S-390

FIRE BEHAVIOR

UNIT IV

TEMPERATURE- MOISTURE RELATIONSHIP

STUDENT WORKBOOK
for Individual Study

1981

The NATIONAL WILDFIRE COORDINATING GROUP consists of representatives from: United States Department of Agriculture Forest Service; United States Department of Interior Bureau of Indian Affairs; Bureau of Land Management, Fish and Wildlife Service, and National Park Service; and National Association of State Foresters.

ACKNOWLEDGEMENTS

Contributions to this course were made by numerous individuals within agencies represented in the National Wildfire Coordination Group. Special recognition should be given to individuals within these organizations:

US Forest Service, Region 1, Missoula, MT.

Northern Forest Fire Laboratory, Missoula, MT.

Montana State Division of Forestry, Missoula, MT.

National Weather Service, Boise, ID. & Missoula, MT.

Bureau of Land Management, BIFC, Boise, ID.

Produced by

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COURSE SCHEDULE

SELF-STUDY UNITS		APPROXIMATE HOURS*
0	Student Guide**	1/2
I	The Fire Environment	2 1/2
II	Fuels Classification	3
III	Topography and Fire Behavior	2 1/2
IV	**Temperature-Moisture Relationship**	**2 ½**
V	Fuel Moisture	3
IV	Local and General Winds	2 1/2
VII	Atmospheric Stability and Instability	3
VIII	Keeping Current with the Weather	2 1/2
IX	Extreme Fire Behavior	3
X	Fire Behavior Affects Fireline Tactics	3
XI	Fire Behavior Predictions	4
	Total Review Period for all Units	3

CONTROLLED ACTIVITY		
--	Final Examination	2 1/2

* Includes time for unit tests or evaluations, but not for break periods.

** Prerequisite units to this unit.

INSTRUCTIONS TO STUDENTS

This unit has been designed for self-instruction. In addition to the workbook, you will need an audio cassette tape player and the cassette tape for the unit, or you may use the reference text.

The workbook section contains a series of exercises and note-taking items which help you interact with the materials. You are asked to write down certain information as provided by the narrator on tape. If the tape proceeds too fast for note taking, manually pause it. An audible "beep" will signal when you are to stop the tape and perform an assignment. When you complete an assignment, restart the tape as instructed in the workbook. Follow the workbook sequence. Do not go ahead until instructed.

FOR UNFAMILIAR TERMS USE THE GLOSSARY IN THE STUDENT GUIDE.

START THE TAPE. OR TURN TO THIS UNIT IN THE REFERENCE TEXT.

UNIT OBJECTIVES

UPON COMPLETION OF THIS UNIT YOU WILL BE EXPECTED TO:

1. Compare the effects of daytime solar radiation, and nighttime heat losses from various topographic surfaces.

2. Explain temperature lapse rates in the atmosphere, and give the theoretical values for dry, wet, and normal lapse rates.

3. Explain the relationship between temperature, dew point, and relative humidity.

*4. Given the dry bulb and wet bulb temperatures, determine relative humidity and dew point using appropriate psychrometric tables.

*5. Determine relative humidities at various temperatures within a fixed or stationary air mass when given one temperature and corresponding relative humidity.

6. Give four groups of clouds, their approximate base height, and explain how these clouds are formed.

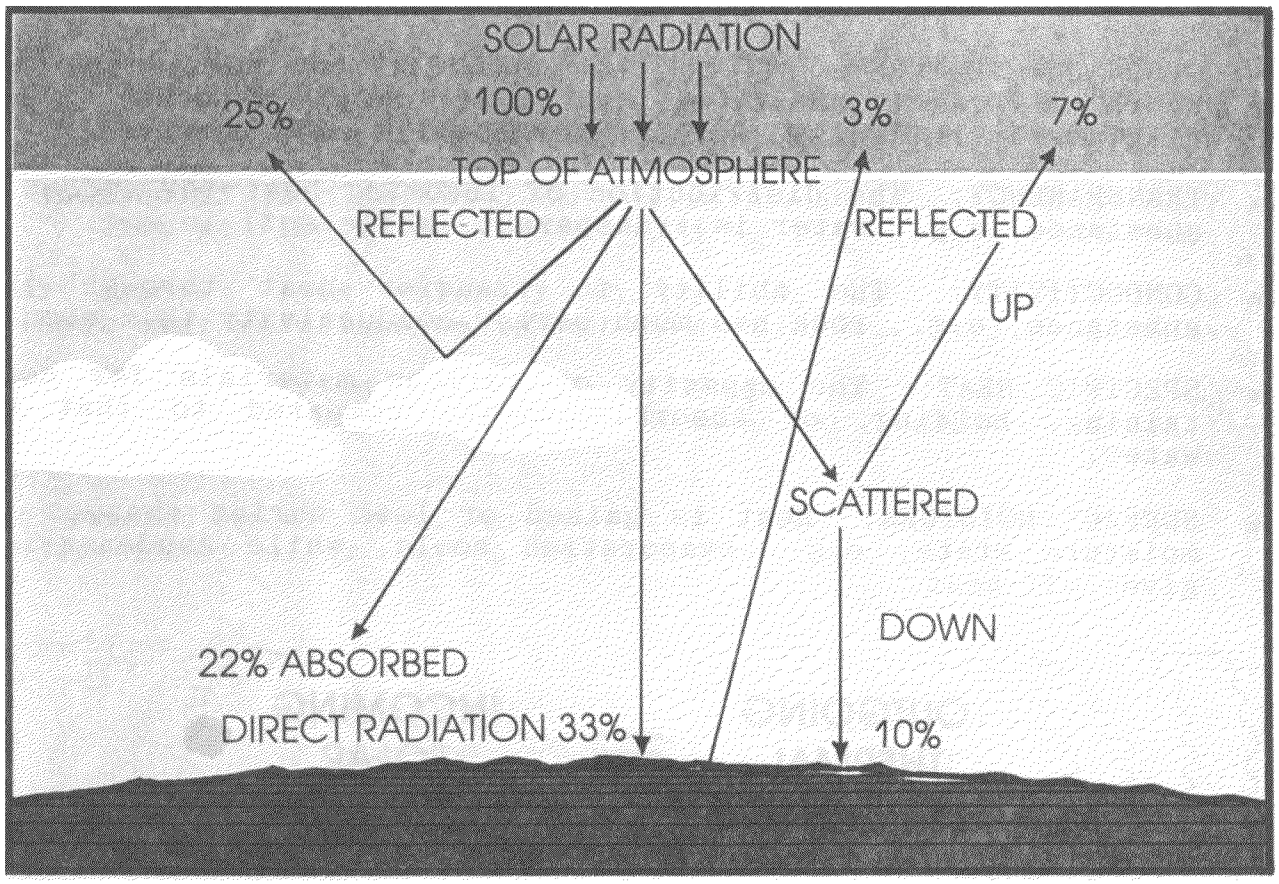
7. Given six indicator cloud types, describe their probable effect on fire weather.

* Key skill objectives

TEMPERATURE AND HEAT

TEMPERATURE: THE DEGREE OF HOTNESS OR COLDNESS OF A SUBSTANCE; A MEASUREMENT OF ITS MOLECULAR ACTIVITY, IT IS MEASURED BY A THERMOMETER ON A DESIGNATED SCALE, I.E., FAHRENHEIT OR CELSIUS.

FIGURE 1 — APPROXIMATE DISTRIBUTION OF INCOMING SOLAR RADIATION



A. THE AMOUNT OF SOLAR HEATING RECEIVED AND SURFACE TEMPERATURES ARE DEPENDENT ON:

1. _____

   which can reflect and/or absorb incoming radiation. The presence and thickness of clouds, water vapor, haze, and smoke are factors.

2. _____

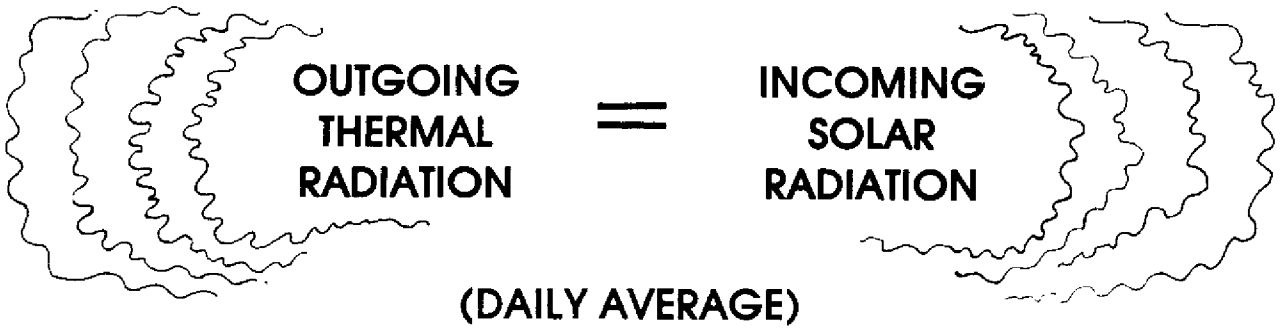
   as affected by time of day and year, and by topography. Latitude, slope, aspect, elevation, and shape of the country are factors.

3. _____

   which reflect and/or absorb incoming radiation. Color, texture, transparency, conductivity, and specific heat are factors.

HEAT GAIN AND LOSS AT THE EARTH'S SURFACE DEPEND ON:

- COLOR AND TEXTURE: Affect the capability of substances to absorb or reflect radiation, e.g., black mostly absorbs, while white mostly reflects. Rough absorbs while smooth reflects.
- TRANSPARENCY: The distribution of incoming heat throughout a substance, e.g., water is transparent, while soil is not.
- CONDUCTIVITY: The ability to transfer heat through the substance, e.g., rock has much better conductivity than wood.
- SPECIFIC HEAT: The capacity of various materials for containing, holding, or absorbing heat, compared to that of water.
- SURFACE MOISTURE: Heat is gained or lost during changes in moisture state, e.g., evaporation cools, while condensation gives off heat.



(DAILY AVERAGE)