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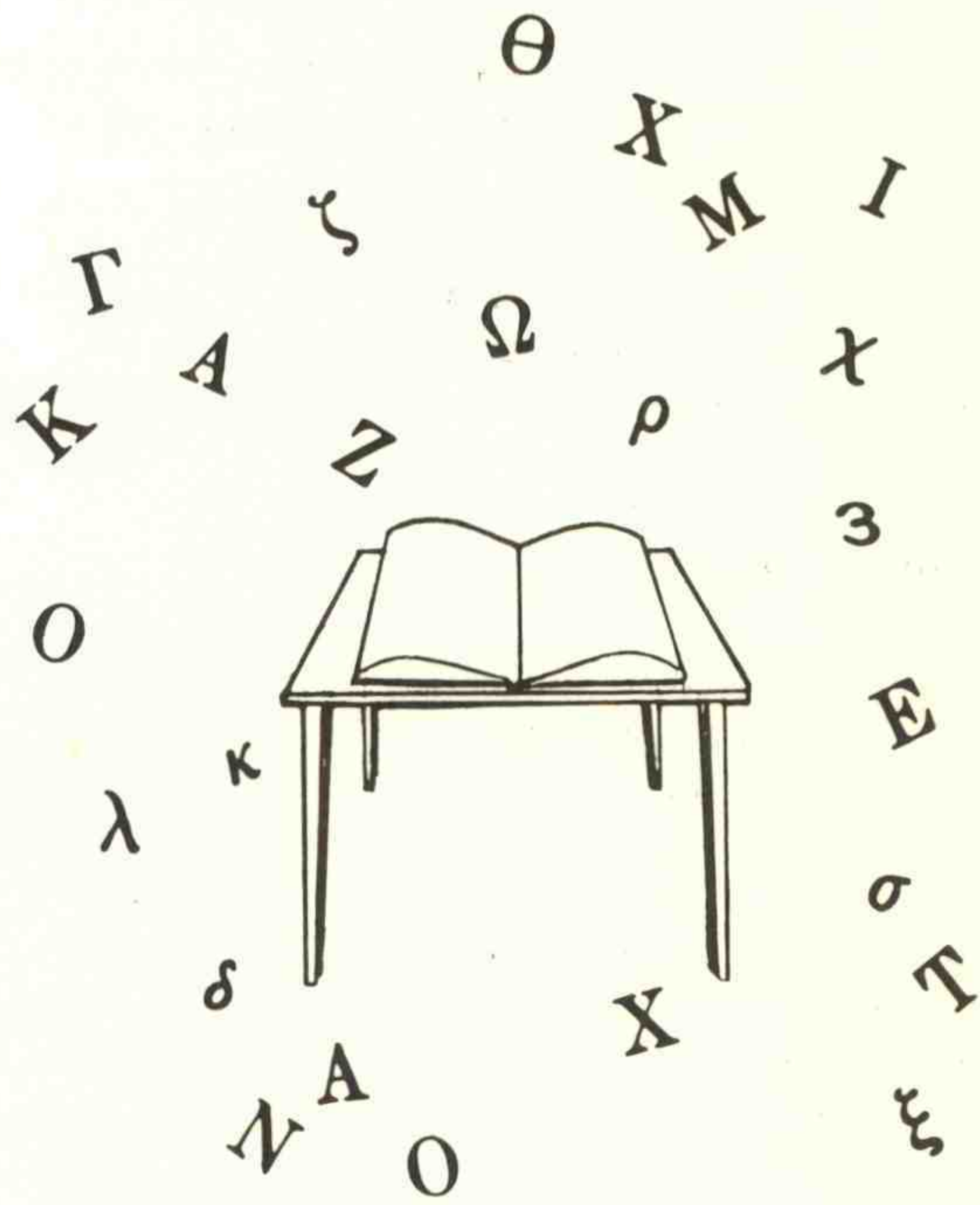
U.S. DEPARTMENT OF COMMERCE / National Oceanic and Atmospheric Administration

FEDERAL COORDINATOR FOR
METEOROLOGICAL SERVICES
AND SUPPORTING RESEARCH



**Federal Standard Definitions
for Meteorological Services
and Supporting Research**

FCM-S1-1981



Washington, D.C.
1981 November

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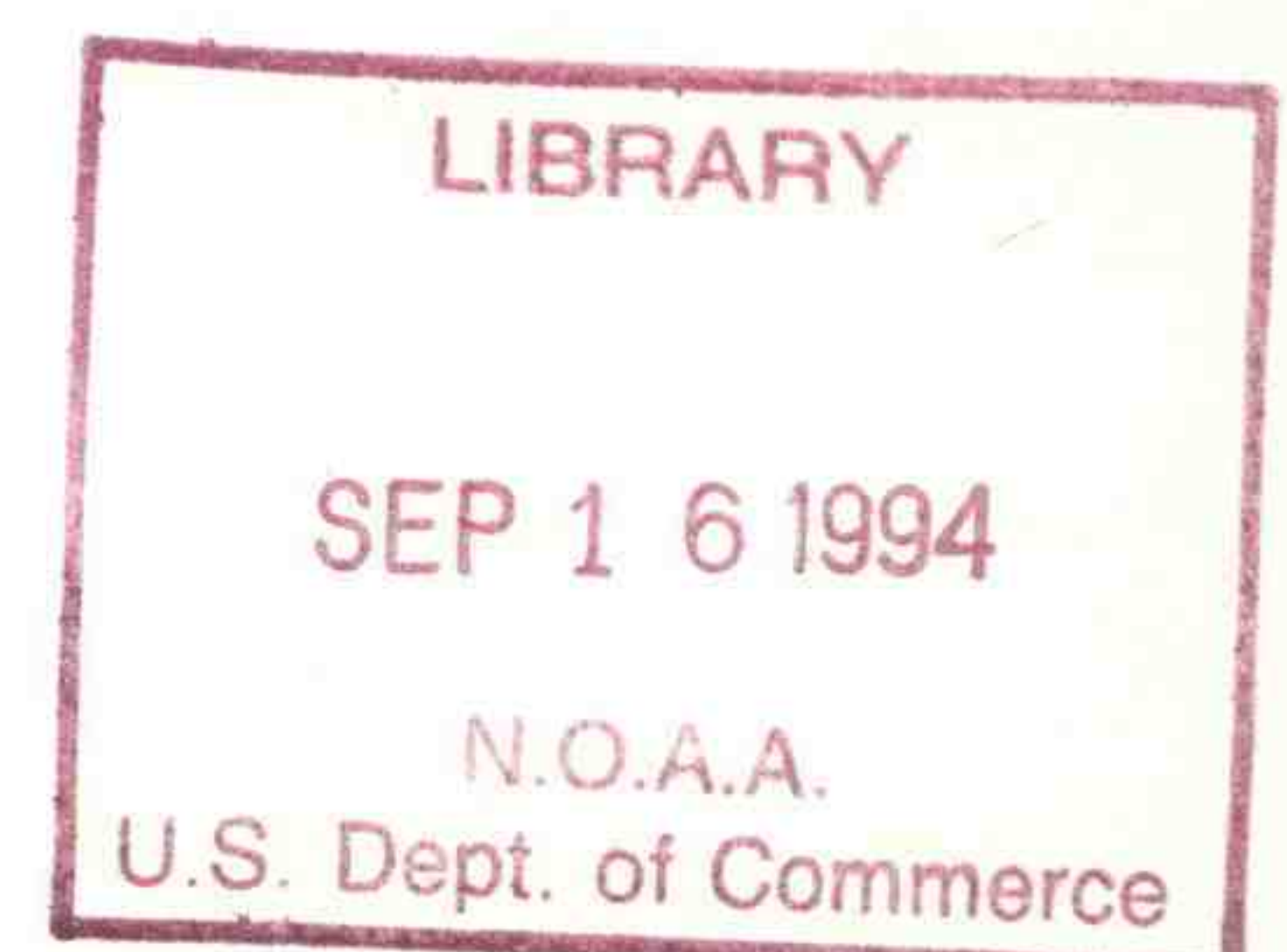
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FEDERAL STANDARD DEFINITIONS
FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

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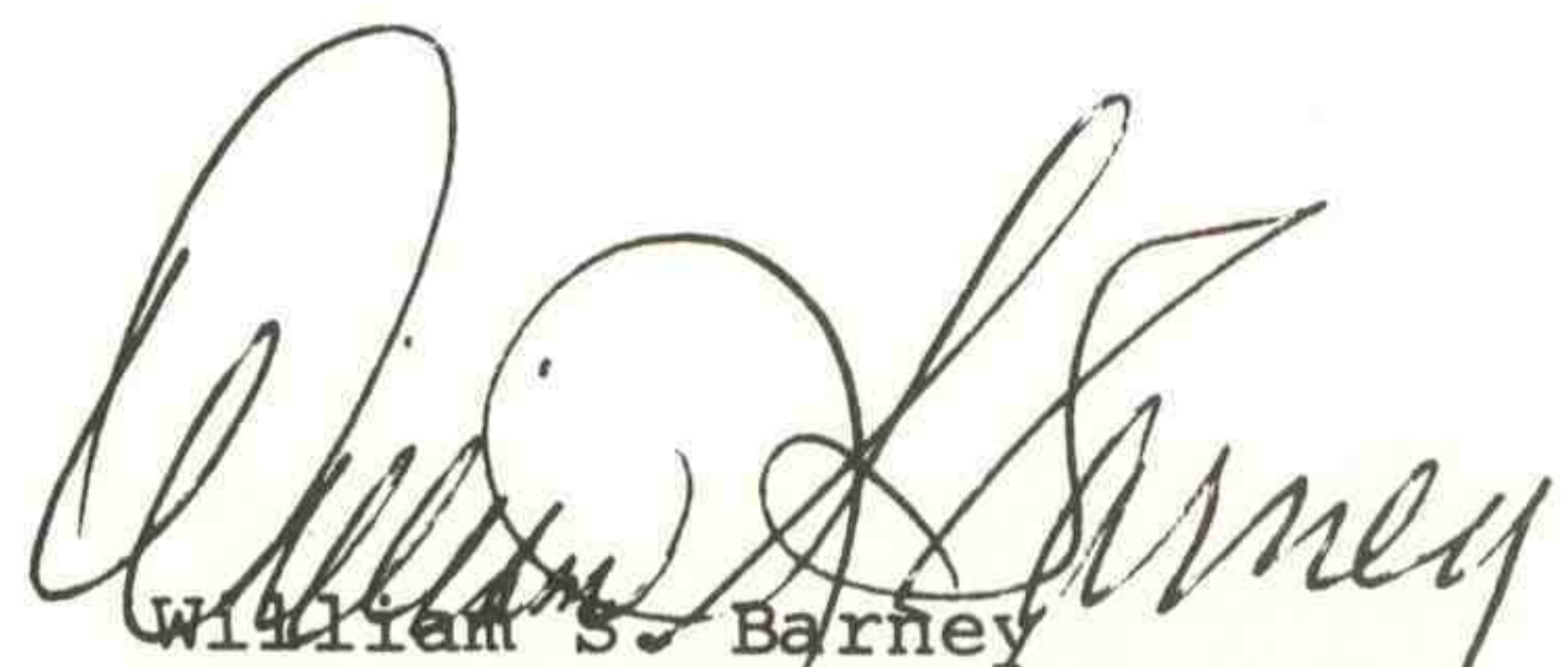
FOREWORD

Definitions and standards are foundation to development and operations. It's therefore appropriate that this publication, Federal Standard Definitions for Meteorological Service and Supporting Research (FCM-S1), is the first in the standards series to help improve efficiency, effectiveness, and economy in Federal weather services. The purpose of this publication is to provide a useful source of approved definitions used in Federal Meteorological Services and Supporting Research. This document is not all inclusive but is intended to be used to supplement other existing references, e.g. the Glossary of Meteorology produced by the American Meteorological Society. Its principal application at this time is to aid the transition from generally human observations to emerging automation capability.

Definitions are used to aid understanding by establishing boundaries and relationships. Advances in technology and changing mission requirements require that definitions and standards are revised to ensure their continued usefulness. Definitions and use of standards should be quantified to the extent possible. Realistically, a balance between the quantitative and the qualitative will result. In any case, clarity is essential.

The first draft of Section 1 was prepared by the Panel on Automatic Meteorological Observing Systems (PAMOS) as one of its final efforts before being dissolved. The Working Group on Automated Surface Observations (WG-ASO) carried on the work of PAMOS and expanded Section 1 to take account of definitions contained in the Joint Automated Weather Observing System (JAWOS) Proposed Functional Requirements. The WG-ASO will now maintain Section 1.

This publication is designed to be expanded. Other sections will be added as contributions by other committees and groups within the Federal Committee structure are developed.



William S. Barney
Acting Federal Coordinator
for Meteorological Services
and Supporting Research

FEDERAL STANDARD DEFINITIONS
FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

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1. WEATHER PARAMETERS FOR USE IN SURFACE WEATHER OBSERVING

1.1 INTRODUCTION AND PURPOSE.

Advances in technology now appear to permit automation of almost the entire surface/aviation and synoptic observation. For this reason, the weather parameters contained in these observations have been reviewed and the human attributes removed from their definitions where ever possible.

To promote application of technological advances, the definitions, as much as possible, do not contain methods, procedures, or techniques. In most cases they are worded to permit observations to be made without regard to human or to current sensor or processing capabilities. The objective, in using these revised definitions, is to permit observations from automatic weather stations to be used in place of those made by observers without significantly changing Federal Aviation Administration regulations, U. S. Air Force regulations, or WMO agreements.

However, to meet future and changing requirements, the definitions contained in this section may be modified, expanded or extended through the Federal Committee structure.

Metric units contained herein are rationalized units of the International System of Units (SI). The definitions follow.

1.2 SKY CONDITION.

1.2.1 Sky Condition. The state of the sky in terms of such variables as cloud type, height,

layers, amount, density, and obscuring phenomena.

1.2.2 Cloud Height. The height of the base of a cloud or cloud layer above the surface of the earth.

1.2.2.1 Ceiling. The height above the earth's surface of the lowest layer of clouds or obscuring phenomena aloft that is not classified as a thin layer or partial obscuration, that together with all lower clouds or obscuring phenomena covers more than half the sky as detected from the point of observation.

1.2.2.2 Variable Ceiling. A ceiling of less than 3000 feet (900 m) which rapidly increases or decreases in height by one or more reportable values during the period of observation.

1.2.3 Layer. An array of clouds or obscuring phenomena aloft whose bases are at approximately the same level.

1.2.3.1 Multiple Layers. More than one layer.

1.2.3.2 Dense Layer. A layer whose ratio of dense sky cover to total sky cover is more than one-half.

1.2.3.3 Thin Layer. A layer whose ratio of dense sky cover to total sky cover is one-half or less.

1.2.4 Sky Cover. The amount of clouds and/or other obscuring phenomena that are detectable from the point of observation.

1.2.4.1 Layer Amount. The amount of sky cover at a given level.

1.2.4.2 Variable Layer Amount. The layer amount which varies between reportable values during the period of observation.

1.2.4.3 Dense Sky Cover. Sky cover that prevents detection of higher clouds or the sky above it.

1.2.4.4 Thin Sky Cover. Sky cover through which higher clouds or the sky can be detected.

1.2.4.5 Total Sky Cover. The proportion of the total sky dome obscured by clouds or obscuring phenomena.

1.2.5 Cloud Type. A cloud form which is identified according to the WMO International Cloud Atlas.

1.3 VISIBILITY.

1.3.1 Visibility. The greatest distance at which selected objects can be seen and identified, or its equivalent derived from instrumental measurements.

1.3.2 Ground Visibility.

1.3.2.1 Prevailing Visibility. The greatest visibility equaled or exceeded throughout at least half the horizon circle, which need not necessarily be continuous.

1.3.2.2 Index of Visibility. The horizontal visibility near the earth's surface representative of visibility conditions in the vicinity of the point of observation.

1.3.3 Sector Visibility. The visibility within a specified portion of the horizon circle when the visibility is less than 3 miles (5 km) or when operationally significant.

1.3.4 Variable Visibility. Ground visibility of less than 3 miles (5 km) which rapidly increases and decreases by one or more reportable values during the period of observation.

1.3.5 Path Visibility. Line of sight visibility.

1.3.6 Slant Range Visibility. The maximum distance along the slant glide path at which approach lights are visible.

1.3.7 Runway Visual Range. A value normally determined by instruments located along side and about 14 feet (4 m) higher than the center line of the runway and calibrated with reference to the sighting of high-intensity runway lights or the visual contrast of other targets -- whichever yields the greater visual range.

1.3.8 Vertical Visibility. Visibility into a surface based obscuring phenomena perpendicular to the surface of the earth.

1.4 OBSCURATIONS.

1.4.1 Obscuring Phenomena. Any collection of aerosol particles aloft or in contact with the earth's surface which is dense enough to be detected from the surface of the earth.

1.4.2 Fog. Suspension of minute water droplets which are based on the earth's surface and extend vertically to at least 20 feet (6 m) and reduces horizontal and vertical visibility.

1.4.2.1 Ground Fog. Fog which extends vertically to less than 20 feet (6 m).

1.4.2.2 Ice Fog. A suspension of minute ice crystals which are based on the earth's surface and reduces horizontal and vertical visibility.

1.4.3 Blowing Spray. Water droplets lifted from a body of water and carried in such quantities that the horizontal visibility is reduced.

1.4.4 Blowing Snow. Snow lifted by wind from the earth's surface to a height of 6 feet (2 m) or more above the ground.

1.4.5 Particulates.

1.4.5.1 Dust. Finely divided earthy matter suspended in the atmosphere which imparts a tannish or grayish hue to distant objects and gives the sun's disk a yellowish tinge or the disk appears pale and colorless.

1.4.5.2 Haze. Suspended dust or salt particles so small they cannot be individually identified and are distinguished from fog by a bluish or yellowish tinge.

1.4.5.3 Smoke. Fine ash particles suspended in the atmosphere which often cause the sun's disk to appear quite red.

1.4.5.4 Blowing Dust. Finely divided earthy matter picked up from the earth's surface and carried aloft and moved by the wind in clouds or sheets.

1.4.5.5 Blowing Sand. Sand picked up from the earth's surface and carried aloft and moved by the wind in clouds or sheets.

1.5 PRECIPITATION.

1.5.1 Precipitation. Any of the forms of water particles, whether

liquid or solid, that fall from the atmosphere and reach the ground.

1.5.1.1 Precipitation Rate. The amount of water, liquid or solid, that reaches the ground in a unit of time.

1.5.1.2 Precipitation Accumulation. The vertical depth of the amount of precipitation which reaches the earth's surface during a specified period of time.

1.5.2 Liquid Precipitation.

1.5.2.1 Rain. Precipitation composed of water drops with diameters of 0.02 inches (0.5 mm) or greater.

1.5.2.2 Freezing Rain. Rain that freezes upon contact with objects.

1.5.2.3 Drizzle. Precipitation composed exclusively of water drops smaller than 0.02 inches (0.5 mm) in diameter.

1.5.2.4 Freezing Drizzle. Drizzle that freezes upon contact with objects.

1.5.3 Solid Precipitation.

1.5.3.1 Snow. Precipitation composed of ice crystals usually of complex branched hexagonal form.

1.5.3.2 Snow Grains. Precipitation of small, white, opaque, grains of ice, similar in structure to snow crystals. The grains are flat or elongated. It is the solid equivalent of drizzle.

1.5.3.3 Snow Pellets. Precipitation of white and opaque grains of ice, about 0.08 to 0.2 inches (2 to 5 mm) in diameter. These pellets are spherical or sometimes conical. They are crisp and easily compressed.

1.5.3.4 Hail. Precipitation composed of pieces of ice generally associated with convective activity and having a diameter in excess of 0.2 inches (5 mm).

1.5.3.5 Ice Crystals. Unbranched crystals in the form of needles, columns, or plates, which fall very slowly to the surface.

1.5.3.6 Ice Pellets. Transparent or translucent pieces of ice less than 0.2 inches (5 mm) in diameter that rebound when striking hard ground.

1.5.3.7 Snow Accumulation. The vertical depth of the amount of snow which reached the earth's surface during a specified period of time.

1.5.3.8 Total Snow Depth. The total vertical extent of a column of snow.

1.5.3.9 Water Equivalent. The liquid equivalent of solid precipitation expressed as a vertical depth.

1.5.4 Precipitation Intensities.

	<u>Rain or Ice Pellets</u>	<u>Snow or Drizzle*</u>	<u>Light Drizzle & Fog when visibility < 500 m</u>
Light	less than 0.10"/h or less than 0.01"/6 min (less than 2 mm/h or less than 0.2 mm/6 min)	Visibility 5/8 mile (1000 m) or more	less than 0.01"/h (0.2 mm/h)
Moderate	All values between light and heavy	All values between light and heavy	All values between light and heavy
Heavy	0.30"/h (8 mm/h) or more or 0.03"/6 min (0.8 mm/6 min) or more	Visibility less than 5/16 mile (500 m)	0.03"/h (0.8 mm/h) or more

No intensities are assigned to hail or ice crystals.

* Must be occurring alone to use visibility as a discriminator.

1.6 CONVECTIVE ACTIVITY.

1.6.1 Thunderstorm. A localized storm characterized by one or more electrical discharges.

1.6.1.1 Severe Thunderstorm. A thunderstorm accompanied by wind gusts of 50 knots (25 m/s) or greater or hail 0.75 inches (20 mm) in diameter or greater.

1.6.2. Funnel Cloud. A pronounced v-shaped cloud rotating rapidly which is usually appended to a cumulonimbus cloud.

1.6.2.1 Tornado. A funnel cloud that touches the ground.

1.6.2.2 Waterspout. A funnel cloud that touches a body of water.

1.7 TEMPERATURE AND DEW POINT.

1.7.1 Temperature. A measure of the average kinetic energy of the molecules of the air.

1.7.2 Maximum Temperature. The highest temperature during a specified period.

1.7.3 Minimum Temperature. The lowest temperature during a specified period.

1.7.4 Dry-Bulb Temperature. The temperature of the air as would be measured with the dry-bulb thermometer of a psychrometer.

1.7.5 Wet-Bulb Temperature. The temperature a parcel of air would have if cooled adiabatically at constant pressure by evaporation of water into it, when all latent heat is supplied by the parcel.

1.7.6 Dew Point. The temperature to which a given parcel of air must be cooled at constant pressure and constant water vapor content in order for saturation to occur.

1.7.7 Relative Humidity. The ratio expressed as a percentage of the actual vapor pressure of the air to the saturation vapor pressure.

1.7.8 Radiative Temperature. The temperature of an object determined by measuring black body radiative emission from the object.

1.8 WIND.

1.8.1 Wind Direction. The direction from which the air is moving at a given location.

1.8.1.1 Variable Wind Direction. Wind direction which fluctuates by 60 degrees or more during the period of time the wind direction is being determined.

1.8.1.2 Wind Shift. A change in the average wind direction of 45 degrees or more which takes place in less than 15 minutes, if the wind speed during the period is more than 6 knots (3 m/s).

1.8.2 Wind Speed. The rate of horizontal motion of the air past a given point.

1.8.2.1 Light Wind. Wind speeds of six knots (3 m/s) or less.

1.8.2.2 Peak Wind. The greatest 5-second average wind speed during the previous hour that exceeded 35 knots (17 m/s)

1.8.2.3 Fastest Mile. The fastest wind speed in miles per hour of any wind over the 24-hour observation day.

1.8.2.4 Wind Gust. The maximum 5-second average wind speed which exceeds the minimum 5-second average during a 1-minute period by at least 10 knots (5 m/s), exceeds the current 2-minute average wind speed by at least 5 knots (2.5 m/s) and occurs within the previous 10 minutes.

1.8.2.5 Gust Spread. The limits of wind speed between peak and lull when that difference is 10 knots (5 m/s) or more.

1.8.2.6 Squall. An increase in wind speed of at least 15 knots (7.5 m/s) that occurs in less than one minute and is sustained at a speed of 20 knots (10 m/s) or more for at least one minute but not more than five minutes.

1.9 PRESSURE

1.9.1 Station Pressure. The pressure of free air at an assigned station location and elevation.

1.9.2 Sea-Level Pressure. The pressure value obtained by the theoretical reduction or increase of station pressure to sea level.

1.9.3 Altimeter Setting. The pressure value to which an aircraft altimeter scale is set so it will indicate the altitude above mean-sea-level of the aircraft on the ground at the location for which the pressure value was determined.

1.9.4 Density Altitude. The pressure altitude corrected for temperature deviations from the standard atmosphere.

1.9.5 Pressure Altitude. The height of the standard atmosphere at which the station pressure would be observed.

1.9.6 Pressure Change. The net difference between the pressure at the beginning and ending of a specified interval of time.

1.9.7 Pressure Falling Rapidly. A decrease in station pressure at a rate of 0.06 inch of mercury (200 Pa) or more per hour and which totals 0.02 inch (70 Pa) or more.

1.9.8 Pressure Jump. A rise in pressure at the rate of 0.06 inch of mercury (200 Pa) or more per hour followed by an abrupt fall at the rate of 0.06 inch (200 Pa) per hour and both the rise and fall each equals 0.03 inch (100 Pa) or more.

1.9.9 Pressure Rising Rapidly. An increase in station pressure at the rate of 0.06 inch of mercury (200 Pa) or more per hour and which totals 0.02 inch (70 Pa) or more which does not meet the criteria for pressure jump.

1.9.10 Pressure Tendency. The character and amount of atmospheric pressure change during a specified period of time.

1.9.11 Pressure Unsteady. A pressure that fluctuates by 0.03 inch of mercury (100 Pa) or more from the mean pressure during the period of measurement.

1.9.12 Pressure Characteristic. The pattern of the pressure change during a specified period of time.

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