ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL FOUR

INSTRUCTIONAL GUIDE

SECTION 3

EO C436.01 – EXPLAIN FOG

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-804/PG-001, *Proficiency Level Four Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Acquire jars, strainers, and oven mitts (1 pair per group) for each group in TP 1.

Obtain three or four ice cubes for each group for TP 1.

Use a kettle(s) to boil water for each group for TP 1.

Prepare slides or handouts located at Attachment A.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An in-class activity was chosen for this lesson as it is an interactive way to present the formation and types of fog.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall be expected to explain fog.

IMPORTANCE

Fog is one of the most common and persistent weather hazards encountered in aviation which impedes a pilot's visibility. Being able to explain fog provides knowledge for potential instructional duties and is part of the fundamentals that cadets pursing future aviation training will require.

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Teaching point 1 **Have the cadets perform an experiment to illustrate the formation of fog.**

Time: 10 min Method: In-Class Activity

ACTIVITY

OBJECTIVE

The objective of this activity is to have the cadet demonstrate how fog forms.

RESOURCES

- Glass jars,
- Strainers,
- Oven mitts,
- Kettle,
- Water,
- Rubbing alcohol, and
- Ice cubes.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into groups of two to four.
2. Use a kettle to boil water for each group.
3. Distribute resources to each group.
4. Briefly explain the steps of the experiment below and have the cadets make a hypothesis regarding the outcome.
5. Have each group perform the following experiment:
    a. Fill the jar completely with hot water and let it stand for one minute.
    b. Using oven mitts pour out all but 3 cm of water from the jar.
    c. Add three to four drops of rubbing alcohol to water.
    d. Put the strainer over the top of the jar.
    e. Place three or four ice cubes in the strainer.
    f. Observe the results.
6. Give the groups time to discuss what they have observed.
7. Ask the cadets to provide an explanation of what has happened.

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The warm, moist air is cooled by the ice cubes to a temperature below its dewpoint, causing the water vapour to condense and form a cloud. A cloud in contact with the ground is called fog.

Fog can also form when the dewpoint is raised to the air temperature through the addition of water vapour.

The following are the ideal conditions for the formation of fog:

- an abundance of condensation nuclei,
- high relative humidity,
- a small temperature dewpoint spread, and
- some cooling process to initiate condensation.

Fog is usually dissipated by heating from below as sunlight filters down through the fog layer.

SAFETY

- Warn the cadets the water is hot and may cause burns.
- Ensure the cadets use oven mitts and caution when pouring the hot water.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in the activity will serve as the confirmation of this TP.

Teaching point 2 **Conduct an in-class activity to explain types of fog.**

Time: 15 min Method: In-Class Activity

ACTIVITY

OBJECTIVE

The objective of this activity is to have the cadets explain types of fog.

RESOURCES

- Flip chart paper,
- Flip chart markers, and
- *From the Ground Up: Millennium Edition*.

ACTIVITY LAYOUT

Arrange the classroom for group work.

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ACTIVITY INSTRUCTIONS

1. Divide the cadets into four groups.

2. Assign a leader in each group. The group leader will be responsible for assigning tasks to fellow cadets. Each group will need a recorder and at least one presenter.

3. Distribute flip chart paper and flip chart markers to each group.

4. Assign each group one of the following:

   a. radiation fog,

   b. advection fog,

   c. upslope fog and steam fog, and

   d. precipitation-induced fog and ice fog.

5. Have each group prepare a two-minute presentation on their type of fog using *From the Ground Up: Millennium Edition*, p. 147 as a reference.



Encourage the cadets to be creative and draw diagrams of the formation of their types of fog.

6. Have each group deliver their presentation.



Give handouts to each cadet or show slides located at Attachment A.

7. Answer any questions about the types of fog.



The types of fog can easily be remembered using the mnemonic "RAIS UP", as in "RAIS UP da roof".

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. What conditions are ideal for the formation of radiation fog?

Q2. The drifting of warm, moist air over a colder land or sea surface causes which type of fog?

Q3. Explain the formation of steam fog.

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ANTICIPATED ANSWERS:

A1. Light wind, clear skies, and an abundance of condensation nuclei.

A2. Advection fog.

A3. Steam fog is formed when cold air passes over a warm water surface. Evaporation of the water into the cold air occurs until the cold air becomes saturated. The excess water vapour condenses as fog.

END OF LESSON CONFIRMATION

QUESTIONS:

Q1. What is fog?

Q2. What are the two basic ways in which fog is formed?

Q3. What type of fog is associated mostly with warm fronts?

ANTICIPATED ANSWERS:

A1. Fog is a cloud in contact with the ground.

A2. Fog is formed in the following ways:

- warm, moist air is cooled to a temperature below its dewpoint, causing the water vapour to condense and form a cloud; or
- the dewpoint is raised to the air temperature through the addition of water vapour.

A3. Precipitation-induced fog.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

A good lookout is one of the most important aspects of airmanship when flying under Visual Flight Rules, making visibility from the cockpit a key factor in flight. Fog is one of the most common and persistent weather hazards encountered in aviation which impedes a pilot's visibility. An understanding of fog and the conditions under which it forms is essential for future aviation training.

INSTRUCTOR NOTES / REMARKS

Cadets who are qualified Advanced Aviation may assist with this instruction.

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REFERENCES

C3-116 ISBN 0-9680390-5-7 MacDonald, A. F., & Peppler, I. L. (2000). *From the ground up: Millennium edition*. Ottawa, ON: Aviation Publishers Co. Limited.

C3-200 Weather Wiz Kids. (2008). *Make fog*. Retrieved September 26, 2008, from http://www.weatherwizkids.com/fog.htm

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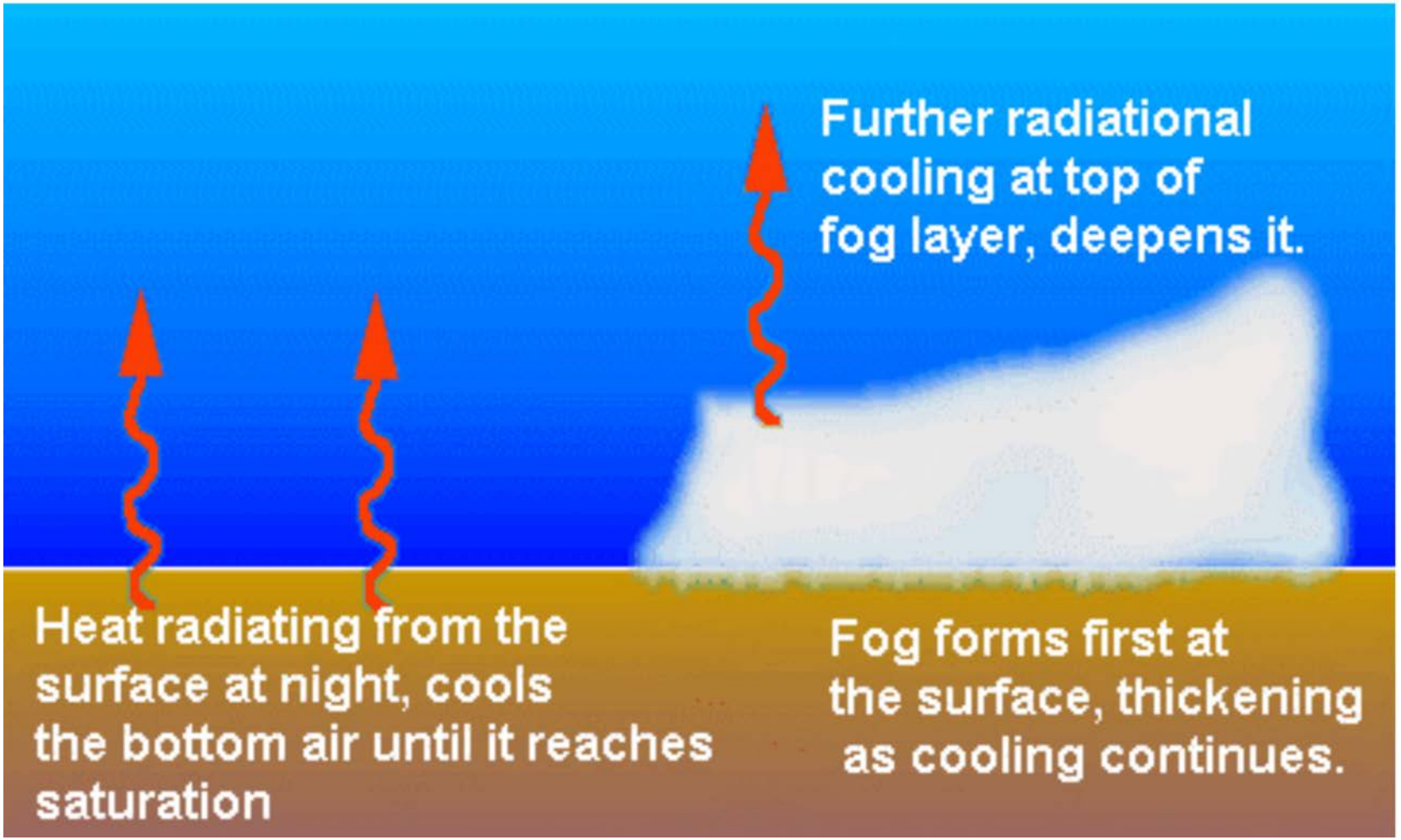

Note. From The Fog Rolls In, 2002, Weather Almanac for September. Copyright 2002 by The Weather Doctor. Retrieved March 2, 2009, from http://www.islandnet.com/~see/weather/almanac/arc2002/alm02sep.htm

Figure A-1 Radiation Fog

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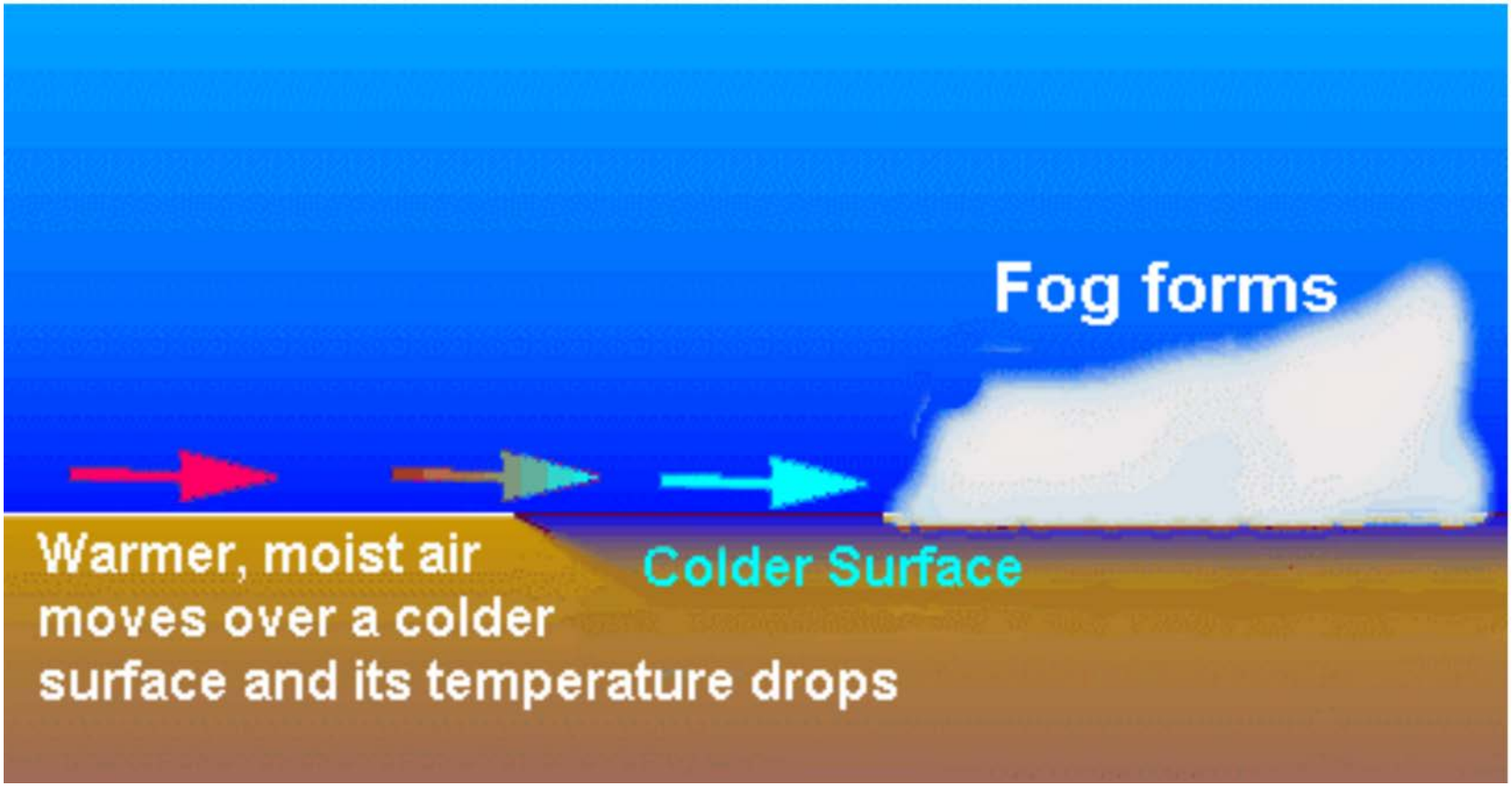

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Figure A-2 Advection Fog

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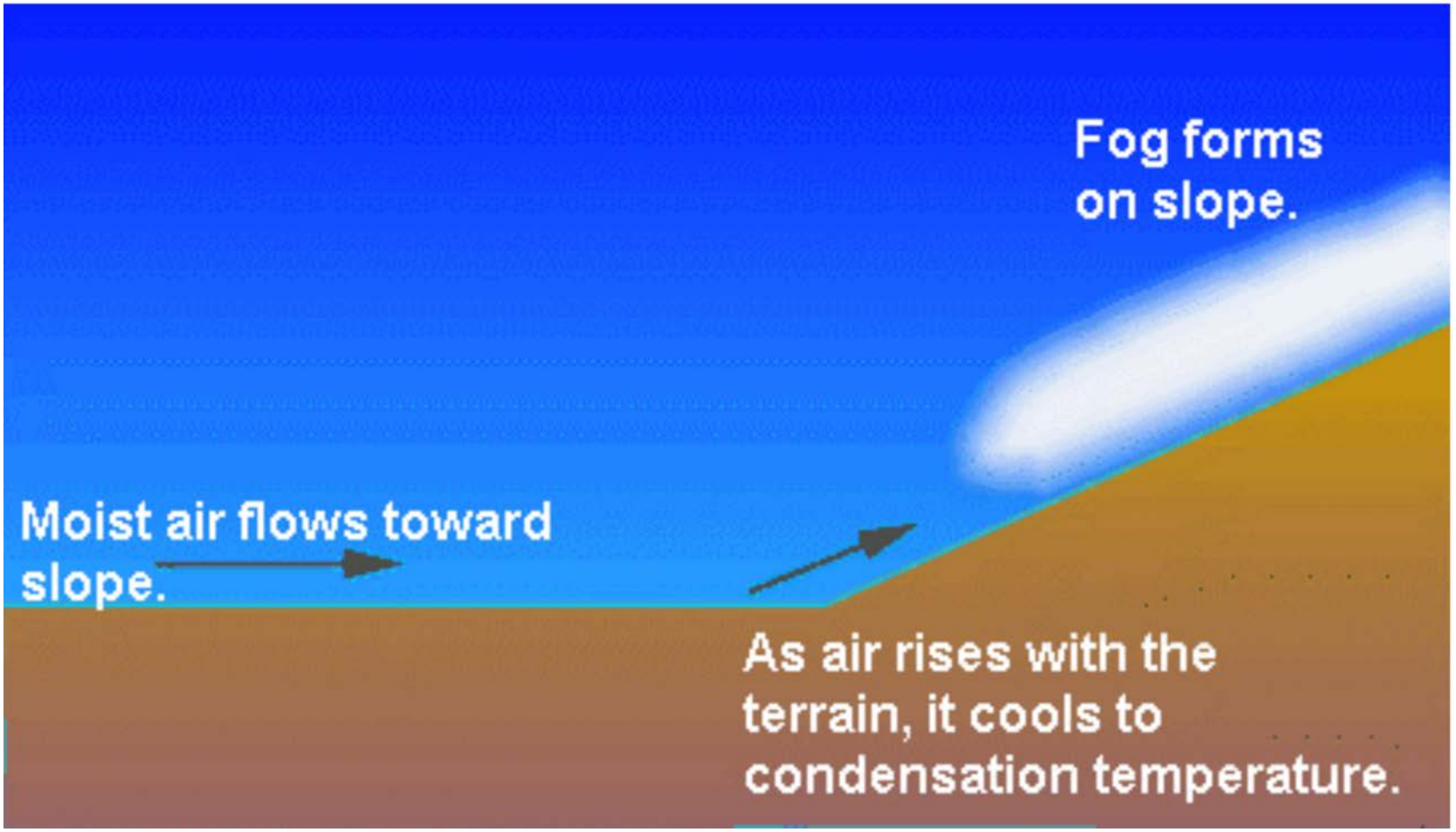

Note. From The Fog Rolls In, 2002, Weather Almanac for September. Copyright 2002 by The Weather Doctor. Retrieved March 2, 2009, from http://www.islandnet.com/~see/weather/almanac/arc2002/alm02sep.htm

Figure A-3 Upslope Fog

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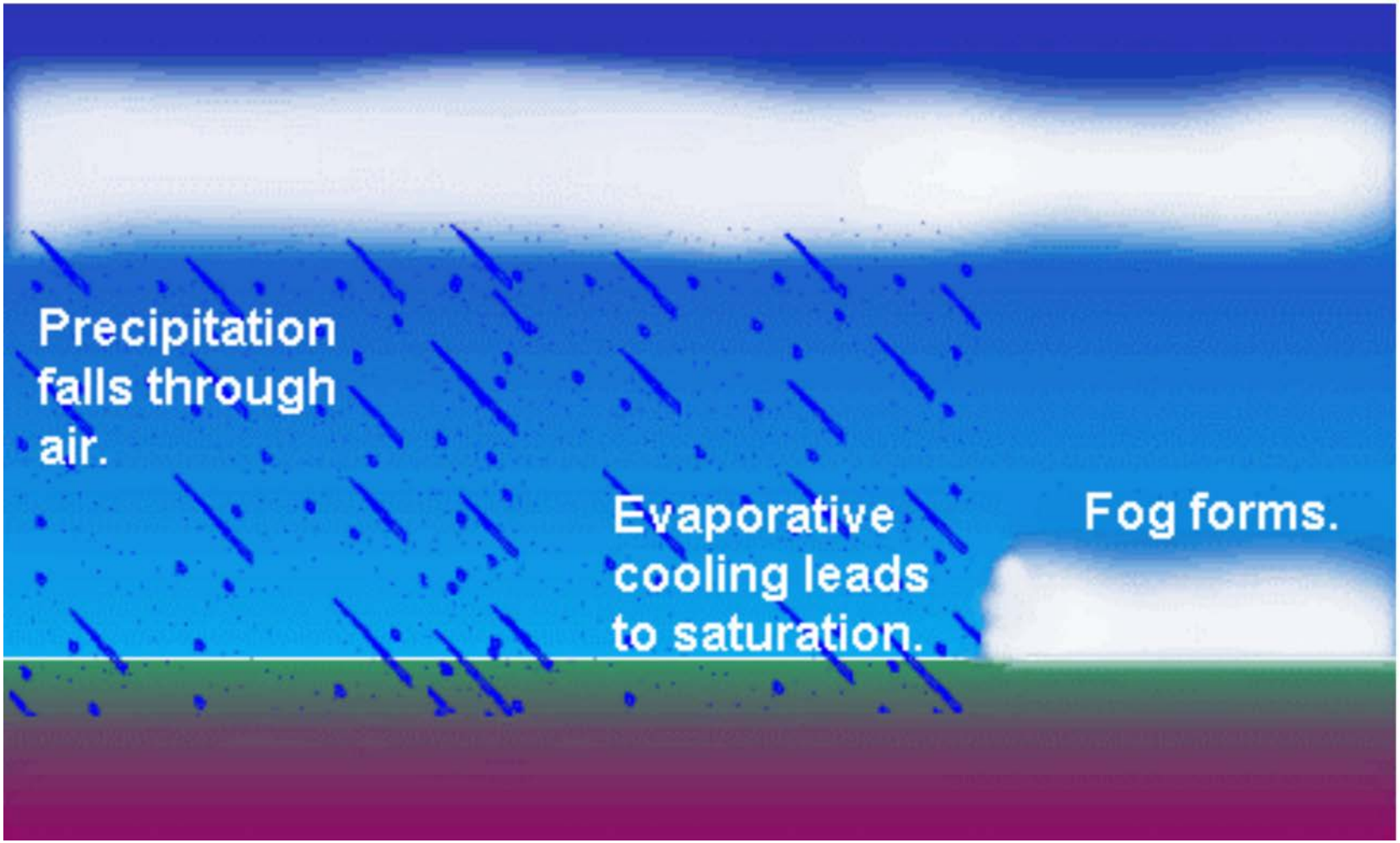

Note. From The Fog Rolls In, 2002, Weather Almanac for September. Copyright 2002 by The Weather Doctor. Retrieved March 2, 2009, from http://www.islandnet.com/~see/weather/almanac/arc2002/alm02sep.htm

Figure A-4 Precipitation-Induced Fog

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