

Manual on the Global Observing System

Volume II – Regional Aspects

2011 edition



**World
Meteorological
Organization**

WMO-No. 544

Weather • Climate • Water

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INTRODUCTION

1. The material contained in Volume II does not form part of the WMO Technical Regulations and is applicable only to the Members of the regional associations concerned. The words "shall" and "should" mentioned in this volume have their dictionary meanings and do not have the regulatory character mentioned in the introduction to Volume I and in the Introduction to the WMO *Technical Regulations* (WMO-No. 49).

2. Volume II is divided into sections corresponding to the six Regions of the World Meteorological Organization and the Antarctic, namely:

Region I	Africa
Region II	Asia
Region III	South America
Region IV	North America, Central America and the Caribbean
Region V	South-West Pacific
Region VI	Europe
Antarctic	

3. Each of the sections mentioned in paragraph 2 above is based on the resolution adopted by the regional association concerned and, as regards the Antarctic, by the Executive Council or the WMO Congress.

1. REGION I

AFRICA

1.1 REGIONAL BASIC SYNOPTIC NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS

- (a) Target requirements (TRQs) refer to desired characteristics of network stations;
- (b) Minimum requirements (MRQs) refer to threshold characteristics which are decisive for inclusion or exclusion of a station.

1.1.1 Composition of the Regional Basic Synoptic Network

The inclusion of a station in the network implies a clear commitment by the Member concerned to make fair efforts for (maintaining) compliance with the TRQs.

1.1.1.1 The Regional Basic Synoptic Network (RBSN) of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBSN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 1.1.3 below).

In the table below, TRQs and MRQs for RBSN stations are recorded.

1.1.1.2 Manned surface land stations included in the RBSN shall conform to the specifications laid down for land stations in Volume I of this Manual.

1.1.2.2 Classification of stations

Stations are classified according to their performance with reference to the requirements in 1.1.2.1 above:

1.1.2 Criteria for inclusion of stations in the Regional Basic Synoptic Network

- (a) Those stations meeting all TRQs are classified as OK;
- (b) Those stations meeting all MRQs are classified as IP (incomplete programme);
- (c) Operational stations not meeting all MRQs are classified as BC (below criteria);
- (d) Silent stations are classified as NO (not operating).

1.1.2.1 Definition of the criteria

For the definition of the criteria, two types of requirements are distinguished:

	<i>TRQ Surface</i>	<i>MRQ Surface</i>	<i>TRQ Upper-air</i>	<i>MRQ Upper-air</i>
Parameters (measured and recorded)	Pressure Temperature Wind Humidity Weather Visibility Cloud cover Cloud base	Pressure Temperature Wind (not for buoys) Humidity (not for buoys)	Pressure/ geopotential Temperature Wind Humidity	Pressure/ geopotential Temperature Wind Humidity
Level	Surface	Surface	Up to 10 hPa	Up to 100 hPa
Observations at main hours UTC	4	3	2 (at 0000 and 1200)	1 (at 1200)
Observations at main and intermediate hours (i.e., 3 hourly)	8	5	–	–
Availability of data	100%	50%	100%	50%

1.1.2.3 **Horizontal distribution of surface stations**

- (a) As an ideal target over land areas, the RBSN should have a horizontal resolution of 150 km for surface and 250 km for upper-air stations;
- (b) As an optimal target over land areas, the RBSN should have a horizontal resolution of 250 km for surface and 500 km for upper-air stations;
- (c) OK stations are acceptable if at a distance of at least 60 km from the nearest network station.

1.1.2.4 **Application of the criteria**

The criteria are developed and revised periodically by the Association at each of its sessions, which take place every four years. These criteria should ensure a network with an optimum composition regarding the observing programme, reliability of reception and spacing of stations. In particular, the criteria should allow for the inclusion of stations with reduced observing programmes in data-sparse areas.

1.1.3 **Arrangements and procedures for updating and amending the Regional Basic Synoptic Network**

Certain minor changes in the RBSN of surface and upper-air stations that do not affect the data requirements of the Region as a whole are inevitable. To provide a simple and rapid means of effecting changes proposed by the Members concerned, the following procedure shall be followed:

- (a) The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of RBSN stations without formal consultation with the Members of the Association, it being understood that any change of substance, that is, one adversely affecting the density of the network or proposing a significant change in observational hours, would still require the formal agreement of Members through the adoption of a resolution by postal ballot;
- (b) The Secretary-General shall notify all Members of WMO through the Operational Newsletter or by circular letter of changes agreed with the president of the Association;
- (c) Each Member of the Association is encouraged to nominate a national focal point for WMO on operational matters related to the RBSN. The nominated national focal point should coordinate information with the chair of the respective subsidiary body of the Association and the Secretariat with a view to timely updating information regarding the RBSN.

1.2 **REGIONAL BASIC CLIMATOLOGICAL NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS**

1.2.1 **Composition of the Regional Basic Climatological Network**

1.2.1.1 The Regional Basic Climatological Network (RBCN) was established by the Association to provide a comprehensive network of CLIMAT reporting stations. It is based primarily on RBSN stations and includes all Global Climate Observing System (GCOS) Surface Network (GSN) and GCOS Upper-air Network (GUAN) stations, regardless of whether these report CLIMAT or not. The RBCN also includes all other stations that report CLIMAT needed for description of regional climate features, except those that are within 60 km of another network station. These other stations should be selected under the same criteria used for GSN stations. Non-RBSN stations reporting CLIMAT messages should be considered, particularly those with long records, as well as any Reference Climatological Stations.

1.2.1.2 The RBCN of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBCN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 1.2.2 below).

1.2.1.3 Members are urged to comply fully with the global and regional coding procedures and data-collection standards in accordance with procedures laid down in the WMO *Technical Regulations* (WMO-No. 49), *Manual on Codes* (WMO-No. 306), *Manual on the Global Telecommunication System* (WMO-No. 386) and in this Manual when operating the RBCN stations.

1.2.2 **Arrangements and procedures for updating and amending the Regional Basic Climatological Network**

The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of RBCN stations without formal consultation with the Members of the Association, following similar procedures to those specified for the RBSN.

1.3 REGIONAL ARRANGEMENTS AND PROCEDURES FOR OBSERVATIONS

1.3.1 Pressure-reduction method

1.3.1.1 According to this Manual, Volume I, Part III, Regulation 3.3.2.6, the atmospheric pressure at a station shall be reduced to mean sea level, except at those stations where the resolutions of the Association prescribe otherwise (see the *Manual on Codes* (WMO-No. 306), Volume II, Region I, Section A.1, 1/12.1.1).

1.3.1.2 The Association has not taken any decision regarding the introduction of a uniform method of pressure reduction throughout the Region and Members of the Region are free to use the method that suits them best.

1.3.2 Regional comparison of barometers

1.3.2.1 Each Member in the Region should ensure that the barometer of each observing station in its territory is traceable to a fixed national barometric standard, through an appropriate series of comparisons at least once every two years.

1.3.2.2 National barometric standards should be traceable to an absolute barometric standard recognized by WMO, within or outside the Region, through an appropriate intercomparison at least every 10 years.

Note: The term “barometric standard” is used rather than “standard barometer”, as often the standard is not a barometer, for example, a dead weight tester is a pressure standard, but not a barometer.

1.3.3 Ground weather radar observations

Considering the usefulness of exchanging, on a bilateral or multilateral basis, meteorological information obtained by ground weather radar stations, Members are urged to continue their efforts to install ground weather radar stations for detecting precipitation, including heavy rain, hail and other severe weather phenomena, and to exchange on a bilateral or multilateral basis the meteorological information so obtained using the appropriate WMO code form, for example, FM 94-XIV BUFR.

1.3.4 Regional Instrument Centres

1.3.4.1 Considering the need for regular calibration and maintenance of meteorological instruments to meet increasing needs for high-quality

meteorological and hydrological data, the requirements of Members in the Region for standardization of meteorological measurements, the need for international instrument comparisons and evaluations, and for training of instrument experts, the Regional Instrument Centres should be established according to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 1, [Annex 1.A](#).

1.3.4.2 The instrument centres in Algiers, Gaborone, Cairo and Nairobi are designated as Regional Instrument Centres.

1.3.5 Regional Radiation Centres

1.3.5.1 Considering the usefulness of the calibration of national and regional standard pyrhemometers against pyrhemometers of the World Standard Group at five-year intervals for guaranteeing the high quality of radiation data and noting Resolution 11 (EC-XXX) – National, Regional and World Radiation Centres, Regional Radiation Centres should be established according to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 7, [Annex 7.C](#).

1.3.5.2 The radiation centres in Tamanrasset (Algeria), Cairo, Lagos (Nigeria), Khartoum, Tunis and Kinshasa are designated as Regional Radiation Centres.

1.4 AIRCRAFT METEOROLOGICAL DATA RELAY PROGRAMME

Facing the degradation of the state of the network of upper-air stations in Africa, and in order to significantly increase the number of upper-air reports for the purpose of improving forecast quality, each Member of the Association is requested to urge its national airlines to join a regional or subregional aircraft meteorological data relay (AMDAR) programme.

1.5 GLOBAL CLIMATE OBSERVING SYSTEM

A summary of best practices involved in discharging the commitments made by the Member concerned regarding GCOS surface and upper-air stations is included in this Manual, Volume I, Part III, Regulation 2.9 (for GSN stations) and Regulation 2.10 (for GUAN stations).

2. REGION II

ASIA

2.1 REGIONAL BASIC SYNOPTIC NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS

2.1.1 Composition of the Regional Basic Synoptic Network

2.1.1.1 The Regional Basic Synoptic Network (RBSN) of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBSN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 2.1.5 below).

2.1.1.2 Manned surface land stations included in the RBSN shall conform to the specifications laid down for land stations in Volume I of this Manual.

2.1.2 Surface synoptic observations

All surface stations included in the RBSN should make surface observations at the four main standard times of observation, that is, 0000, 0600, 1200 and 1800 UTC, and at the four intermediate standard times of observation, that is, 0300, 0900, 1500 and 2100 UTC. Any surface station that cannot carry out the full observational programme should give priority to carrying out the observations at the main standard times.

2.1.3 Upper-air synoptic observations

2.1.3.1 All upper-air stations included in the RBSN should carry out radiosonde and radiowind observations at 0000 and 1200 UTC, and radiowind observations at 0600 and 1800 UTC. The radiosonde/radiowind observations carried out at 0000 and 1200 should reach the 30 hPa level for 50 per cent of the ascents. Carrying out the radiowind observations at 0000 and 1200 UTC should receive priority over the radiowind observations at 0600 and 1800 UTC.

2.1.3.2 Radiowind stations in the areas affected by tropical cyclones should, during the cyclone season, also make radiowind observations at 0600 and 1800 UTC, which should reach as far as practicable the 70 hPa level.

2.1.4 Principles to be applied when revising the Regional Basic Synoptic Network

The following principles should be applied when revising the RBSN:

- (a) As a target over land areas, the RBSN should have a horizontal resolution of 150 km for surface and 250 km for upper-air stations;
- (b) If an RBSN station was “silent” according to monitoring results and another RBSN station located nearby (less than 100 km for surface stations) had regularly reported its observation, the “silent” station should be replaced in the RBSN. If there is no alternative regularly reporting station nearby, the “silent” station may remain on the list if there is an intention to restore operations;
- (c) In data-sparse areas existing stations may be nominated for the RBSN even if there are no plans for them to carry out the full schedule of observations;
- (d) The nomination by a Member of a station in the network implies a clear commitment of the Member concerned to make an effort to carry out the schedule of observations.

2.1.5 Arrangements and procedures for updating and amending the Regional Basic Synoptic Network

Certain minor changes in the RBSN of surface and upper-air stations that do not affect the data requirements of the Region as a whole are inevitable. To provide a simple and rapid means of effecting changes proposed by the Members concerned, the following procedure shall be followed:

- (a) The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of RBSN stations without formal consultation with the Members of the Association, it being understood that any change of substance, that is, one adversely affecting the density of the network or proposing a significant change in observational hours, would still require the formal agreement of Members through the adoption of a resolution by postal ballot;

- (b) The Secretary-General shall notify all Members of WMO through the Operational Newsletter or by circular letter of changes agreed with the president of the Association;
- (c) Each Member of the Association is encouraged to nominate a national focal point for WMO on operational matters related to the RBSN. The nominated national focal point should coordinate information with the chair of the respective subsidiary body of the Association and the Secretariat with a view to timely updating information regarding the RBSN.

2.2 REGIONAL BASIC CLIMATOLOGICAL NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS

2.2.1 Composition of the Regional Basic Climatological Network

2.2.1.1 The Regional Basic Climatological Network (RBCN) was established by the Association to provide a comprehensive network of CLIMAT reporting stations. It is based primarily on RBSN stations and includes all Global Climate Observing System (GCOS) Surface Network (GSN) and GCOS Upper-air Network (GUAN) stations, regardless of whether these report CLIMAT or not. The RBCN also includes all other stations that report CLIMAT needed for description of regional climate features. These other stations should be selected under the same criteria used for GSN stations. Non-RBSN stations reporting CLIMAT messages should be considered, particularly those with long records, as well as any Reference Climatological Stations.

2.2.1.2 The RBCN of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBCN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 2.2.2 below).

2.2.1.3 Members are urged to comply fully with the global and regional coding procedures and data-collection standards in accordance with procedures laid down in the WMO *Technical Regulations* (WMO-No. 49), *Manual on Codes* (WMO-No. 306), *Manual on the Global Telecommunication System* (WMO-No. 386) and in this Manual when operating the RBCN stations.

2.2.2 Arrangements and procedures for updating and amending the Regional Basic Climatological Network

The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of RBCN stations without formal consultation with the Members of the Association, following similar procedures to those specified for the RBSN.

2.3 REGIONAL ARRANGEMENTS AND PROCEDURES FOR OBSERVATIONS

2.3.1 Pressure-reduction method

2.3.1.1 According to this Manual, Volume I, Part III, Regulation 3.3.2.6, the atmospheric pressure at a station shall be reduced to mean sea level, except at those stations where the resolutions of the Association prescribe otherwise (see the *Manual on Codes* (WMO-No. 306), Volume II, Region II, Section A.1, 2/12.2.1).

2.3.1.2 The Association has not taken any decision regarding the introduction of a uniform method of pressure reduction throughout the Region, as it considers that a uniform method of pressure reduction could be used only in areas that have similar lapse rates of temperature and humidity in the lower troposphere. On this general principle, it is of the opinion that different formulae may be needed for different climatic areas. A number of selected methods of pressure reduction were consequently elaborated and were included in the *Note on the Standardization of Pressure Reduction Methods in the International Network of Synoptic Stations* (WMO-No. 154, Technical Note No. 61) (out of print).

2.3.2 Regional comparison of barometers

2.3.2.1 Each Member in the Region should ensure that the barometer of each observing station in its territory is traceable to a fixed national barometric standard, through an appropriate series of comparisons at least once every three years.

2.3.2.2 National barometric standards should be traceable to an absolute barometric standard

recognized by WMO, within or outside the Region, through an appropriate intercomparison at least every 10 years.

Note: The term “barometric standard” is used rather than “standard barometer”, as often the standard is not a barometer; for example, a dead weight tester is a pressure standard, but not a barometer.

2.3.2.3 The standard barometer in Calcutta (India) shall be recognized as the reference standard barometer for the Region.

2.3.3 **Ground weather radar observations**

Considering the value of ground weather radar observations for forecasting purposes and their essential role in detecting and tracking tropical cyclones, Members that have not yet done so are invited to establish and maintain ground weather radar stations for synoptic and particularly tropical cyclone warning purposes. Weather radars have also demonstrated their usefulness for short-range weather forecasting, in particular for the assessment of area precipitation.

2.3.4 **Regional Instrument Centres**

2.3.4.1 Considering the need for regular calibration and maintenance of meteorological instruments to meet increasing needs for high-quality meteorological and hydrological data, the requirements of Members in the Region for standardization of meteorological measurements, the need for international instrument comparisons and evaluations, and for training of instrument experts, the Regional Instrument Centres should be established according

to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 1, [Annex 1.A](#).

2.3.4.2 The instrument centres in Beijing and Tsukuba (Japan) are designated as Regional Instrument Centres.

2.3.5 **Regional Radiation Centres**

2.3.5.1 Considering the usefulness of the calibration of national and regional standard pyrhemometers against pyrhemometers of the World Standard Group at five-year intervals for guaranteeing the high quality of radiation data and noting Resolution 11 (EC-XXX) – National, Regional and World Radiation Centres, Regional Radiation Centres should be established according to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 7, [Annex 7.C](#).

2.3.5.2 The radiation centres in Pune (India) and Tokyo are designated as Regional Radiation Centres.

2.4 **GLOBAL CLIMATE OBSERVING SYSTEM**

A summary of best practices involved in discharging the commitments made by the Member concerned regarding GCOS surface and upper-air stations is included in this Manual, Volume I, Part III, Regulation 2.9 (for GSN stations) and Regulation 2.10 (for GUAN stations).

3. REGION III

SOUTH AMERICA

3.1 REGIONAL BASIC SYNOPTIC NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS

- (a) Target requirements (TRQs) refer to desired characteristics of network stations;
- (b) Minimum requirements (MRQs) refer to threshold characteristics which are decisive for inclusion or exclusion of a station.

3.1.1 Composition of the Regional Basic Synoptic Network

The inclusion of a station in the network implies a clear commitment by the Member concerned to make fair efforts for (maintaining) compliance with the TRQs.

3.1.1.1 The Regional Basic Synoptic Network (RBSN) of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBSN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 3.1.3 below).

In the table below, TRQs and MRQs for RBSN stations are recorded.

3.1.1.2 Manned surface land stations included in the RBSN shall conform to the specifications laid down for land stations in Volume I of this Manual.

3.1.2.2 Classification of stations

Stations are classified according to their performance with reference to the requirements in 3.1.2.1 above:

3.1.2 Criteria for inclusion of stations in the Regional Basic Synoptic Network

- (a) Those stations meeting all TRQs are classified as OK;
- (b) Those stations meeting all MRQs are classified as IP (incomplete programme);
- (c) Operational stations not meeting all MRQs are classified as BC (below criteria);
- (d) Silent stations are classified as NO (not operating).

3.1.2.1 Definition of the criteria

For the definition of the criteria, two types of requirements are distinguished:

	<i>TRQ Surface</i>	<i>MRQ Surface</i>	<i>TRQ Upper-air</i>	<i>MRQ Upper-air</i>
Parameters (measured and recorded)	Pressure Temperature Wind Humidity Weather Visibility Cloud cover Cloud base	Pressure Temperature Wind (not for buoys) Humidity (not for buoys)	Pressure/ geopotential Temperature Wind Humidity	Pressure/ geopotential Temperature Wind Humidity
Level	Surface	Surface	Up to 10 hPa	Up to 100 hPa
Observations at main hours UTC	4	3	2 (at 0000 and 1200)	1 (at 0000 or 1200)
Observations at main and intermediate hours (i.e., 3 hourly)	8	5	–	–
Availability of data	100%	50%	100%	50%

3.1.2.3 **Horizontal distribution of surface stations**

- (a) As an ideal target over land areas, the RBSN should have a horizontal resolution of 150 km for surface and 250 km for upper-air stations;
- (b) As an optimal target over land areas, the RBSN should have a horizontal resolution of 250 km for surface and 500 km for upper-air stations;
- (c) OK stations are acceptable if at a distance of at least 60 km from the nearest network station.

3.1.2.4 **Application of the criteria**

The criteria are developed and revised periodically by the Association at each of its sessions, which take place every four years. These criteria should ensure a network with an optimum composition regarding the observing programme, reliability of reception and spacing of stations. In particular, the criteria should allow for the inclusion of stations with reduced observing programmes in data-sparse areas.

3.1.3 **Arrangements and procedures for updating and amending the Regional Basic Synoptic Network**

Certain minor changes in the RBSN of surface and upper-air stations that do not affect the data requirements of the Region as a whole are inevitable. To provide a simple and rapid means of effecting changes proposed by the Members concerned, the following procedure shall be followed:

- (a) The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of RBSN stations without formal consultation with the Members of the Association, it being understood that any change of substance, that is, one adversely affecting the density of the network or proposing a significant change in observational hours, would still require the formal agreement of Members through the adoption of a resolution by postal ballot;
- (b) The Secretary-General shall notify all Members of WMO through the Operational Newsletter or by circular letter of changes agreed with the president of the Association.
- (c) Each Member of the Association is encouraged to nominate a national focal point for WMO on operational matters related to the RBSN. The nominated national focal point should coordinate information with the chair of the respective subsidiary body of the Association and the Secretariat with a view to timely updating information regarding the RBSN.

3.2 **REGIONAL BASIC CLIMATOLOGICAL NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS**

3.2.1 **Composition of the Regional Basic Climatological Network**

3.2.1.1 The Regional Basic Climatological Network (RBCN) was established by the Association to provide a comprehensive network of CLIMAT reporting stations. It is based primarily on RBSN stations and includes all Global Climate Observing System (GCOS) Surface Network (GSN) and GCOS Upper-air Network (GUAN) stations, regardless of whether these report CLIMAT or not. The RBCN also includes all other stations that report CLIMAT needed for description of regional climate features, except those that are within 60 km of another network station. These other stations should be selected under the same criteria used for GSN stations. Non-RBSN stations reporting CLIMAT messages should be considered, particularly those with long records, as well as any Reference Climatological Stations.

3.2.1.2 The RBCN of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBCN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 3.2.2 below).

3.2.1.3 Members are urged to comply fully with the global and regional coding procedures and data-collection standards in accordance with procedures laid down in the WMO *Technical Regulations* (WMO-No. 49), *Manual on Codes* (WMO-No. 306), *Manual on the Global Telecommunication System* (WMO-No. 386) and in this Manual when operating the RBCN stations.

3.2.2 **Arrangements and procedures for updating and amending the Regional Basic Climatological Network**

The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of RBCN stations without formal consultation with the Members of the Association, following similar procedures to those specified for the RBSN.

3.3 REGIONAL ARRANGEMENTS AND PROCEDURES FOR OBSERVATIONS

appropriate WMO code form, for example, FM 94-XIV BUFR.

3.3.1 Pressure-reduction method

3.3.1.1 According to this Manual, Volume I, Part III, Regulation 3.3.2.6, the atmospheric pressure at a station shall be reduced to mean sea level, except at those stations where the resolutions of the Association prescribe otherwise (see the *Manual on Codes* (WMO-No. 306), Volume II, Region III, Section A.1, 3/12.1.1).

3.3.1.2 The Association has not taken any decision regarding the introduction of a uniform method of pressure reduction throughout the Region and Members of the Region are free to use the method that suits them best.

3.3.2 Regional comparison of barometers

3.3.2.1 Each Member in the Region should ensure that the barometer of each observing station in its territory is traceable to a fixed national barometric standard, through an appropriate series of comparisons at least once every two years.

3.3.2.2 National barometric standards should be traceable to an absolute barometric standard recognized by WMO, within or outside the Region, through an appropriate intercomparison at least every 10 years.

Note: The term “barometric standard” is used rather than “standard barometer”, as often the standard is not a barometer; for example, a dead weight tester is a pressure standard, but not a barometer.

3.3.3 Ground weather radar observations

Considering the usefulness of exchanging, on a bilateral or multilateral basis, meteorological information obtained by ground weather radar stations, Members are urged to continue their efforts to install ground weather radar stations for detecting precipitation, including heavy rain, hail and other severe weather phenomena, and to exchange on a bilateral or multilateral basis the meteorological information so obtained using the

3.3.4 Regional Instrument Centres

3.3.4.1 Considering the need for regular calibration and maintenance of meteorological instruments to meet increasing needs for high-quality meteorological and hydrological data, the requirements of Members in the Region for standardization of meteorological measurements, the need for international instrument comparisons and evaluations, and for training of instrument experts, the Regional Instrument Centres should be established according to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 1, [Annex 1.A](#).

3.3.4.2 The Meteorological Laboratory and Workshop of the National Meteorological Service of Argentina in Buenos Aires is designated as the Regional Instrument Centre.

3.3.5 Regional Radiation Centres

3.3.5.1 Considering the usefulness of the calibration of national and regional standard pyrhemeters against pyrhemeters of the World Standard Group at five-year intervals for guaranteeing the high quality of radiation data and noting Resolution 11 (EC-XXX) – National, Regional and World Radiation Centres, Regional Radiation Centres should be established according to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 7, [Annex 7.C](#).

3.3.5.2 The radiation centres in Buenos Aires, Santiago and Lima are designated as Regional Radiation Centres.

3.4 GLOBAL CLIMATE OBSERVING SYSTEM

A summary of best practices involved in discharging the commitments made by the Member concerned regarding GCOS surface and upper-air stations is included in this Manual, Volume I, Part III, Regulation 2.9 (for GSN stations) and Regulation 2.10 (for GUAN stations).

4. REGION IV

NORTH AMERICA, CENTRAL AMERICA AND THE CARIBBEAN

4.1 **REGIONAL BASIC SYNOPTIC NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS**

4.1.1 **Composition of the Regional Basic Synoptic Network**

4.1.1.1 The Regional Basic Synoptic Network (RBSN) of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBSN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 4.1.5 below).

4.1.1.2 Manned surface land stations included in the RBSN shall conform to the specifications laid down for land stations in Volume I of this Manual.

4.1.2 **Surface synoptic observations**

All surface stations included in the RBSN should make surface observations at the four main standard times of observation, that is, 0000, 0600, 1200 and 1800 UTC, and at the four intermediate standard times of observation, that is, 0300, 0900, 1500 and 2100 UTC. Any surface station that cannot carry out the full observational programme should give priority to carrying out the observations at the main standard times.

4.1.3 **Upper-air synoptic observations**

All upper-air stations included in the RBSN should carry out radiosonde and/or radiowind observations up to the 10 hPa level at 0000 and 1200 UTC. Stations that are unable to carry out the full observing programme should give priority to the making of observations at 1200 UTC.

4.1.4 **Principles to be applied when revising the Regional Basic Synoptic Network**

The following principles should be applied when revising the RBSN:

- (a) As a target over land areas, the RBSN should have a horizontal resolution of 150 km for surface and 250 km for upper-air stations;
- (b) If an RBSN station was “silent” according to monitoring results and another RBSN station located nearby (less than 100 km for surface

stations) had regularly reported its observation, the “silent” station should be replaced in the RBSN. If there is no alternative regularly reporting station nearby, the “silent” station may remain on the list if there is an intention to restore operations;

- (c) In data-sparse areas existing stations may be nominated for the RBSN even if there are no plans for them to carry out the full schedule of observations;
- (d) The nomination by a Member of a station in the network implies a clear commitment of the Member concerned to make an effort to carry out the schedule of observations.

4.1.5 **Arrangements and procedures for updating and amending the Regional Basic Synoptic Network**

Certain minor changes in the RBSN of surface and upper-air stations that do not affect the data requirements of the Region as a whole are inevitable. To provide a simple and rapid means of effecting changes proposed by the Members concerned, the following procedure shall be followed:

- (a) The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of RBSN stations without formal consultation with the Members of the Association, it being understood that any change of substance, that is, one adversely affecting the density of the network or proposing a significant change in observational hours, would still require the formal agreement of Members through the adoption of a resolution by postal ballot;
- (b) The Secretary-General shall notify all Members of WMO through the Operational Newsletter or by circular letter of changes agreed with the president of the Association;
- (c) Each Member of the Association is encouraged to nominate a national focal point for WMO on operational matters related to the RBSN. The nominated national focal point should coordinate information with the chair of the respective subsidiary body of the Association and the Secretariat with a view to timely updating information regarding the RBSN.

4.2 REGIONAL BASIC CLIMATOLOGICAL NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS

4.2.1 Composition of the Regional Basic Climatological Network

4.2.1.1 The Regional Basic Climatological Network (RBCN) was established by the Association to provide a comprehensive network of CLIMAT reporting stations. It is based primarily on RBSN stations and includes all Global Climate Observing System (GCOS) Surface Network (GSN) and GCOS Upper-air Network (GUAN) stations, regardless of whether these report CLIMAT or not. The RBCN also includes all other stations that report CLIMAT needed for description of regional climate features. These other stations should be selected under the same criteria used for GSN stations. Non-RBSN stations reporting CLIMAT messages should be considered, particularly those with long records, as well as any Reference Climatological Stations.

4.2.1.2 The RBCN of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBCN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 4.2.2 below).

4.2.1.3 Members are urged to comply fully with the global and regional coding procedures and data-collection standards in accordance with procedures laid down in the WMO *Technical Regulations* (WMO-No. 49), *Manual on Codes* (WMO-No. 306), *Manual on the Global Telecommunication System* (WMO-No. 386) and in this Manual when operating the RBCN stations.

4.2.2 Arrangements and procedures for updating and amending the Regional Basic Climatological Network

The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of RBCN stations without formal consultation with the Members of the Association, following similar procedures to those specified for the RBSN.

4.3 REGIONAL ARRANGEMENTS AND PROCEDURES FOR OBSERVATIONS

4.3.1 Pressure-reduction method

According to this Manual, Volume I, Part III, Regulation 3.3.2.6, the atmospheric pressure at a station shall be reduced to mean sea level. However, pending a worldwide decision on a uniform pressure-reduction method, the method being used in the United States of America for reducing atmospheric pressure to mean sea level should be applied in the Region.

4.3.2 Regional comparison of barometers

4.3.2.1 Each Member in the Region should ensure that the barometer of each observing station in its territory is traceable to a fixed national barometric standard, through an appropriate series of comparisons at least once every two years.

4.3.2.2 National barometric standards should be traceable to an absolute barometric standard recognized by WMO, within or outside the Region, through an appropriate intercomparison at least every 10 years.

4.3.2.3 The barometric standard at the National Institute of Standards and Technology (NIST), Gaithersburg, Maryland (United States) shall be recognized as the absolute standard for the Region.

4.3.2.4 The barometric standards in Guatemala City, Mexico, D.F., Miami, Florida (United States), San Juan (Puerto Rico), Silver Spring, Maryland (United States) and Toronto (Canada) shall be the subregional standard barometers for the Region.

Notes:

1. The term "barometric standard" is used rather than "standard barometer", as often the standard is not a barometer, for example, a dead weight tester is a pressure standard, but not a barometer.
2. There is no standard barometer in Washington, D.C. The standard barometer at the National Weather Service Headquarters in Silver Spring is not a national standard, but a working standard traceable to NIST.

4.3.3 Ground weather radar observations

Meteorological radars are important for both operational and research purposes in synoptic meteorology and hydrology, and in improving the accuracy of short-period forecasts, especially those

for aviation, while non-meteorological radars, such as aircraft surveillance radars, may often be used advantageously for meteorological purposes and thus fill any temporary gaps in the radar network. Members should therefore take all practical steps to encourage the installation of meteorological radars in their own countries, coordinating, where desirable, with neighbouring countries, and should also make maximum use of non-meteorological radars for meteorological purposes.

4.3.4 **Regional Instrument Centres**

4.3.4.1 Considering the need for regular calibration and maintenance of meteorological instruments to meet increasing needs for high-quality meteorological and hydrological data, the requirements of Members in the Region for standardization of meteorological measurements, the need for international instrument comparisons and evaluations, and for training of instrument experts, the Regional Instrument Centres should be established according to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 1, [Annex 1.A](#).

4.3.4.2 The instrument centres at Mount Washington, New Hampshire (United States), the Caribbean Institute for Meteorology and Hydrology, Bridgetown and the Regional Training Centre in

San José are designated as Regional Instrument Centres.

4.3.5 **Regional Radiation Centres**

4.3.5.1 Considering the usefulness of the calibration of national and regional standard pyrhemeters against pyrhemeters of the World Standard Group at five-year intervals for guaranteeing the high quality of radiation data and noting Resolution 11 (EC-XXX) – National, Regional and World Radiation Centres, Regional Radiation Centres should be established according to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 7, [Annex 7.C](#).

4.3.5.2 The radiation centres in Toronto (Canada), Mexico, D.F. and Boulder, Colorado (United States) are designated as Regional Radiation Centres.

4.4 **GLOBAL CLIMATE OBSERVING SYSTEM**

A summary of best practices involved in discharging the commitments made by the Member concerned regarding GCOS surface and upper-air stations is included in this Manual, Volume I, Part III, Regulation 2.9 (for GSN stations) and Regulation 2.10 (for GUAN stations).



5. REGION V

SOUTH-WEST PACIFIC

5.1 REGIONAL BASIC SYNOPTIC NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS

5.1.1 Composition of the Regional Basic Synoptic Network

5.1.1.1 The Regional Basic Synoptic Network (RBSN) of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBSN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 5.1.5 below).

5.1.1.2 Manned surface land stations included in the RBSN shall conform to the specifications laid down for land stations in Volume I of this Manual.

5.1.2 Surface synoptic observations

All surface stations included in the RBSN should make surface observations at the four main standard times of observation, that is, 0000, 0600, 1200 and 1800 UTC, and at the four intermediate standard times of observation, that is, 0300, 0900, 1500 and 2100 UTC. Any surface station that cannot carry out the full observational programme should give priority to carrying out the observations at the main standard times.

5.1.3 Upper-air synoptic observations

All upper-air stations included in the RBSN should carry out radiosonde and/or radiowind observations up to the 10 hPa level at 0000 and 1200 UTC. Additional radiowind observations at 0600 and 1800 UTC are also desirable. Any radiosonde station that cannot carry out the full observing programme required should give priority to making the 0000 UTC observations.

5.1.4 Principles to be applied when revising the Regional Basic Synoptic Network

The following principles should be applied when revising the RBSN:

(a) As a target over land areas, the RBSN should have a horizontal resolution of 150 km for surface and 250 km for upper-air stations;

- (b) If an RBSN station was “silent” according to monitoring results and another RBSN station located nearby (less than 100 km for surface stations) had regularly reported its observation, the “silent” station should be replaced in the RBSN. If there is no alternative regularly reporting station nearby, the “silent” station may remain on the list if there is an intention to restore operations;
- (c) In data-sparse areas existing stations may be nominated for the RBSN even if there are no plans for them to carry out the full schedule of observations;
- (d) The nomination by a Member of a station in the network implies a clear commitment of the Member concerned to make an effort to carry out the schedule of observations.

5.1.5 Arrangements and procedures for updating and amending the Regional Basic Synoptic Network

Certain minor changes in the RBSN of surface and upper-air stations that do not affect the data requirements of the Region as a whole are inevitable. To provide a simple and rapid means of effecting changes proposed by the Members concerned, the following procedure shall be followed:

- (a) The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of RBSN stations without formal consultation with the Members of the Association, it being understood that any change of substance, that is, one adversely affecting the density of the network or proposing a significant change in observational hours, would still require the formal agreement of Members through the adoption of a resolution by postal ballot;
- (b) The Secretary-General shall notify all Members of WMO through the Operational Newsletter or by circular letter of changes agreed with the president of the Association;
- (c) Each Member of the Association is encouraged to nominate a national focal point for WMO on operational matters related to the RBSN. The nominated national focal point should coordinate information with the chair of the respective subsidiary body of the Association and the Secretariat with a view to timely updating information regarding the RBSN.

5.2 REGIONAL BASIC CLIMATOLOGICAL NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS

RBCN stations without formal consultation with the Members of the Association, following similar procedures to those specified for the RBSN.

5.2.1 Composition of the Regional Basic Climatological Network

5.2.1.1 The Regional Basic Climatological Network (RBCN) was established by the Association to provide a comprehensive network of CLIMAT reporting stations. It is based primarily on RBSN stations and includes all Global Climate Observing System (GCOS) Surface Network (GSN) and GCOS Upper-air Network (GUAN) stations, regardless of whether these report CLIMAT or not. The RBCN also includes all other stations that report CLIMAT needed for description of regional climate features. These other stations should be selected under the same criteria used for GSN stations. Non-RBSN stations reporting CLIMAT messages should be considered, particularly those with long records, as well as any Reference Climatological Stations.

5.2.1.2 The RBCN of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBCN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 5.2.2 below).

5.2.1.3 Members are urged to comply fully with the global and regional coding procedures and data-collection standards in accordance with procedures laid down in the WMO *Technical Regulations* (WMO-No. 49), *Manual on Codes* (WMO-No. 306), *Manual on the Global Telecommunication System* (WMO-No. 386) and in this Manual when operating the RBCN stations.

5.2.1.4 CLIMAT reports from RBCN stations shall be regarded as essential data in the sense of Resolution 40 (Cg-XII) – WMO policy and practice for the exchange of meteorological and related data and products including guidelines on relationships in commercial meteorological activities.

5.2.2 Arrangements and procedures for updating and amending the Regional Basic Climatological Network

The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of

5.3 REGIONAL ARRANGEMENTS AND PROCEDURES FOR OBSERVATIONS

5.3.1 Pressure-reduction method

5.3.1.1 According to this Manual, Volume I, Part III, Regulation 3.3.2.6, the atmospheric pressure at a station shall be reduced to mean sea level, except at those stations where the resolutions of the Association prescribe otherwise (see the *Manual on Codes* (WMO-No. 306), Volume II, Region V, Section A.1, 5/12.1.1).

5.3.1.2 The Association has not taken any decision regarding the introduction of a uniform method of pressure reduction throughout the Region as it considers that, because of the topography of the Region and the fact that a large majority of the meteorological stations in the Region have an elevation of less than 300 metres, this is not a matter of great importance.

5.3.2 Regional comparison of barometers

5.3.2.1 Each Member in the Region should ensure that the barometer of each observing station in its territory is traceable to a fixed national barometric standard, through an appropriate series of comparisons at least once every two years.

5.3.2.2 National barometric standards should be traceable to an absolute barometric standard recognized by WMO, within or outside the Region, through an appropriate intercomparison at least every 10 years.

Note: The term “barometric standard” is used rather than “standard barometer”, as often the standard is not a barometer; for example, a dead weight tester is a pressure standard, but not a barometer.

5.3.2.3 The dead weight tester in the Australian Regional Instrument Centre in Melbourne shall be recognized as the reference standard barometer for the Region.

5.3.3 Ground weather radar observations

Considering that ground weather radar observations have demonstrated their usefulness for

short-range forecasting, for assessment of precipitation over a given area and for the tracking of tropical cyclones and disturbances, Members that have not yet done so are invited to establish and maintain ground weather radar stations. Members that operate weather radars are encouraged to exchange the data with other Members.

5.3.4 **Regional Instrument Centres**

5.3.4.1 Considering the need for regular calibration and maintenance of meteorological instruments to meet increasing needs for high-quality meteorological and hydrological data, the requirements of Members in the Region for standardization of meteorological measurements, the need for international instrument comparisons and evaluations, and for training of instrument experts, the Regional Instrument Centres should be established according to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 1, [Annex 1.A](#).

5.3.4.2 The instrument centres in Melbourne (Australia) and Manila are designated as Regional Instrument Centres.

5.3.5 **Regional Radiation Centres**

5.3.5.1 Considering the usefulness of the calibration of national and regional standard pyrhemometers against pyrhemometers of the World Standard Group at five-year intervals for guaranteeing the high quality of radiation data and noting Resolution 11 (EC-XXX) – National, Regional and World Radiation Centres, Regional Radiation Centres should be established according to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 7, [Annex 7.C](#).

5.3.5.2 The radiation centre in Melbourne (Australia) is designated as the Regional Radiation Centre.

5.4 **OTHER IN SITU OBSERVING SYSTEMS**

5.4.1 **Marine observations**

Members are urged to contribute to programmes for the collection of meteorological and oceanographic observations over ocean areas.

5.4.2 **Aircraft meteorological data relay programme**

In order to significantly increase the number of upper-air reports for improved analysis and forecasts, Members of the Association are requested to explore opportunities for obtaining reports from their national airlines as part of regional or sub-regional aircraft meteorological data relay (AMDAR) programmes.

5.4.3 **Space-based observations**

Members should possess the means to receive and display satellite imagery and quantitative data. For weather forecasting purposes the geostationary satellite imagery is a high priority. Meteorological research satellites are now considered part of the Global Observing System.

5.5 **GLOBAL CLIMATE OBSERVING SYSTEM**

5.5.1 Priority should be given by Members of the Association in the implementation of the various components of GCOS such as the GSN, GUAN and the Baseline Surface Radiation Network.

5.5.2 A summary of best practices involved in discharging the commitments made by the Member concerned regarding GCOS surface and upper-air stations is included in this Manual, Volume I, Part III, Regulation 2.9 (for GSN stations) and Regulation 2.10 (for GUAN stations).

6. REGION VI

EUROPE

6.1 REGIONAL BASIC SYNOPTIC NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS

6.1.1 Composition of the Regional Basic Synoptic Network

6.1.1.1 The Regional Basic Synoptic Network (RBSN) of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBSN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 6.1.3 below).

6.1.1.2 Manned surface land stations included in the RBSN shall conform to the specifications laid down for land stations in Volume I of this Manual.

6.1.2 Criteria for inclusion of stations in the Regional Basic Synoptic Network

6.1.2.1 Definition of the criteria

For the definition of the criteria, two types of requirements are distinguished:

- (a) Target requirements (TRQs) refer to desired characteristics of network stations;
- (b) Minimum requirements (MRQs) refer to threshold characteristics which are decisive for inclusion or exclusion of a station.

The inclusion of a station in the network implies a clear commitment by the Member concerned to make fair efforts for (maintaining) compliance with the TRQs.

In the table below, TRQs and MRQs for RBSN stations are recorded.

	<i>TRQ Surface</i>	<i>MRQ Surface</i>	<i>TRQ Upper-air</i>	<i>MRQ Upper-air</i>
Parameters (measured and recorded)	<i>All</i> Pressure Temperature Wind Humidity <i>Land stations</i> Precipitation amount Present weather Visibility Cloud cover Cloud base <i>Marine stations</i> SST Significant wave height	<i>All</i> Pressure <i>Land stations</i> Temperature Wind Humidity <i>Marine stations</i> SST	Pressure/ geopotential Temperature Wind Humidity	Pressure/ geopotential Temperature Wind Humidity
Level	–	–	Up to 10 hPa	Up to 100 hPa
Observations at main hours UTC	4	3	2 (at 0000 and 1200)	1 (at 0000 or 1200)
Observations at main and intermediate hours (i.e., 3 hourly)	8	5	–	–
Availability of data	95–100%	50%	95–100%	25%

Note: The availability percentage refers to the data amount required as a TRQ. Thus, for example, if a land station makes five observations per day, but on average only three are available, then it yields an availability of 37.5 per cent, not 60 per cent.

6.1.2.2 Classification of stations

Stations are classified according to their performance with reference to the requirements in 6.1.2.1 above:

- (a) Those stations meeting all TRQs are classified as OK;
- (b) Those stations meeting all MRQs are classified as IP (incomplete programme);
- (c) Operational stations not meeting all MRQs are classified as BC (below criteria);
- (d) Silent stations are classified as NO (not operating).

Silent stations should not be included in the network unless there are specific indications for a planned restoration of acceptable standards in the short term. The same holds for BC stations.

Note: TRQs are defined in accordance with the requirements set out in this Manual. These should be regarded as the level of performance that should be aimed at for all stations. MRQs have been defined as corresponding to the policy that has been applied in practice in the last few years. The definitions are such that these will not imply major changes in the current RBSN. MRQs form the minimum threshold for inclusion or exclusion.

6.1.2.3 Horizontal distribution of surface stations

Stations classified as OK are acceptable if at a distance of at least 60 km from the nearest network station; IP stations are acceptable if at a distance of at least 90 km from the nearest station. Stations classified as BC and NO are not acceptable as network stations.

6.1.2.4 Application of the criteria

The criteria are developed and revised periodically by the Association at each of its sessions, which take place every four years. If, during the intersessional period, a station performance drops below the MRQ, no automatic withdrawal is anticipated. In such cases, the continuation of the station in the network should be discussed by the president of the Association with the chair of the respective subsidiary body of the Association and the Member concerned, and appropriate action should be taken. If no recovery at least to MRQ standard is anticipated, the station should then be withdrawn.

6.1.3 Arrangements and procedures for updating and amending the Regional Basic Synoptic Network

Certain minor changes in the RBSN of surface and upper-air stations that do not affect the data requirements of the Region as a whole are inevitable. To provide a simple and rapid means of effecting

changes proposed by the Members concerned, the following procedure shall be followed:

- (a) The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of RBSN stations without formal consultation with the Members of the Association, it being understood that any change of substance, that is, one adversely affecting the density of the network or proposing a significant change in observational hours, would still require the formal agreement of Members through the adoption of a resolution by postal ballot;
- (b) The Secretary-General shall notify all Members of WMO through the Operational Newsletter or by circular letter of changes agreed with the president of the Association.

6.2 REGIONAL BASIC CLIMATOLOGICAL NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS

6.2.1 Composition of the Regional Basic Climatological Network

6.2.1.1 The Regional Basic Climatological Network (RBCN) was established by the Association to provide a comprehensive network of CLIMAT reporting stations. It is based primarily on RBSN stations and includes all Global Climate Observing System (GCOS) Surface Network (GSN) and GCOS Upper-air Network (GUAN) stations, regardless of whether these report CLIMAT or not. The RBCN also includes all other stations that report CLIMAT, except those that are within 60 km of another network station.

Note: This distance criterion may be overruled if there is a difference in altitude of more than 1 000 metres.

6.2.1.2 The RBCN of surface and upper-air observing stations is reviewed and revised at each session of the Association. The list of stations constituting the current RBCN is given in the report of the most recent session of the Association. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 6.2.2 below).

6.2.1.3 Members are urged to comply fully with the global and regional coding procedures and data-collection standards in accordance with procedures laid down in the WMO *Technical Regulations* (WMO-No. 49), *Manual on Codes* (WMO-No. 306), *Manual on the Global Telecommunication System*

(WMO-No. 386) and in this Manual when operating the RBCN stations.

6.2.2 **Arrangements and procedures for updating and amending the Regional Basic Climatological Network**

The Association authorizes its president to approve, at the request of the Member concerned, on the advice of the chair of the respective subsidiary body of the Association and in consultation with the Secretary-General, minor amendments to the list of RBCN stations without formal consultation with the Members of the Association, following similar procedures to those specified for the RBSN.

6.3 **REGIONAL ARRANGEMENTS AND PROCEDURES FOR OBSERVATIONS**

6.3.1 **Pressure-reduction method**

6.3.1.1 According to this Manual, Volume I, Part III, Regulation 3.3.2.6, the atmospheric pressure at a station shall be reduced to mean sea level, except at those stations where the resolutions of the Association prescribe otherwise (see the *Manual on Codes* (WMO-No. 306), Volume II, Region VI, Section A.1, 6/12.1.1).

6.3.1.2 The Association has not taken any decision regarding the introduction of a uniform method of pressure reduction throughout the Region, although the desirability of accepting a single method is generally recognized. However, it encourages Members, especially those for whom the problem of pressure reduction is of particular importance because of the nature of the orography of their country, to make further trials concerning the use of the formulae suggested in the *Note on the Standardization of Pressure Reduction Methods in the International Network of Synoptic Stations* (WMO-No. 154, Technical Note No. 61) (out of print).

6.3.2 **Regional comparison of barometers**

6.3.2.1 Each Member in the Region should ensure that the barometer of each observing station in its territory is traceable to a fixed national barometric standard, through an appropriate series of comparisons at least once every three years.

Note: The term “barometric standard” is used rather than “standard barometer”, as often the standard is not a barometer; for example, a dead weight tester is a pressure standard, but not a barometer.

6.3.2.2 The standard barometers in Hamburg (Germany), Saint Petersburg (Russian Federation), London and Trappes (France) shall be recognized as the reference standard barometers for the Region.

6.3.3 **Ground weather radar observations**

Considering the usefulness of exchanging, on a bilateral or multilateral basis, meteorological information obtained by ground weather radar stations, Members are urged to continue their efforts to install ground weather radar stations for detecting precipitation, including heavy rain, hail and other severe weather phenomena, and to exchange on a bilateral or multilateral basis the meteorological information so obtained using the appropriate WMO code form, for example, FM 94-XIV BUFR.

6.3.4 **Regional Instrument Centres**

6.3.4.1 Considering the need for regular calibration and maintenance of meteorological instruments to meet increasing needs for high-quality meteorological and hydrological data, the requirements of Members in the Region for standardization of meteorological measurements, the need for international instrument comparisons and evaluations, and for training of instrument experts, the Regional Instrument Centres should be established according to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 1, [Annex 1.A](#).

6.3.4.2 The Service des équipements et des techniques instrumentales de la météorologie in Trappes (France), the Calibration Laboratory of the Slovak Hydrometeorological Institute in Bratislava and the Calibration Laboratory of the Environmental Agency of the Republic of Slovenia in Ljubljana are designated as Regional Instrument Centres.

6.3.5 **Regional Radiation Centres**

6.3.5.1 Considering the usefulness of the calibration of national and regional standard pyrhemeters against pyrhemeters of the World Standard Group at five-year intervals for guaranteeing the high quality of radiation data and noting Resolution 11 (EC-XXX) – National, Regional and World Radiation Centres, Regional Radiation Centres should be established according to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8), Part I, Chapter 7, [Annex 7.C](#).

6.3.5.2 The radiation centres in Budapest, Davos (Switzerland), Lindenberg (Germany), Saint Petersburg (Russian Federation), Norrköping

(Sweden), Trappes/Carpentras (France) and Uccle (Belgium) are designated as Regional Radiation Centres.

6.4 **OTHER IN SITU OBSERVING SYSTEMS**

6.4.1 **Marine observations**

Members are urged to actively contribute to/participate in regional and subregional large-scale projects involved in the study of atmosphere–ocean interaction and the routine collection and dissemination of observations that support the requirements of the RBSN and RBCN.

6.4.2 **Aircraft meteorological data relay programme**

Members of the Association are strongly encouraged to become actively involved in the aircraft meteorological data relay (AMDAR) programme, either directly, or through a shared programme such as E-AMDAR, and thus support an important element of the Global Observing System (GOS).

6.4.3 **Space-based observations**

6.4.3.1 The Association recognizes the importance of the space-based subsystem within GOS, and the important contribution made by some of its Members through support of European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) and other space-based programmes. The Association encourages all Members to become as involved as they can in programmes.

6.4.3.2 Each Member of the Association should possess satellite image reception equipment, or an alternative method of acquiring real-time images, to support its activities.

6.5 **GLOBAL CLIMATE OBSERVING SYSTEM**

A summary of best practices involved in discharging the commitments made by the Member concerned regarding GCOS surface and upper-air stations is included in this Manual, Volume I, Part III, Regulation 2.9 (for GSN stations) and Regulation 2.10 (for GUAN stations).

7. THE ANTARCTIC

7.1 **ANTARCTIC OBSERVING NETWORK OF SURFACE AND UPPER-AIR OBSERVING STATIONS**

7.1.1 **Composition of the Antarctic Observing Network**

7.1.1.1 The Antarctic Observing Network (AntON) is composed of surface and upper-air stations adequate to meet the requirements of Members, and constitutes one of the most important obligations of Members under Article 2 of the WMO Convention.

7.1.1.2 The AntON is reviewed by a dedicated subsidiary body of the Executive Council and adopted by the Council or the WMO Congress in a resolution. The list of stations constituting the AntON is given in the annex to a resolution approved by Congress or the Executive Council. Changes are announced in the monthly Operational Newsletter issued by the Secretariat (see 7.1.6 below).

7.1.1.3 Manned surface land stations included in the AntON shall conform to the specifications laid down for land stations in Volume I of this Manual.

7.1.2 **Surface synoptic observations**

All surface stations included in the AntON should make surface observations at the four main standard times of observation, that is, 0000, 0600, 1200 and 1800 UTC. Whenever possible and desirable, observations should also be made at some or all of the four intermediate standard times of observation, that is, 0300, 0900, 1500 and 2100 UTC. Any surface station that cannot carry out the full observational programme should give priority to carrying out the observations at the main standard times.

7.1.3 **Upper-air synoptic observations**

All upper-air stations included in the AntON should carry out radiosonde and/or radiowind observations at 0000 and 1200 UTC. Other considerations permitting, those stations that are unable to carry out the full observing programme should give priority to the observations that maintain the historic record. Stations that are

separated by no more than about 600 km may wish to consider bilateral arrangements whereby each undertakes one of the ascents so as to complete between them the full observing programme required.

7.1.4 **Climatological observations**

7.1.4.1 As far as possible, all AntON surface stations shall report CLIMAT messages for better monitoring of climate.

7.1.4.2 CLIMAT reports from AntON stations shall be regarded as essential data in the sense of Resolution 40 (Cg-XII) – WMO policy and practice for the exchange of meteorological and related data and products including guidelines on relationships in commercial meteorological activities.

7.1.5 **Operational procedures**

Members are urged to comply fully with the global coding procedures and data-collection standards in accordance with procedures laid down in the WMO *Technical Regulations* (WMO-No. 49), *Manual on Codes* (WMO-No. 306), *Manual on the Global Telecommunication System* (WMO-No. 386) and in this Manual when operating the stations in the AntON.

7.1.6 **Arrangements and procedures for updating and amending the Antarctic Observing Network**

Certain minor changes in the AntON of surface and upper-air stations that do not affect the data requirements for the Antarctic as a whole are inevitable. To provide a simple and rapid means of effecting changes by Members, the following procedure shall be followed:

- (a) The President of WMO may approve, at the request of the Member concerned, on the advice of the Chair of a dedicated Executive Council subsidiary body and in consultation with the Secretary-General, minor amendments to the AntON. Any proposed significant change in the composition of AntON would still require the formal agreement of Members operating components of the AntON;
- (b) The Secretary-General shall notify all Members of WMO through the Operational Newsletter or by circular letter of changes agreed with the President of WMO.

7.2 WEATHER REPORTING BY TRAVERSE PARTIES

Members operating stations in the Antarctic are encouraged to instruct all traverse parties to make surface observations wherever circumstances permit when they are more than 200 km away from their base. The observations, which should be carried out as close as possible to the standard times of observations, should be transmitted at least once a day.

7.3 AUTOMATIC WEATHER STATIONS IN THE ANTARCTIC

Members are encouraged to use automatic weather stations as a part of the AntON, taking advantage of the data-collection capabilities of polar-orbiting satellites and, in some cases, of the geostationary meteorological satellites.

7.4 SHIPS OPERATING IN ANTARCTIC WATERS

7.4.1 Members should ensure that all research vessels, supply vessels and tourist ships operating in the Antarctic make regular surface synoptic observations at main and intermediate synoptic hours, and transmit these data in real time. When these data cannot be transmitted in real time they should be submitted in delayed mode or as historic data.

7.4.2 Members should also ensure that vessels, whenever practicable, also make upper-air

observations, and that any observations made are transmitted in real time.

7.5 SURFACE DRIFTING BUOYS

Members are encouraged to enhance their deployment and maintenance of surface drifting buoys, which shall be equipped with at least atmospheric pressure and sea surface temperature sensors, transmitting data in real time. Members are also encouraged to further develop buoy technology to enhance operations and real-time reporting both on and off the ice.

7.6 AIRCRAFT REPORTS

Members are encouraged to arrange for making, recording and distributing in real time observational reports from all flights to/from and within the Antarctic.

7.7 ADDITIONAL AND EXTENDED OBSERVATIONS

Members are encouraged to arrange for making, recording and distributing in real time additional and extended observations from ships and stations in the Antarctic. A list of observations made for the Global Atmosphere Watch (GAW) should be recorded in the GAW Station Information System (GAW SIS).

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