Brief Chronology:

- Fire started on 2021-06-28 due to human ignition.
- Source of fire traced back to burnt out vehicles and an old cannabis grow operation.
- Extremely hot and dry weather during the 2021 NW Heat wave allowed the fire to grow quickly.
- Fire was 15 km N of Kamloops Lake.
- Winds allowed the fire to spread north, impacting communities within the Thompson-Nicola Regional District
- On 26 Aug, BC Wildfire changed fire status to Being Held.
- On 5 Sept, BC Wildfire declared the fire to be Under Control.
- On xxx, the fire was finally extinguished.

Fire Facts:

- Fire ID: K21001
- Official Name: “Sparks Lake”
- Total burned area: 89,626 ha
- 60 days out of control
- Spawned multiply pyro-thunderstorms with lightning that started many more fires.
- At its peak there were 140 firefighters, 49 pieces of heavy equipment, and 11 helicopters working on the fire from 20-21st of July. Total number of personnel throughout suppression efforts unknown.
- Evacuation Orders were issued for at least 309 properties, displacing many residents from their homes.

Links for Fire - Weather Briefing

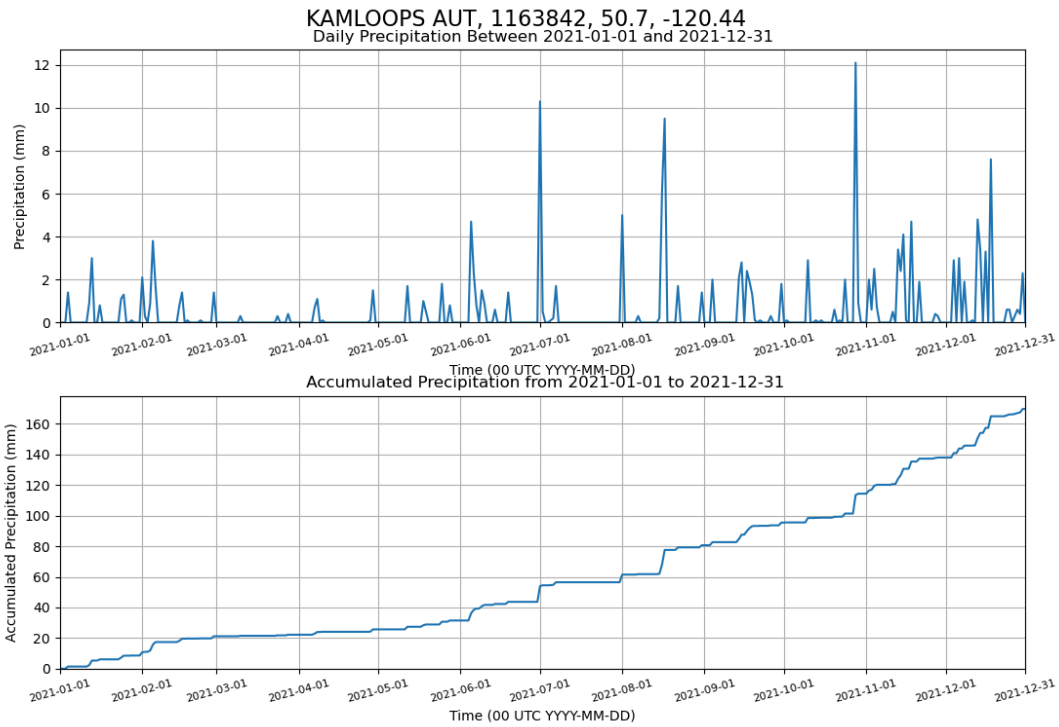
What to include:

- want to access satellite images, surface weather maps, and all the usual stuff.
- antecedent conditions (e.g., heat dome, dry, drought index, etc.)
- upper-level patterns just before the fire started
- soundings and instability, as might cause Tstorms and lightning
- surface fronts and winds in just before the fire started
- hot, dry, windy conditions just before, and during various stages of the fire
- forecast for the various days of the fire
- soundings and formation of pyroTstorms

Current order as of august 22nd (not done yet):

Antecedent conditions

- https://en-ca.topographic-map.com/map-h5157/British-Columbia/?center=51.25112%2C-120.23951&zoom=7
- https://science.gc.ca/site/science/en/blogs/science-health/surviving-heat-impacts-2021-western-heat-dome-canada
- https://www.cbsnews.com/news/what-is-heat-dome-extreme-temperatures-pacific-northwest/
- https://worldview.earthdata.nasa.gov/?v=-175.60602154840615,29.522209512358184,-86.02095042911537,71.30524658908989&l=Reference_Labels_15m,Reference_Features_15m,Coastlines_15m,OrbitTracks_Aqua_Descending(hidden),MODIS_Aqua_Thermal_Anomalies_All,MODIS_Terra_Thermal_Anomalies_All,MODIS_Combined_Thermal_Anomalies_All,VIIRS_SNPP_Thermal_Anomalies_375m_All,VIIRS_NOAA20_Thermal_Anomalies_375m_All,BlueMarble_NextGeneration(hidden),VIIRS_NOAA20_CorrectedReflectance_TrueColor(hidden),VIIRS_SNPP_CorrectedReflectance_TrueColor(hidden),MODIS_Aqua_CorrectedReflectance_TrueColor(hidden),MODIS_Terra_CorrectedReflectance_TrueColor&lg=true&t=2021-06-25-T18%3A00%3A00Z
- https://www.eoas.ubc.ca/courses/atsc413/fct/forecast.html - Upper air 25 kPa june 25-26 2021
- ‘’ upper air 50 kPa june 25
- ‘’ surface temperature june 25-26
- ‘’ surface moisture june 25-26 -> super dry
- https://climate.weather.gc.ca/radar/index_e.html?site=PYR&year=2021&month=6&day=25&hour=07&minute=00&duration=24&image_type=PRECIPET_RAIN_WEATHEROFFICE - radar during heat dome
- Precip collected at station in Kamloops (plot created by my script for ECCC stations):



- Fuel conditions: https://gwis.jrc.ec.europa.eu/apps/gwis_current_situation/index.html

Upper level patterns

- ‘’ 50 kPa 25-26 again, showing tight packed isobars on east side of heat dome crossing through central BC, and how this created fast upper level northerly winds
- ‘’ upper air 85 kPa june 25 -> 26: shows how wind is >30km/h for 1.5 days at beginning of heat dome by fire area, drying out plants. Wind dies during heat dome, really making the surface temperatures stagnant and even hotter.

Soundings/instability

- June 26 00z sounding http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2500&TO=2600&STNM=73033
- June 27 00z sounding http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2600&TO=2700&STNM=73033
- June 28 00z sounding http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2700&TO=2800&STNM=73033

Surface fronts and winds b4 fire start

- https://www.wpc.ncep.noaa.gov/html/sfc-zoom.php - look at how there are no fronts that move through BC during heat dome
- ‘’ 100 m and 10 m surface winds up through to fire start time

So if there was no lightning, no thunderstorms/fronts, and light winds, how did a fire start? - Human activity - fuels were so ready to combust that once a fire was started by humans, it got out of control immediately and started to burn large swathes of wilderness.
Forecasts for various days of fire

- June 28

- June 29
  Large cape - potential for pycb

- June 30
  Winds from south, then switched to be blowing from the west, and blow faster than other days.
  Massive pyrocb formations, cape >400 which usually only makes weak CB but

- July 1
  Cape > 150, little potential for pyrocb under normal conditions
- July 2
- July 3
- July 4

Soundings and pyrocb

- Pyrocb on 3 evenings in a row: June 29 sounding: http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2900&TO=3000&STNM=73033
- June 30 and july 1 sounding: http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=07&FROM=0100&TO=0200&STNM=73033
- Resulting in lightning, and starting more fires to the north: https://worldview.earthdata.nasa.gov/?v=-124.76192926996876,49.691641835314606,-116.74834701045665,53.07237185104628&l=Reference_Labels_15m,Reference_Features_15m,Coastlines_15m,OrbitTracks_Aqua_Descending(hidden),MODIS_Aqua_Thermal_Anomalies_All,MODIS_Terra_Thermal_Anomalies_All,MODIS_Combined_Thermal_Anomalies_All,VIIRS_SNPP_Thermal_Anomalies_375m_All,VIIRS_NOAA20_Thermal_Anomalies_375m_All,BlueMarble_NextGeneration(hidden),VIIRS_NOAA20_CorrectedReflectance_TrueColor(hidden),VIIRS_SNPP_CorrectedReflectance_TrueColor(hidden),MODIS_Aqua_CorrectedReflectance_TrueColor(hidden),MODIS_Terra_CorrectedReflectance_TrueColor&lg=true&t=2021-07-01-T18%3A00%3A00Z
- Ram slider of pyrocb clouds june 30 2023: https://rammb.cira.colostate.edu/ramsdis/online/loop.asp?data_folder=loop_of_the_day/goes-16/20210701000000&number_of_images_to_display=100&loop_speed_ms=200
- Ram slider pyrocb june 30 with lightning overlay added - see how much lightning it spawned: https://www.nesdis.noaa.gov/news/raging-wildfires-spark-lightning-over-british-columbia

- Solstice, no clouds, lots of radiation, short nights, not much cool down
- Ridge breakdown around June 29-30!
- Height contours -> NOT isobars (for geopotential heights)

Link list post-presentation:

- https://en-ca.topographic-map.com/map-h5157/British-Columbia/?center=51.36458%2C-120.20291&zoom=8
- https://science.gc.ca/site/science/en/blogs/science-health/surviving-heat-impacts-2021-western-heat-dome-canada
- https://www.cbsnews.com/news/what-is-heat-dome-extreme-temperatures-pacific-northwest/
- https://go.nasa.gov/3OSrRk9
- https://www.eoas.ubc.ca/courses/atsc413/fct/forecast.html
- https://gwis.jrc.ec.europa.eu/apps/gwis_current_situation/index.html
- https://www.eoas.ubc.ca/courses/atsc413/fct/forecast.html
- http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2500&TO=2600&STNM=73033
- http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2600&TO=2700&STNM=73033
- http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2700&TO=2800&STNM=73033
- https://www.wpc.ncep.noaa.gov/html/sfc-zoom.php
- https://go.nasa.gov/3KZZNu1
- https://www.eoas.ubc.ca/courses/atsc413/fct/forecast.html
- http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2900&TO=3000&STNM=73033
- http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=07&FROM=0100&TO=0200&STNM=73033
- https://go.nasa.gov/3QXfFkP
- https://rammb.cira.colostate.edu/ramsdis/online/loop.asp?data_folder=loop_of_the_day/goes-16/20210701000000&number_of_images_to_display=100&loop_speed_ms=200
- https://www.nesdis.noaa.gov/news/raging-wildfires-spark-lightning-over-british-columbia

Camtasia:
https://it.ubc.ca/services/desktop-print-services/software-licensing/snagit-and-camtasia-installation-instructions

Actual presentation:

- Call it a heat wave, not a heat dome (NOT a met term, dont say it in front of greg)
- Show a video of the planes getting water out of reservoirs (not whole thing, but parts of cool media)
- Interaction: print out copy of skew-T and ask students to identify levels of free convection/LCL/other things.

Latent heat with water vapour from tropical cyclone in W. Pacific. , moist warm air over the pacific fed the heatwave, impacts on aquatic life during the event, really talk about the heat wave. (amplification of ridge from latent heating)

Pull up section on fire components, pyroCB, show graphics. (june 30), new fire starts pulls crews away, lessens efforts on all fires, fires are severe cant have crews downwind

Synoptic breakdown on the study: ridge set up, thermal low (hypsometric effect, higher pressure aloft in warm air column, drives air out in up, low surface pressure). Red/pink image, low formed down in mojave desert and moved north, parking offshore. High over rockies (ridge), low over ocean, downsloping effect (caused adiabatic heating).

Take more time to talk about all fire indices (FWI, FFMC, BUI, etc.)

Shortwave trough on 25, stays offshore for a little bit, pushed a lot of WV into middle atmosphere of the ridge, which led up to the set up of the upside down V soundings

- Get sounding of 00z July 1 (best for pyrocb) https://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=07&FROM=0100&TO=0100&STNM=73033
-
-
- See also lynn creek and mckay fires on loop

Look at tropical typhoon -> extra-tropical cyclone on worldview, and how it changes and moves towards BC. (start at june 23rd or 21 june 2021). (JUST SAY TROUGH, gets a lot of moist air, Diabatic heating, southerly flow ahead of the low, diabatic heating within the frontal zone contributed to the low warming, and trough along cold front heating -> east of japan brought warm moist air into … look it up in rachels paper!)

pyroCB for the first week of july for certain fires.

TO DO
Add in fire forecasts for the fire days that are in the website, including talk about the cold front!! (winds shift, worse fire)

Figure out concise way to talk about heat wave

- Low pressure centers, or troughs, over east russia/western pacific generated a West-east jet across the pacific due to a strong temperature gradient
- Southerly flow ahead of the lows ahead of lows and frontal zones (and diabetic heating within frontal zones due to condensation) contributed to low level heating, which helped build and strengthen a ridge east of the lows/trough.
- Thermal low off the coast of washington made outflow winds from interior, causing adiabatic heating as air flowed from higher elevations in the mountains to lower elevations by the coast.

50 minute version links post-presentation (Nov.16th 2023)

- https://www.eoas.ubc.ca/courses/atsc413/cases/sparks_lake_BC/index.html
- https://www.eoas.ubc.ca/courses/atsc413/cases/sparks_lake_BC/news/Sparks_Lake-news2.pdf
- https://wildfiresituation.nrs.gov.bc.ca/map
- https://www.google.com/maps/@50.6628804,-119.8492971,7.61z?entry=ttu
- https://en-ca.topographic-map.com/map-h5157/British-Columbia/?center=51.80638%2C-122.34108&zoom=7
- https://science.gc.ca/site/science/en/blogs/science-health/surviving-heat-impacts-2021-western-heat-dome-canada
- https://www.nature.com/articles/s41467-023-36289-3
- https://esd.copernicus.org/articles/13/1689/2022/#&gid=1&pid=1
- https://www.cbsnews.com/news/what-is-heat-dome-extreme-temperatures-pacific-northwest/
- https://go.nasa.gov/3SKACAy
- https://www.eoas.ubc.ca/courses/atsc413/fct/forecast.html
- https://gwis.jrc.ec.europa.eu/apps/gwis_current_situation/index.html
- https://www.eoas.ubc.ca/courses/atsc413/fct/forecast.html
- http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2500&TO=2600&STNM=73033
- http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2600&TO=2700&STNM=73033
- http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2700&TO=2800&STNM=73033
- https://www.wpc.ncep.noaa.gov/html/sfc-zoom.php
- https://go.nasa.gov/46o5FF7
- https://www.eoas.ubc.ca/courses/atsc413/fct/forecast.html
- http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=06&FROM=2900&TO=3000&STNM=73033
- http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2021&MONTH=07&FROM=0100&TO=0200&STNM=73033
- https://www.youtube.com/watch?v=HIIHxxvkY4I&ab_channel=mikehinch100
- https://www.youtube.com/watch?v=3s4ZcCIfWOY&ab_channel=CastanetNews
- https://www.youtube.com/watch?v=ZlhQziMStnM&ab_channel=Lenlen%E2%80%99sKitchen

- https://go.nasa.gov/3G316Wb
- https://rammb.cira.colostate.edu/ramsdis/online/loop.asp?data_folder=loop_of_the_day/goes-16/20210630000000&number_of_images_to_display=100&loop_speed_ms=200
- https://rammb.cira.colostate.edu/ramsdis/online/loop.asp?data_folder=loop_of_the_day/goes-16/20210701000000&number_of_images_to_display=100&loop_speed_ms=200
- https://www.nesdis.noaa.gov/news/raging-wildfires-spark-lightning-over-british-columbia
- https://www.eoas.ubc.ca/courses/atsc413/fct/forecast.html
- https://www.wpc.ncep.noaa.gov/html/sfc-zoom.php
- https://www.castlegarnews.com/news/sparks-lake-wildfire-near-kamloops-remains-largest-in-b-c-4742171
- https://www.youtube.com/watch?v=cMqgDsQ__-E&ab_channel=EvanfromKamloops