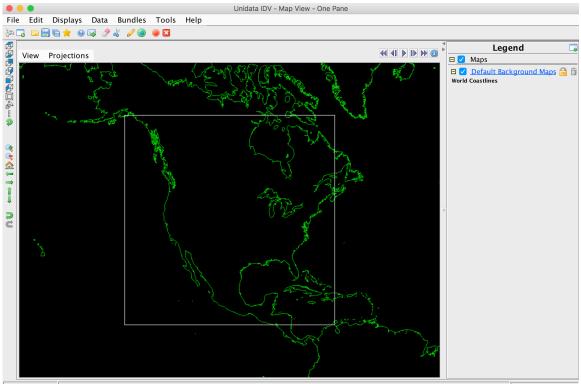
IDV Instructions for WRFV4

Updated: January 2023

Preliminaries

- Ensure that you've downloaded the required sample wrfout files to your laptop
 - o mkdir wrfouts_original
 - o cd wrfouts_original
 - scp username@optimum.eos.ubc.ca:/data/rstull/shared/ATSC50 7/WRF/wrfout_d01_2018-12-20* .
 - All on one line
 - o scp
 - username@optimum.eos.ubc.ca:/data/rstull/shared/ATSC50
 7/WRF/wrfout_d01_2018-12-21* .
 - All on one line
 - o Total: 2.8 GB
- Download IDV and install onto your computer
 - o <u>https://www.unidata.ucar.edu/downloads/idv/current/index.jsp</u>

IDV Basics



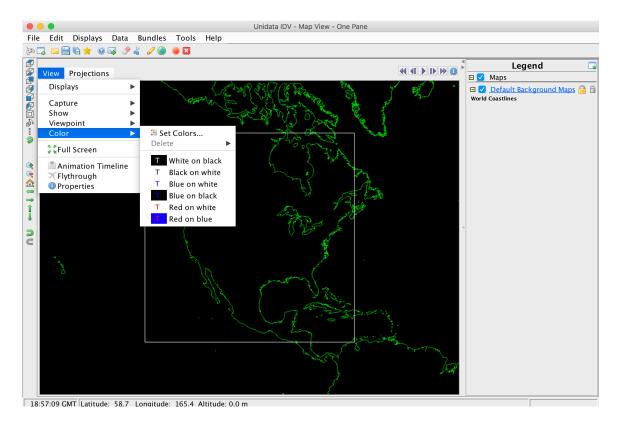
• When you first open up IDV, you should see two windows pop up:

18:54:19 GMT Latitude: 57.9 Longitude: -30.4 Altitude: 0.0 m

• This is the Map View, and will show the bulk of the plots you make

		Dashboard	
	Data Bundles Tools Help		
in 🔁 🖬 🖬 📢 🔞 🕻			
	🖄 Quicklinks 🔗 Data	Choosers 📋 Field Selector	💻 Displays
□⊕View 1	File Edit View Help		
Default Background Ma. 🕨		Maps Lat/Lon	
	Maps		1
	World Country Outlines	1.0 🗘 🌣	🗌 Fast rendering 📮 🕞
	✓ World Coastlines	1.0 🗘 🗘	🗌 Fast rendering 🗢 🔀 🔒
	World Political Boundaries	1.0 🗘 🛄 🗘	🗌 Fast rendering 🗢 🔀 🕞
	🗌 North & Central America	1.0 🗘 🌣	🗌 Fast rendering 🌩 💹 🔒
	Hi-Res US	1.0 🗘 🌣	🗌 Fast rendering 🗢 🔤 🐻
	U.S. County Outlines	1.0 🗘 🌣	🗹 Fast rendering 🗢 💹 🗟
	Position: OBottom	Middle	-0.99 Top
	¥ 🗔 🖑 🕕 🗒		
18:54:26 GMT			

• This is the Dashboard. This window provides most of the settings for the plots you'd make in the Map View



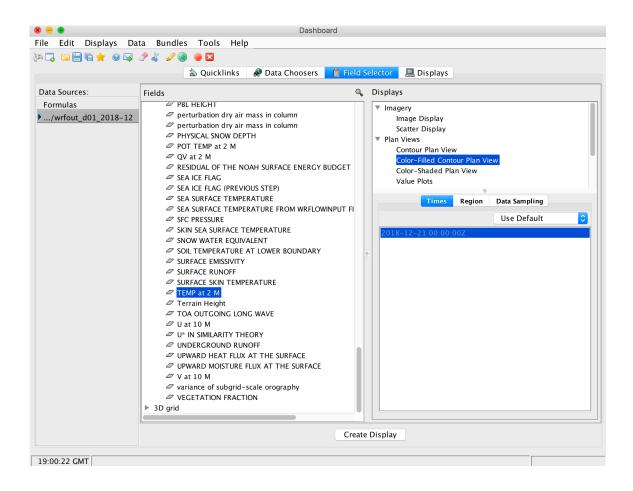
- The black background isn't that great to work with, so let's give the Map View • a white ocean background o "View" > "Color" > "Blue on white"

- 🖬 🗎 🖨 🌟 🙆 🖾	A a a a a a a a a a a a a a a a a a a a		
	🗟 Quicklinks 🛛 🔗 Data Choosers	📋 Field Selector 🛛 💻 Displays	
 General 	Data Source Type: I'm Feeling Lucky		
Files	Data Source Type.		
URLs		rfouts_original	
Catalogs	W		
Directory	Name	 Date Modified 	
🗸 Sat & Radar	wrfout d01 2018-12-20 00/00/00	Tuesday, December 17, 2019 4:51 PM	
Images	wrfout_d01_2018-12-20_01/00/00	Tuesday, December 17, 2019 4:51 PM	
GLM	wrfout d01 2018-12-20 02/00/00	Tuesday, December 17, 2019 4:51 PM	
Radar	wrfout d01 2018-12-20 03/00/00	Tuesday, December 17, 2019 4:51 PM	
 Observations 	wrfout d01 2018-12-20 04/00/00	Tuesday, December 17, 2019 4:51 PM	
Point	wrfout_d01_2018-12-20_05/00/00	Tuesday, December 17, 2019 4:51 PM	
RAOB	wrfout_d01_2018-12-20_06/00/00	Tuesday, December 17, 2019 4:52 PM	
Fronts	wrfout_d01_2018-12-20_07/00/00	Tuesday, December 17, 2019 4:52 PM	
	wrfout_d01_2018-12-20_08/00/00	Tuesday, December 17, 2019 4:52 PM	
	wrfout_d01_2018-12-20_09/00/00	Tuesday, December 17, 2019 4:52 PM	
	wrfout_d01_2018-12-20_10/00/00	Tuesday, December 17, 2019 4:52 PM	
	wrfout_d01_2018-12-20_11/00/00	Tuesday, December 17, 2019 4:52 PM	
	wrfout_d01_2018-12-20_12/00/00	Tuesday, December 17, 2019 4:52 PM	
	wrfout_d01_2018-12-20_13/00/00	Tuesday, December 17, 2019 4:52 PM	
	wrfout_d01_2018-12-20_14/00/00	Tuesday, December 17, 2019 4:52 PM	
	wrfout_d01_2018-12-20_15/00/00	Tuesday, December 17, 2019 4:52 PM	
	wrfout_d01_2018-12-20_16/00/00	Tuesday, December 17, 2019 4:52 PM	
	wrfout_d01_2018-12-20_17/00/00	Tuesday, December 17, 2019 4:53 PM	
	wrfout_d01_2018-12-20_18/00/00	Tuesday, December 17, 2019 4:53 PM	
	wrfout_d01_2018-12-20_19/00/00	Tuesday, December 17, 2019 4:53 PM	
	wrfout_d01_2018-12-20_20/00/00	Tuesday, December 17, 2019 4:53 PM	
	File Format:	All Files	
		Please select a file	
		Add Source 🔁 🔞	

- Now on the dash board, click "Data Choosers"
- Navigate to where your wrfout files are stored, and click on the file wrfout_d01_2018-12-21_00:00:00
- Click "Add Source", and hit OK when prompted

	🥜 🐇 🖉 🍥 🥌 🖾 🖄 Quicklinks 🛛 🦃 Data Choosers 📄 Field Selector 🛛 💻 Displays
Data Sources:	Fields Q Displays
Formulas	▼ 2D grid
/wrfout_d01_2018-12	 Derived <i>f</i>⁽⁰⁾ Absolute Vorticity (from U10 & V10) <i>f</i>⁽⁰⁾ Flow Vectors (from U10 & V10) <i>f</i>⁽⁰⁾ Horizontal Advection (from U10 & V10) <i>f</i>⁽⁰⁾ Horizontal Divergence (from U10 & V10) <i>f</i>⁽⁰⁾ Horizontal Flux Divergence (from U10 & V10) <i>f</i>⁽⁰⁾ Relative Vorticity (from U10 & V10) <i>f</i>⁽¹⁾ True Wind vectors (from U10 & V10) <i>f</i>⁽²⁾ True Wind vectors (from U10 & V10) <i>f</i>⁽²⁾ - ACCUMULATED DOWNWELLING CLEAR SKY LONGWAN ACCUMULATED DOWNWELLING CLEAR SKY SHORTWAP ACCUMULATED DOWNWELLING CLEAR SKY SHORTWAP ACCUMULATED DOWNWELLING CLEAR SKY SHORTWAP ACCUMULATED DOWNWELLING LONGWAVE FLUX AT ACCUMULATED DOWNWELLING SHORTWAVE FLUX AT ACCUMULATED SHALLOW CUMULUS PRECIPITATION ACCUMULATED TOTAL GRID SCALE GRAUPEL ACCUMULATED TOTAL GRID SCALE FRECIPITATION ACCUMULATED TOTAL GRID SCALE SNOW AND ICE ACCUMULATED TOTAL GRID SCALE SNOW AND ICE ACCUMULATED UPWARD HEAT FLUX AT THE SURFAC ACCUMULATED UPWARD LATENT HEAT FLUX AT THE

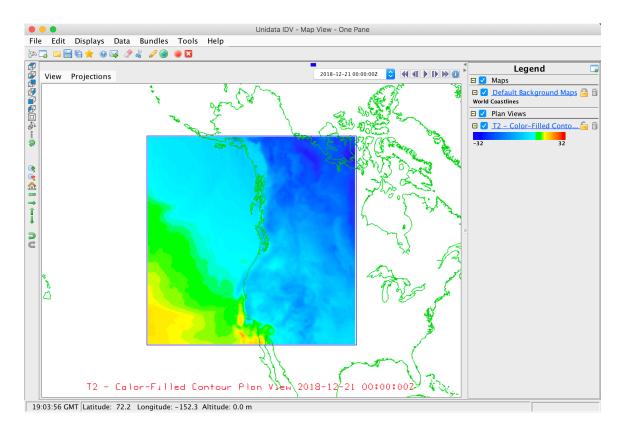
- You should then be taken to the "Field Selector" tab. You will see 2D grid and 3D grid as options
- Click the arrow next to 2D grid. You will see a whole bunch of raw 2D fields available, as well another arrow for Derived fields



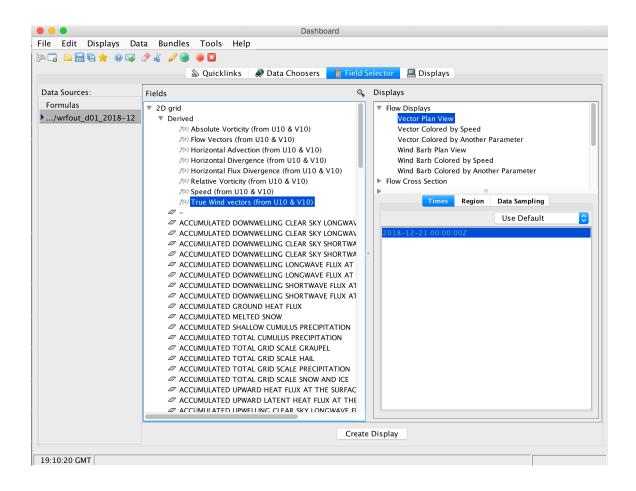
- Let's start simple with 2-m temperature. Click "TEMP at 2 M", then under "Plan Views" choose "Color-Filled Contour Plan View"
- At the bottom, click "Create Display"

le Edit Displays	Data Bundles T	ools Help	Dashboard			
	🖂 🧷 🐇 🥒 🍥 🥌	×				
	2	Quicklinks 🛛 🔗 D	ata Choosers 📋 Field	Selector 📃 Display		
(h) (i	File Edit View	Help				
View 1 Default Background Maps			and the set of the			
T2 – Color-Filled Conto.		Change Inte	erval: 1 celsius			
	Color Table:	Temperature	-32	32 celsius		
	Vertical Position:	0		Con	tour Properties Editor	
	vertical rosition.	Bottom	Middle	Contour Interval:	1	celsius
	Smoothing:	None	Sector: 6	Dana Cantaur	0	celsius
				Base Contour:	0	ceisius
	¥ 🗔 🖑 🕕 🗒			Minimum Value:	-32	celsius
				Maximum Value:	32	celsius
				Line Width:	1	\$
					-	
				Dash:		\$
				Labels:		
				Font:	Default	\$
				Size:	12	\$
				A.1:	Along Contours	\$
				Align:	Along Contours	~
				Frequency:		1 1
					Lo Med	Hi
				Label Every Nth Line:		2 🕄
				Apply	OK Cancel	
					eancer	_

- You should see a plot created in Map View, but we can make it a whole lot nicer
- On your Dashboard, under the "Displays" tab, "Change" the contour settings with the same settings as what you see above
- For "Temperature" next to "Color Table", change the range from -32 and 32, as seen above



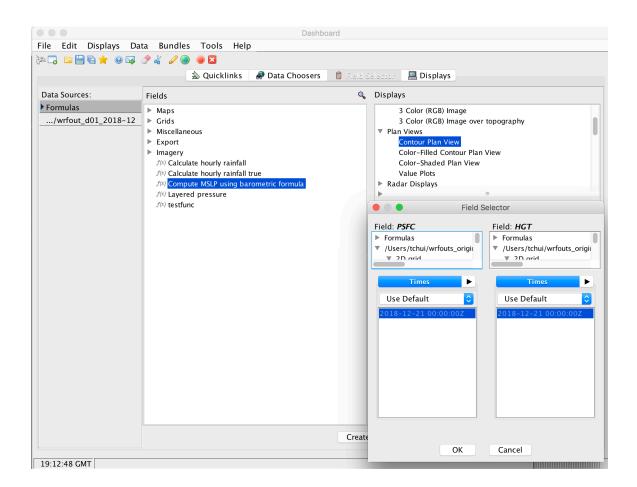
- Your Map View should now look something like this, with much finer contours than before
- Note that the plot is rotated from the map we saw from the beginning; that's because we're plotting using the domain's projection (polar stereographic)



- Now let's add some wind vectors to the plot
- Under "Field Selector" on your Dashboard, click the arrow next to "Derived", and choose "True Wind vectors (from U10 & V10)"
- Choose "Vector Plan View", and then "Create Display"

		Dashboard
	Data Bundles	
ا 📀 🚖 🗐 🚍 🖕 📀 ا	🛶 🧷 🐇 🥒 🥘 🧧	
	<u>ک</u>	Quicklinks 🔗 Data Choosers 📋 Field Selector 📃 Displays
□⊕View 1	File Edit View	Help
Default Background Maps		• Vectors:
T2 – Color–Filled Conto. truewindvectors – Vect.		Size: 5.0 🖛 🛛 Autosize
truewindvectors – vect.		O Streamlines:
		Density: Low High
	Show:	◯ Trajectories:
		Trajecotry Form: Line 🗘 Length Offset: 4 🗰 🗌 Arrow
		O Curly Vectors:
		Vector Length: 2
	Arrow Scale:	1 db
	Skip:	XY: 4.0 ===
	Range:	-25.4 to 25.4 🖅
	Vertical Position:	-1
		Bottom Middle Top
	Color:	red 🗘
	Line Width:	2.0
	¥ 🗔 🖑 🕕 📋	
19:12:03 GMT		

- The vectors in Map View should be barely visible. We can fix that under the "Displays" tab on your Dashboard
- Firstly, we don't need one vector for each grid point, that's just too much. Next to "Skip", change "XY:" to 4.0
 - This plots one vector for every 4th grid point
- We can make the vectors bigger by changing "Size:" to 5.0
- ...and make the arrows thicker by changing "Line Width:" to 2.0
- Finally, let's change the "Color" of the arrows to red
- Your vectors should now show up much nicer on the Map View, but let's plot one final thing before seeing it again



- We want to plot MSLP, but MSLP is not a raw model field, nor is it automatically derived in IDV
- *** The workflow to compute MSLP is different depending on your IDV version***

COMPUTE MSLP - OLDER VERSIONS OF IDV

- On the very left of your Dashboard, you should see a "Formulas" tab. Click it, and look under the "Imagery" option in the "Fields" panel
- You should see "Compute MSLP using barometric formula". This is an example formula that IDV has pre-made. You can create your own Formula to derive your own variables (we'll do this with precipitation later).
- Choose it, then choose "Contour Plan View".
- "Create Display", then hit "OK" for all options. You will notice that you're deriving MSLP from PSFC (surface pressure) and HGT (terrain height)

		~	
Iata Sources: Formulas /wrfout_d01_2018-12	Fields 100 Grid 3D Trajectory (from %N1% & %N2% & %N3%) 100 Horizontal Advection (from %N1% & %N2%) 100 Horizontal Flux Divergence (from %N1% & %N2%) 100 Horizontal Flux Divergence (from %N1% & %N2%) 101 Layer Difference 102 Layer Wind Shear 103 Make flow vectors from direction data 104 Make flow vectors from grid relative u and v data 105 Make flow vectors from u, v, and w data 106 Make flow vectors from u, v, and w data 107 Make flow vectors from u, v, and w data 108 Make flow vectors from u, v, and w data 109 Make flow vectors from u, v, and w data 109 Make flow vectors from u, v, and w data 109 Make flow vectors from u, v, and w data 100 Neal ele colored by another 100 Neal ele colored by another 100 Speed from 2 components 100 Since at Level 100 Speed from 2 components 100 Wind Shear Vectors > Satellite Viscellaneous 109 Hour Edit Formula 109 Make Copy Formula moneta 109 Nega Evaluate and Save 109 Ning Export to Plugin	•	Displays Imagery Image Display Scatter Display Image Display Over Topography Image As Topography Image Sequence Display 3 Color (RGB) Image RGB Composite

	Formula Editor	
Description:	mslp	
Name:	mslp	
Formula:	PSFC/exp(-HGT/7290)/1000	2
Advanced	Settings Derived	
Grou	IP: Miscellaneous	
Display	/s: O Use all ○ Use selected:	
All on	Imagery	
All off	Plan Views	
	Radar Displays	
	Vertical Cross Sections	
	Cross Sections	
	Trajectory	
	Change Formula Cancel Help	

COMPUTING MSLP - NEWER VERSIONS OF IDV (6.0+)

- On the very left of your Dashboard, you should see a "Formulas" tab. Click it, and look under the "**Miscellaneous**" option in the "Fields" panel
- You should see "Define a formula." Right-click, and choose "Copy Formula."

- In the Formula Editor, change the Description and Name fields to "mslp." Then, insert the formula into the Formula box as follows:
 - PSFC/exp(-HGT/7290)/1000
 - This will compute the mean sea level pressure in kPa, assuming a dry and isothermal atmosphere
- Click "Change Formula".
- Now choose "mslp" in the Fields panel (under "Miscellaneous"), then choose "Contour Plan View".
- "Create Display", then hit "OK" for all options. You will notice that you're deriving MSLP from PSFC (surface pressure) and HGT (terrain height)

• • •		Dashboard
File Edit Displays	Data Bundles T	ools Help
in 🔁 🖬 🖓 🕺	😼 🧷 🔏 🥒 🥥 🥌	
	\$ 0	Quicklinks 🔗 Data Choosers 📋 Field Selector 📃 Displays
∎∰View 1	File Edit View	Help
Default Background Maps		
T2 – Color-Filled Conto.	Contour:	Change Interval: .5
truewindvectors - Vector.	Color Table:	Black 97.4 103.4
MSLP – Contour Plan Vi. 🕨		Edit Color Table
	Vertical Position:	Change Range
	Smoothing:	Transparency 🕨 Factor: 6 🗰
	× 🗔 🖑 🕕 🗎	Dimmer
		Basic
		Radar Satellite
		Misc.
		Solid Black
		White Yellow
		Cyan
		Red
		Blue Gray
		Gray
		Magenta
		Orange Pink
		TUIK
19:14:06 GMT		
19:14:06 GMT		

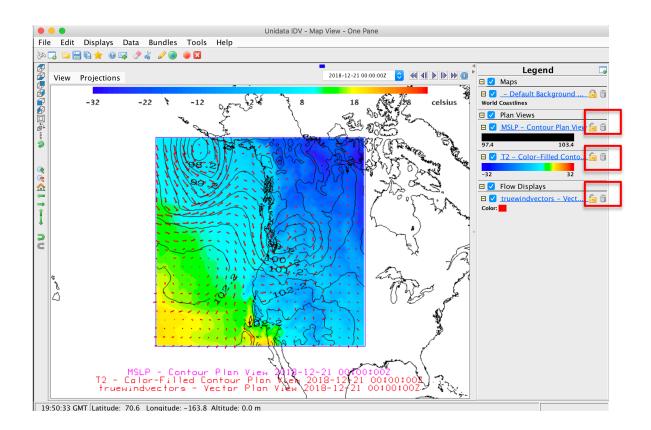
- Again, the default plot will look ugly and be barely visible
- Under the "Displays" tab, change the contour interview to 0.5
- Under "Color Table", choose "Solid" > "Black"
 - This enforces a single color for all contours; better, since temperature is already color-filled contours

		Dashboard
	Data Bundles To	ols Help
🏷 🗖 🔚 🖶 🖊 😡 🖾	🗟 🧷 🐇 🥒 🎯 👅 🕻	3
	🖄 Qı	iicklinks 🔗 Data Choosers 🍵 Field Selector 🛛 💻 Displays
□⊕View 1	File Edit View	Help
- Default Background Ma. T2 - Color-Filled Conto.♪	Contour:	Change Interval: 1 celsius
truewindvectors - Vector. MSLP - Contour Plan View	Color Table:	Temperature -32 32 celsius Properties T2 - Color-Filled Contour Plan View
	Vertical Position:	Settings Color Scale Times Spatial Subset
	Smoothing:	Visible: 🔽
Ē	M 🗔 🖑 🕕 📋	Position: Top ᅌ
		Labels: 🗸 Visible
		Show Unit
		Font: Default ᅌ Bold ᅌ 15 ᅌ
		Color: Change
		Apply OK Cancel
19:39:22 GMT		

- Before we finalize our plot, let's add a colorbar for our temperature contours as well
- On the left, under "View 1", choose "T2 Color-Filled Contour"
- Click the "Edit" button marked by the red box in the image above, and choose "Properties"
- Click the "Color Scale" tab. Check "Visible" and "Show Unit". Change the Position to "Top"
- Change the font color to black, make it bold, and increase its font size to 15

e edit Displays	Data Bundles Tools Help	Dashboard	
» 🗔 🗀 🗎 🖨 🔶 🖸	ž 🧷 🐇 🥒 🍥 😐 🗵		
	🖄 Quicklinks 🛛 🔗 Data	Choosers 📋 Field Selector	🛄 Displays
∃∰View 1	File Edit View Help		
Default Background Ma. 🕨		Maps Lat/Lon	
T2 – Color-Filled Conto. truewindvectors – Vector. MSLP – Contour Plan View	چَه 🖻 Maps		
hour contour num new	World Country Outlines	1.0 🗘 🗘	🗌 Fast rendering 🖨 🗟
	✓ World Coastlines	1.0 🗘 🗘	🗌 Fast rendering 🗢 🔀 🐻
	🗌 World Political Boundaries	1.0 🗘 🗘	🗆 Fast rendering 🗢 🔀 🔒
	🗌 North & Central America	1.0 🗘 🔄 🗘	🗌 Fast rendering 🗢 🔀 🔒
	Hi-Res US	1.0 🗘 🔔 🗘	🗆 Fast rendering 🗢 🔀 🔒
	U.S. County Outlines	1.0 🗘 🗘	🗹 Fast rendering 🗢 🔀 🕠
	Position: OBottom	Middle	-0.99 Top
	• • • • • • • • • • • • • • • • • • •		•
9:17:57 GMT			

- One last thing: because the coastline colors are green by default, it makes the continent difficult to see underneath the temperature contours
- In the "Displays" tab, choose "Default Background Map" on the left under "View 1"
- For the color box next to "World Coastlines", change to black



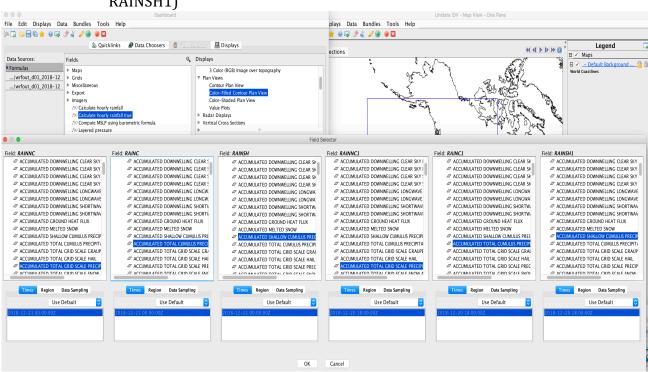
- And there you have it! A plot of MSLP, 2-m temperature and 10-m wind vectors all on one panel, with a temperature colorbar placed at the top. Not the prettiest plot in the world, but it works.
- Congrats on making your first 2D contour plot in IDV!
- Feel free to make this plot with other times as well, or explore other 2D fields.
- Once you're done, you can click the trash cans highlighted by the red boxes above to get rid of the layers; keep the Default Background map

•••	Formula Editor	
Description:	Calculate hourly rainfall true	
Name:	Hourly rain	
Formula:	RAINNC +RAINC + RAINSH - (RAINNC1 + RAINSH1)	÷ 📝
Advanced	â	
	Settings Derived	
Grou		0
		Ť
Display	s: Ouse all Ouse selected:	
All on	Imagery	
All off	Plan Views	
	🔲 🗌 Radar Displays	
	Vertical Cross Sections	
	Cross Sections	
	Trajectory	
	Change Formula Remove Formula Cancel Help	

- Now, we want create an accumulated precipitation plot.
- Precipitation in wrfout files is accumulated from the very first wrfout file; hence, to plot hourly or 3-hourly or 6-hourly precipitation, we need to do some simple subtraction
- Precipitation is also divided into three main variables: RAINNC (grid-scale precipitation, computed from the microphysics scheme), RAINC (cumulus precipitation, computed from the cumulus scheme), RAINSH (shallow cumulus precipitation, computed from the shallow cumulus scheme, if applicable)
 - Accumulated precipitation between current time and some previous time = (RAINNC + RAINC + RAINSH)_{current time} - (RAINNC + RAINC + RAINSH)_{previous time}
 - None of our files should have a shallow cumulus scheme turned on, so RAINSH should be uniformly 0, but we'll pretend that it's on anyway for our calculations
- On your Dashboard, go back to "Field Selector" > "Formulas"

Right-click on "Calculate hourly rainfall" (<u>OLDER VERSIONS OF IDV</u>)/"Define a formula" (<u>NEWER VERSIONS OF IDV</u>) and choose "Copy Formula"

- "Calculate hourly rainfall" does add up RAINNC + RAINC + RAINSH, but does not subtract from some previous time; hence, it's actually the total accumulated precipitation up to that point
- We need to do the subtraction ourselves
- Change the Description and Formula to what you see in the image above



Formula = RAINNC + RAINC + RAINSH - (RAINNC1 + RAINC1 + RAINSH1)

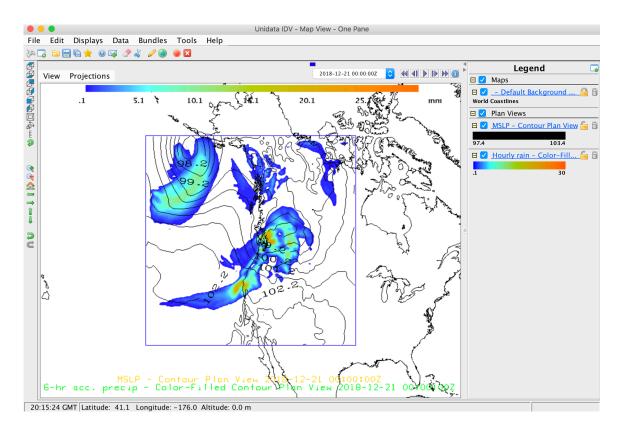
- Go back to Data Choosers, and load out wrfout_d01_2018-12-20_18:00:00, so that we can make a 6-hour accumulated precipitation plot
- Now in Formulas, choose your newly created Formula "Calculate hourly rainfall rate", and select "Color-Filled Contour Plan View"
- Manually select the correct fields for the current time (wrfout_d01_2018-12-21_00:00:00 → ACCUMULATED TOTAL GRID SCALE PRECIPITATION, ACCUMULATED TOTAL CUMULUS PRECIPITATION, ACCUMULATED SHALLOW CUMULUS PRECIPITATION) as well as for the previous time (wrfout_d01_2018-12-20_18:00:00, same fields)

	Dashboard
	Data Bundles Tools Help
in 🔁 🖬 🖬 🙀	😼 🖉 🐇 🥒 🎯 👅 🗵
	🔊 Quicklinks 🛛 🔗 Data Choosers 👘 Field Selector 📃 Displays
⊟∰View 1	File Edit View Help
– Default Background Ma.	
Hourly rain - Color-Fill. 🕨	Change Parameter
	Change Display Official
	Change Contours Verti
	Sharing Middle Top
	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
	▼ 🖉 🖑 🕕 📋
20:01:42 GMT	

• The produced plot will look ugly, and have the wrong units. Change the units on your Dashboard > Displays > Edit > Change Display unit, to mm

			[Dashboard			
File Edit Displays	Data Bundles	Tools Hel	р				
e 🔶 🖻 🔚 🖬 🕼	👒 🧷 🐇 🥒 🥯 🥌	×					
	<u>E</u>	Quicklinks	🔗 Data Choo	osers 🃋 Field	Selector 📃 Displays		
⊟∰View 1	File Edit View	Help					
- Default Background Ma	Contour:	Change	Interval: .2	mm			
Hourly rain - Color-Fill. 🕨		Duratu		2.0			
	Color Table:	Precip	.1	30 mm	1		
	Vertical Position:	0			-1		
		Bottom		Middle		tour Properties Editor	
	Smoothing:	None		Sector: 6	Contour Interval:	.2	mm
	× 🗔 🖑 🕕 🗒				Base Contour:	.1	mn
					Minimum Value:	1	mn
					Maximum Value:	30	mn
					Line Width:	1	\$
					Dash:		0
					Labels:		
						Default	
					Font:	Default	\$
					Size:	12	\$
					Align:	Along Contours	\$
					Frequency:	Lo Med	Hi
					Label Every Nth Line:		2
					Apply	OK Cancel	
20:04:54 GMT							

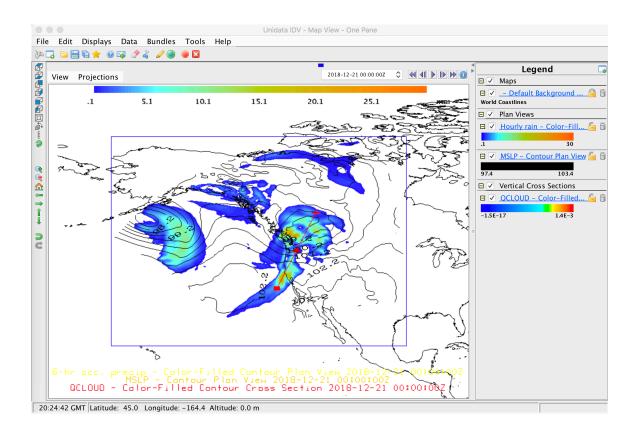
- Also change the contour intervals and color table as seen above
- Instead of using the default color table, choose Basic > Precip
- Finally, add in the MSLP contours we saw in the previous finished plot (do the same as you did before), and add in a colorbar for the accumulated precipitation plot
 - You can change the label name from "Hourly rain" or whatever to something more appropriate like "6-hr acc. precip" under "Edit" > "Properties", in the same window that you toggled colorbar options



• ...and there you have it! Doesn't look half bad! You can clearly make out the frontal precip bands for the system contacting the coast.

• • •	Dashboard								
File Edit Displays Dat	a Bundles Tools Help								
沟 🗔 🗀 🔚 🕒 🚖 🕡	2 🐇 🧷 🔘 🗵								
	🗟 Quicklinks 🔗 Data Choosers 📑 Field Selector 💻 Displays								
Data Sources:	Fields 🔍 Displays								
Formulas	V 3D grid Color-Shaded Plan View								
/wrfout_d01_2018-12	▼ Derived Value Plots								
/wrfout_d01_2018-12	f(#) 3D Flow Vectors (from U & V & W) ▼ Vertical Cross Sections								
	J(%) 3D True Wind Vectors (from U & V & W) Contour Cross Section								
	f(%) Absolute Vorticity (from U & V) Color-Filled Contour Cross Section								
	Image: state of the state o								
	f(≈) Grid 2D Trajectory (from U & V) ▼ 3D Surface								
	f(x) Grid 3D Trajectory (from U & V & W)								
	J(x) Horizontal Advection (from U & V)								
	f(x) Horizontal Divergence (from U & V) Use Default								
	f(x) Horizontal Flux Divergence (from U & V) f(x) Isentropic Potential Vorticity (from T & absvo								
	<i>s(*)</i> Potential Temperature (from T)								
	<i>f</i> (%) Potential Temperature IsoSurface Advection								
	J(#) Potential Temperature IsoSurface Scalar Ana								
	パミ Potential Temperature IsoSurface Vector Ana								
	3(%) Potential Temperature IsoSurface(from theta								
	f(x) Potential Vorticity (from theta & flowvectors)								
	الالالالالالالالالالالالالالالالالالال								
	J(x) Sat' Equiv' Potential Temperature (from T)								
	الالالالالالالالالالالالالالالالالالال								
	الشرقي (from U & V) گره که در در در از محمد از م								
	BASE STATE PRESSURE								
	🗑 base-state geopotential								
	CLOUD FRACTION								
	Cloud water mixing ratio								
	either 1) pert moist pot temp=(1+Rv/Rd Qv)*(ti								
	Create Display								
20:24:36 GMT									

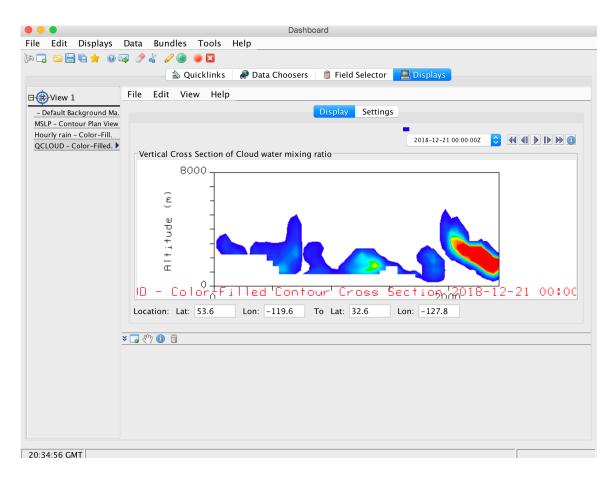
- One last thing, let's add in a cross section of cloud water mixing ratio
- "Field Selector" > "3D grid" > "Cloud water mixing ratio"
- Choose "Vertical Cross Sections" > "Color-Filled Contour Cross Section"



• You should see a transect show up in your Map View. The "+" corresponds to the left side of your cross-section, the triangle the centre, and the square the right

			Dashboard				
	Data Bundles Too	· · -					
in 🔁 🖬 👘 🔶 🛛						_	
	🔊 Quicklin	iks 🔗 Dat	a Choosers 🛛 📋	Field S	Selector 📃 Displa	ays	
□ ⊕View 1	File Edit View H	lelp					
– Default Background Ma.			Dis	splay	Settings		
MSLP - Contour Plan View Hourly rain - Color-Fill.	Contour:	Change	Interval: 5E-6 I	ka ka	1		
QCLOUD - Color-Filled.	Contour.	Therval. SE-0 kg k		KY K	Contour Properties Editor		
	Color Table:	default	1E-5		Contour Interval:	5E-6	kg kg-1
	Selector Position: Smoothing: Vertical Scale:				Base Contour:	5E-6	kg kg-1
		Bottom	Mid	dle		15.0	
		None Change	S Fa	Fa	Minimum Value: Maximum Value:	1E-6	kg kg-1
						1E-3	kg kg-1
		enange	Range. 070000		Line Width:	1	\$
	× 🗖 🛍 🔿 🖻				Dash:		\$
	¥ 🗔 🖑 🕕 📋						~
					Labels:		
					Font:	Default	
					Size:	12	
					Align:	Along Contours	
					Aligh.	Along contours	
					Frequency:	Lo Med	I I Hi
				La	bel Every Nth Line:		2 🗘
					Apply	OK Cance	el
20:34:22 GMT							

- In the "Settings" tab under "Displays" on your Dashboard, change the contour settings as shown above
- Also note that the vertical scale has been changed to 0 to 8000 m



- If done correctly, under the "Display" tab on your Dashboard, you should see a cross-section that looks something like what you see here
- Note the deep, cloudy air next to the square (right side of transect), corresponding to the cold front of the storm
- Feel free to play around with the transect, by moving it around, lengthening it, rotating it, etc.