ATSC 413 Forest Fire Weather & Climate
Fall Term 2024

Reading List and Learning Goals

Week 2 Tue 10 Sep 2024
Weather Chart Analysis

Pre-lecture reading	**Learning Goals**
Atmospheric basics Stull 1.0-1.2; 10.5.8; 10.6 Appendix A: A.1.0-A.1.2 Lackmann 1.0-1.2; 1.3-1.4 (read the text, the equations are not testable) *Manual analysis* Stull 9.2.3-9.4 Lackmann 12.0-12.4	By the end of this week, you will be able to: -Interpret a surface weather map -Interpret upper air charts -Contour an upper air chart by hand -Contour a surface weather map by hand

Week 3 Tue 17 Sep 2024
Weather Charts (continued)
-Surface
-Upper Air
-Cross Sections
-Thickness charts
-Vorticity
Observations (METARS)

Pre-lecture reading	**Learning Goals**
METARS Stull 6.5; 9.0-9.2.2 Wikipedia METAR *Weather Charts* Stull p.458 right hand column	By the end of this week, you will be able to: -Interpret specific weather charts (e.g. Thickness charts) -Interpret weather cross-sections and meteograms -Interpret METARS

Week 4 Tue 24 Sep 2024
Satellite Imagery & Interpretation

Pre-lecture reading	Learning Goals
Satellite imagery Stull 8.0-8.2.3	By the end of this week, you will be able to: -Interpret VIS, IR, WV satellite imagery -Understand GOES and Polar Orbiting imagery -Interpret special sensor channels, especially -fire weather channels

Week 5 Tue 1 Oct 2024
Radar Imagery & Interpretation

Pre-lecture reading	**Learning Goals**
Weather radar Stull 8.3-8.3.4 Lackmann 10.5.1.4	By the end of this week, you will be able to: -Explain specifically what hydrometeors are and how a radar beam detects them -Give an example of an active remote sensor and a passive remote sensor, the outputs of which are used in weather analyses -List the three main characteristics of a radar return signal used to detect storms and other severe weather conditions -Describe in general terms the radar equation and the reflectivity factor Z, and what units are used to quantify radar returns -Interpret radar reflectivity imagery -Interpret Doppler radar imagery

Week 6 Tue 8 Oct 2024
Atmospheric Soundings & Hodographs

Pre-lecture reading	**Learning Goals**
Atmospheric Stability Stull 5.0-5.9 *Thunderstorm Fundamentals* Stull Ch. 14 Focus on Section 14.2 and 14.4 *Hodographs* Stull 14.5.1-14.5.2.5 NOAA's overview on Parcel Theory https://www.noaa.gov/jetstream/upperair/parcel-theory NOAA's overview on Stability / Instability https://www.noaa.gov/jetstream/upperair/bowls NOAA's overview on radiosondes https://www.noaa.gov/jetstream/upperair/radiosondes NOAA's overview on Skew-T Plots https://www.noaa.gov/jetstream/upperair/skew-t-plots NOAA's overview on Severe Weather https://www.noaa.gov/jetstream/upperair/severe-weather	By the end of this week, you will be able to: -Provide the definition of potential temperature and how it relates to vertical motion of air parcels -List the three characteristic states of an air parcel needed to plot as a point on any thermodynamic diagram -Label all lines accurately on a blank Tephigram thermodynamic chart -Analyze upper air soundings (e.g., Tephigrams / Skew-T plots > concentrate on Tephigrams) –Determine cold and warm advection from the winds plotted on a hodograph -Analyze upper winds on hodograph

Week 7 Tue 15 Oct 2024
Extra-tropical (mid-latitude) cyclones

Pre-lecture reading	**Learning Goals**
Extratropical cyclones Stull 13.0-13.8 11.5-11.7, 11.9,11.14 Lackmann 5.0-5.4.7 ATSC 413 website: Met. Concepts mc04: Extra-tropical (mid-latitude) Cyclones Note: *We will go over these sections in class, and much of this material is taken from this week's Stull and Lackmann reading list*	By the end of this week, you will be able to: -Explain extratropical cyclone development and structure -Compare gradient wind and geostrophic winds as the jet stream flows around Rossby Wave troughs and ridges -Explain why surface low-pressure centres will weaken without upper air support -Pinpoint regions of cyclogenesis and cyclolysis in planetary Rossby Waves -Describe in detail the structure of wind maxima in the jet stream and how these wind maxima relate to vertical motion in the troposphere -Describe the role of conservation of potential vorticity in lee wave cyclogenesis

Week 8 Tue 22 Oct 2024
Fronts and Airmasses

Pre-lecture reading	**Learning Goals**
For review (we covered *map plotting and contouring* in week 1): Front symbols on a weather map: Stull p. 280-281 Station Plot Model: c-stn-plot1-model.jpg (2114×1508) (ubc.ca) (for username and password see Canvas homepage) Key variables on Station Plot Model: d-stn-plot2-key-variables.jpg (2122×1530) (ubc.ca) New this week: *Fronts and airmasses* Stull Chapter 12 Fronts & Airmasses: 12.0-12.10 Lackmann Chapter 6 Fronts 6.0-6.5 NOAA Topic: Air Masses https://www.noaa.gov/jetstream/synoptic/air-masses NOAA Topic: Norwegian Cyclone Model: https://www.noaa.gov/jetstream/synoptic/norwegian-cyclone-model NOAA Topic: Types of Weather Phenomena: https://www.noaa.gov/jetstream/synoptic/types-of-weather-phenomena Shapiro-Keyser Cyclone Model: The Shapiro-Keyser Cyclone Model (eumetrain.org) Cyclogenesis (eumetrain.org)	By the end of this week, you will be able to: -Analyze different front types and airmasses -Associate fronts with weather patterns - List the mechanisms that support the formation of high-pressure centres and/or high-pressure ridges at the Earth's surface, and describe typical weather patterns associated with high-pressure cells and ridges. - List the 10 attributes of fronts that may be found on a surface weather chart, including the main attribute usually associated with fronts. - Detail the horizontal and vertical structure of frontal zones - Describe and label frontal features found on both the Norwegian cyclone model and the Shapiro-Keyser cyclone model, and list the additional features that are associated only with the Shapiro-Keyser cyclone model.

Week 9 Tue 29 Oct 2024
Temperature, Humidity, Clouds

Pre-lecture reading	**Learning Goals**
Clouds Stull 6.0-6.6	By the end of this week, you will be able to:

Week 10 Tue 5 Nov 2024
Convective Storms

Pre-lecture reading	**Learning Goals**
Thunderstorms Stull 14.0-14.5	By the end of this week, you will be able to:

Week 11 Tue 12 Nov 2024
No Tuesday class – UBC Fall Midterm Break Mon 11 Nov – Wed 13 Nov

Week 12 Tue 19 Nov 2024
Capstone Presentation: Lahaina fire

Mesoscale Weather
-Mountain weather
-Local winds

Pre-lecture reading	**Learning Goals**
Regional winds Stull 17.3-17.3.4; 17.5-17.5.3; 17.7-17.7.4; 17.10-17.11.1; 17.12	By the end of this week, you will be able to:

Week 13 Tue 26 Nov 2024
Numerical Weather Prediction

Pre-lecture reading	**Learning Goals**
Numerical weather prediction Stull 20.0-20.2.1; 20.5.3-20.5.5.4; 20.6.3-20.6.4; 20.8 Lackmann 10.0-10.4.0; 10.4.4; 10.4.4.4; 10.6-10.6.3.3; 10.7-10.7.2	By the end of this week, you will be able to:

End of Term