 0.4,1.6,1 (lower left), and 0.4, 1.6, 0.5 (lower right):

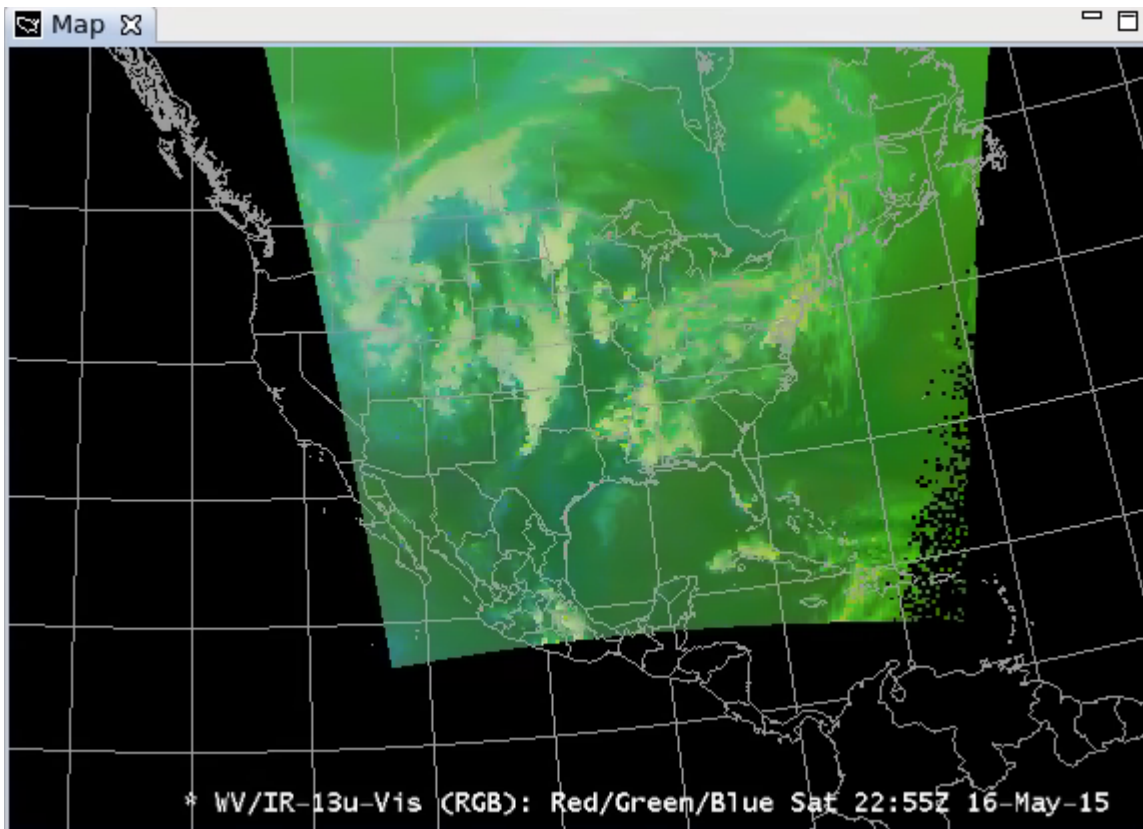


37. In the **gammaDCS.xml** file in the localization Perspective use Find/Replace (**Ctrl + f**) to find the **groupName** tag. Replace “Test” with what you want to label the product (e.g. **WV/IR-13u-Vis**).



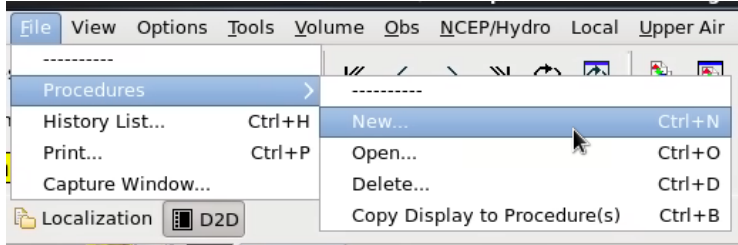


38. Repeat steps 20-23 to **save** the file, change to the **D2D Perspective**, and **Load** the **gammaDCS.xml** bundle. Note the change in label from Test to **WV/IR-13u-Vis**.

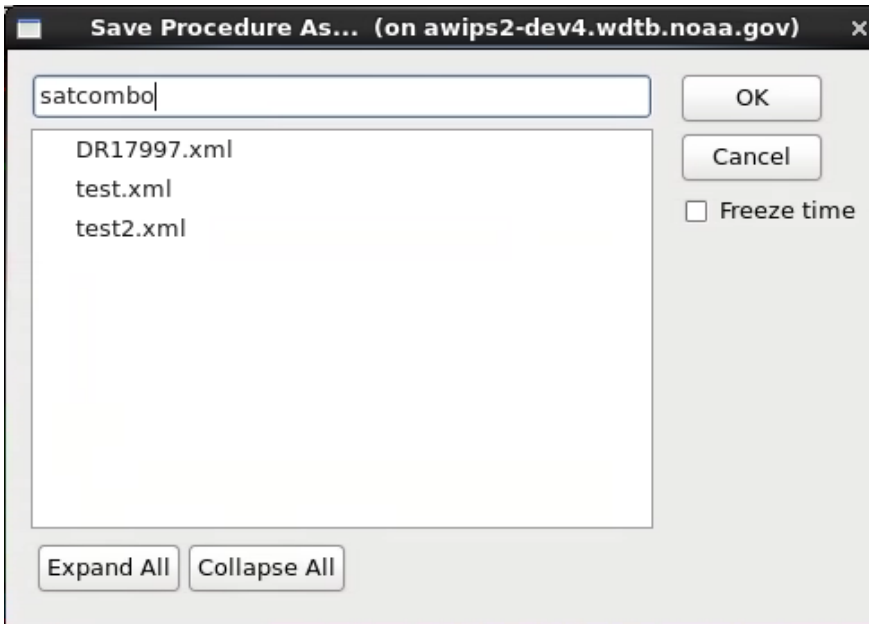
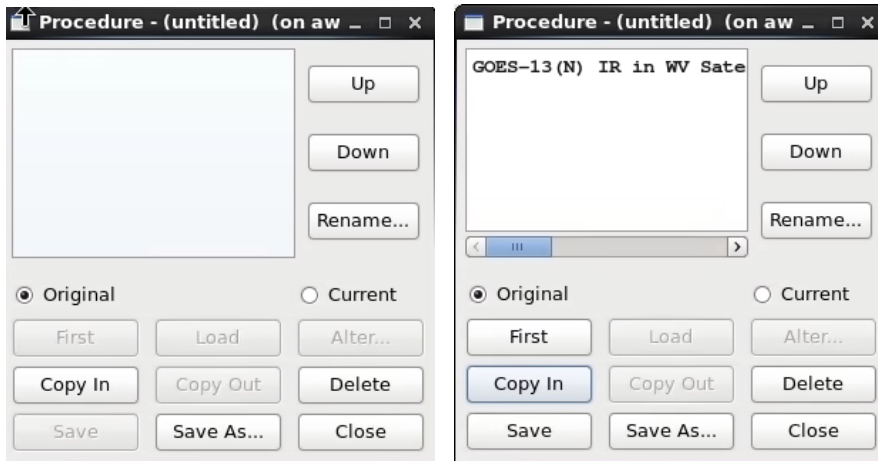


39. **Adjust** the **gamma** settings (right click on text legend), and **open** a procedure (e.g. File-> Procedures-> New) to save the bundle.

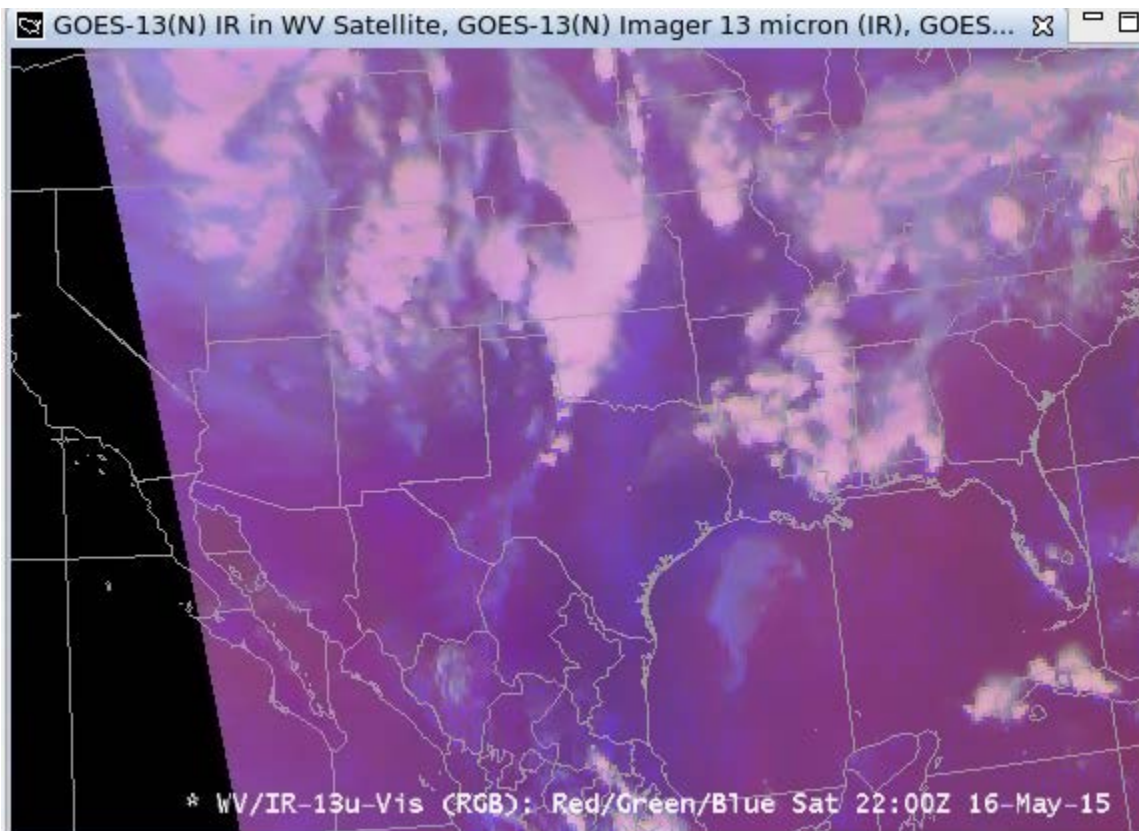
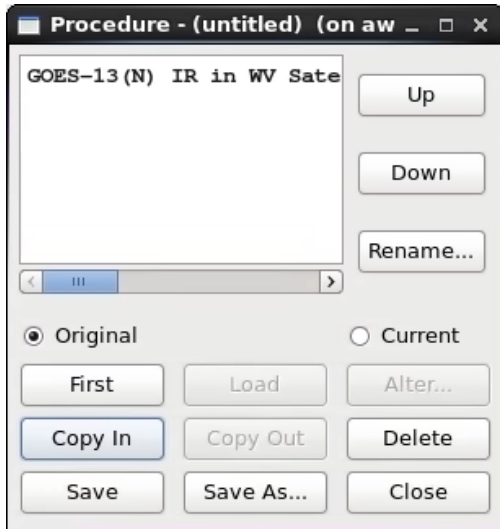
- a. **Note** you may want to change the scale menu from Pacific to another scale in CAVE before saving.



40. **Click** the **Copy In** button and then the **Save** button. In the popup window provide a name (e.g. satcombo).



41. Clear a pane and load the bundle from the procedure window by **double clicking** on the **bundle name**:



42. These instructions were designed to illustrate the basic approach of how to build your own satellite combination product and how adjusting the gamma settings changes the contrast in the input product contributions. There is an art to combining satellite channels in meaningful ways, and future training on GOES-R will explore how to leverage the capabilities for improved displays.