

International Telecommunication Union

ITU-R
Radiocommunication Sector of ITU

Recommendation ITU-R P.1510-1
(06/2017)

Mean surface temperature

P Series
Radiowave propagation



Foreword

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The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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Series of ITU-R Recommendations

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Series	Title
BO	Satellite delivery
BR	Recording for production, archival and play-out; film for television
BS	Broadcasting service (sound)
BT	Broadcasting service (television)
F	Fixed service
M	Mobile, radiodetermination, amateur and related satellite services
P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R P.1510-1

Mean surface temperature

(Question ITU-R 201/3)

(2001-2017)

Scope

Recommendation ITU-R P.1510 contains monthly and annual maps of mean surface temperature that are recommended for the prediction of statistics of different propagation effects such as rainfall rate, rain attenuation and gaseous attenuation due to water vapour and oxygen.

Keywords

Temperature, digital maps, ERA Interim

The ITU Radiocommunication Assembly,

considering

- a) that information on annual and monthly mean surface temperatures is needed for propagation modelling purposes;
- b) that the information is needed for all locations on the surface of the Earth,

recommends

1 that the data in Annex 1 be used to obtain the annual and monthly mean surface temperatures when no local data are available.

Annex 1**1 Surface mean temperature**

The monthly mean surface temperature data, T_{ii} (K), where $ii = \{01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, \text{ and } 12\}$, at 2 m above the surface of the Earth, are an integral part of this Recommendation and are available as digital maps. The latitude grid is from -90° N to $+90^\circ$ N in 0.75° steps, and the longitude grid is from -180° E to $+180^\circ$ E in 0.75° steps.

The annual mean surface temperature data, T_{Annual} (K) at 2 m above the surface of the Earth are also an integral part of this Recommendation and are available as digital maps. The latitude grid is from -90° N to $+90^\circ$ N in 0.75° steps, and the longitude grid is from -180° E to $+180^\circ$ E in 0.75° steps.

These digital maps are available in the file [R-REC-P.1510-1-201706-I!!ZIP-E.zip](#).

The annual mean surface temperature or the monthly mean surface temperature at any desired location at 2 m above the surface of the Earth can be derived according to the following steps:

- a) determine the four grid points (Lat_1, Lon_1) , (Lat_2, Lon_2) , (Lat_3, Lon_3) and (Lat_4, Lon_4) surrounding the desired location (Lat, Lon) ;

- b) determine the monthly or annual mean surface temperature at 2 m above the surface of the Earth, T_1 , T_2 , T_3 , and T_4 at the four surrounding grid points. The latitude grid is from -90° N to $+90^\circ$ N in 0.75° steps, and the longitude grid is from -180° E to $+180^\circ$ E in 0.75° steps;
- c) determine T at the desired location (Lat , Lon) by performing a bi-linear interpolation using the four surrounding grid points as described in Annex 1 Paragraph 1b of Recommendation ITU-R P.1144.

The monthly mean surface temperature maps have been derived from 36 years (1979-2014) of European Centre of Medium-range Weather Forecast (ECMWF) ERA Interim data, and the annual mean surface temperature map is the average of the monthly mean surface temperature maps weighted by the relative number of days in each calendar month.

For reference, a global map of annual mean surface temperature is shown in Fig. 1.

FIGURE 1
Annual mean surface temperature (K)

