

## Water Stress Trend (WST) product

### About “Water Stress Trend (WST)”

“WST (Water Stress Trend)” is index to understand the droughty state of ground.

Using the characteristic of specific heat of water, WST is calculated from the temperature change during daytime and nighttime.

On this site, WST product calculated from brightness temperature data of Terra/MODIS and Aqua/MODIS is provided.

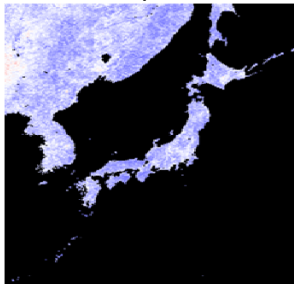
Ranges of WST value is [0:1].

The degree of dryness is strong when WST value approaches 1.

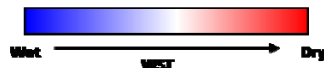
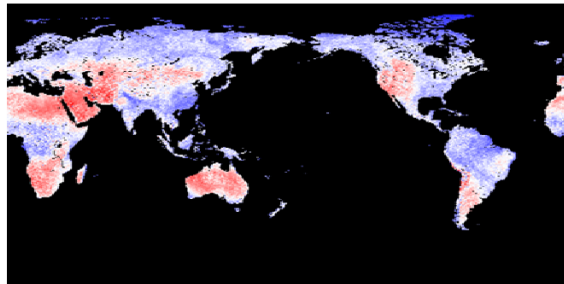
On the other hand, the degree of dryness is weak when WST value is 0.

(Example)

— Japan —



— Global —



Water Stress Trend (WST) in September, 2009

### Water Stress Trend (WST) product data

WST product provides the binary data (two kinds) and the text data.

(1) Binary (raw) data of half-monthly

half-monthly: from the 1st to the 15th

from the 16th to the end day of the month

(2) Binary (raw) data of monthly

(3) Text data

○ Analysis area & Binary data file size

Bit type: 8-bit signed integer

(a) Japan

binary (raw) data file size: Header (2701)+2701 × 2601 pixel

(b) Global

binary (raw) data file size: Header (7200)+7200 × 3601 pixel

○ Range of WST value: [0:1]

(0: The dryness degree is weak, 1: The dryness degree is strong)

However, WST value of the binary (raw) file allocates to 1-255.

○ Product unit (period)

half-monthly (from the 1st to the 15th, from the 16th to the end day of the month)

monthly (It is made from two half-monthly product at the end of the month.)

### **Detailed information about product file**

○ **Binary (raw) data file**

· Filename: MDSYYYYMMDD\_YYYYMMDD-WST\_#.raw

(Example: MDS20091101\_20091115-WST\_#.raw)

MDS: MODIS

20091101: first day of observation

20091115: end day of observation

WST: WST product

#: Area (J: Japan, A: Global)

· binary (raw) data file size

Bit type: 8-bit signed integer

(a) Japan area: Header (2701)+2701 × 2601 pixel

(b) Global area: Header (7200)+7200 × 3601 pixel

· WST value: [0:255]

0: sea, cloud, and snow ice area

1-255: Value in which WST value of [0 :1] was allocated

(1 - The dryness degree is weak, 255 - The dryness degree is strong)

○ **Text data file**

WST values of each prefecture or country are written in text file.

· Filename: halfmonthly-WST\_#.txt

#: Area (J: Japan, A: Global)

· Contents of txt file

(a) Japan

YYYY MM D1 D2 Val Val01 Val02 Val03 ..... Val45 Val46 Val47

(Ex.)

2009 9 1 30 0.3647 0.3697 0.3508 0.3758 0.3225 0.3699 0.3766 0.3706 0.4033  
 0.4038 0.4157 0.4259 0.3569 0.3942 0.3923 0.3823 0.3652 0.3638 0.3375 0.3785 0.3999  
 0.3658 0.3843 0.3845 0.3357 0.3417 0.3147 0.3995 0.3221 0.3041 0.3147 0.3091 0.3409  
 0.3473 0.3527 0.3569 0.2925 0.3571 0.3478 0.3218 0.3931 0.3641 0.3432 0.3877 0.3666  
 0.3633 0.3558 0.290

YYYY: year

MM: month

D1: first day of observation

D2: end day of observation

Val: WST value of whole area of Japan

Val01-47: WST value of each prefecture

Prefecture number:

01: Hokkaido	02: Aomori	03: Iwate	04: Miyagi	05: Akita
06: Yamagata	07: Fukushima	08: Ibaraki	09: Tochigi	10: Gunma
11: Saitama	12: Chiba	13: Tokyo	14: Kanagawa	15: Niigata
16: Toyama	17: Ishikawa	18: Fukui	19: Yamanashi	20: Nagano
21: Gifu	22: Shizuoka	23: Aichi	24: Mie	25: Shiga
26: Kyoto	27: Osaka	28: Hyogo	29: Nara	30: Wakayama
31: Tottori	32: Shimane	33: Okayama	34: Hiroshima	35: Yamaguchi
36: Tokushima	37: Kagawa	38: Ehime	39: Kochi	40: Fukuoka
41: Saga	42: Nagasaki	43: Kumamoto	44: Oita	45: Miyazaki
46: Kagoshima	47: Okinawa			

(b) Global

YYYY MM D1 D2 Val Val1 Val2 Val001 Val002 Val003 .... Val135 Val136 Val137

(Ex.)

2009 9 1 30 0.4743 0.4614 0.5210 0.3709 0.4765 0.4243 0.3816 0.6017 0.2493  
 0.3822 0.4443 0.4253 0.3666 0.4905 0.3660 0.4214 0.3850 0.3595 0.3967 0.3786 0.3394  
 0.5500 0.3598 0.3802 0.5161 0.6949 0.6302 0.6377 0.0000 0.0000 0.5714 0.7404 0.0000  
 0.0000 0.7424 0.5010 0.3590 0.4938 0.3401 0.5669 0.4151 0.6389 0.5514 0.0000 0.0000  
 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000  
 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000  
 0.0000 0.0000 0.3646 0.4411 0.3706 0.5543 0.4352 0.5421 0.3909 0.4749 0.4628 0.5078  
 0.4349 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000  
 0.0000 0.0000 0.3476 0.5290 0.4107 0.3092 0.4508 0.0000 0.0000 0.0000 0.0000 0.0000  
 0.0000 0.0000 0.0000 0.0000 0.0000 0.4248 0.3938 0.3657 0.3778 0.4308 0.5094 0.3714  
 0.3679 0.4782 0.3756 0.5788 0.3831 0.4196 0.4204 0.3843 0.4078 0.0000 0.0000 0.0000  
 0.0000 0.0000 0.0000 0.0000 0.0000 0.6418 0.4129 0.3887 0.0000 0.0000 0.0000

YYYY: year

MM: month

D1: first day of observation

D2: end day of observation

Val: WST value of global

Val1: WST value of whole area of northern hemisphere

Val2: WST value of whole area of southern hemisphere

Val001-137: WST value of each country

country number:

<b>East Asia</b>				
000: Korea		001: China		002: North Korea
003: Japan		004: Mongolia		005: Taiwan
<b>Southeastern Asia</b>				
010: Indonesia	011: Cambodia	012: Thailand	013: Philippine	014: Brunei
015: Vietnam	016: Malaysia, Singapore		017: Myanmar	018: Laos
<b>Southern Asia</b>				
020: India		021: Sri Lanka	022: Nepal	023: Pakistan
024: Bangladesh		025: Bhutan	026: other South Asia	
<b>Central Asia</b>				
030: Uzbekistan		031: Kazakhstan		032: Kirgizia
033: Tajikistan		034: Turkmenistan		
<b>West Asia (including Middle East and Turkey)</b>				
040: Afghanistan		041: Iran		042: Turkey
043: other West Asia (Arabian Peninsula)				
<b>North Africa</b>				
050: Algeria		051: Egypt		052: Tunisia
053: Morocco (Including Western Sahara)				054: Libya
055: Sudan	056: Chad	057: Niger	058: Mali	059: Mauritania
<b>Western Africa</b>				
060: Ghana	061: Cote d'Ivoire	062: Senegal	063: Nigeria	064: Burkina Faso
065: other Gulf of Guinea (nine countries such as Guinea, Burkina Faso, and Liberia)				
074: Gabon			075: Cameroon	
076: Republic of Congo			077: Democratic Republic of the Congo	
078: Equatorial Guinea			079: Central Africa	
<b>Southern Africa</b>				
080: Angola		081: Zambia	082: Zimbabwe	083: Namibia
084: Botswana		085: South Africa		086: Mozambique
087: other Southern Africa (three countries: Malawi, Kingdom of Lesotho, and Kingdom of Swaziland)				
099: Madagascar				
100: other Indian Ocean (four islands: Comoros, Seychelles, Mauritius, and Réunion)				
<b>Eastern Africa</b>				
090: Ethiopia, Eritrea		091: Kenya	092: Somalia	093: Tanzania
094: other East Africa (four countries: Uganda, Djibouti, Rwanda, and Burundi)				
<b>Europe</b>				
110: Ireland	111: Britain	112: Italy	113: Estonia	114: Austria
115: Greece	116: Sweden	117: Spain	118: Slovakia	119: Slovene
120: Czech	121: Denmark	122: Germany	123: Hungary	124: Finland
125: France	126: Bulgaria	127: Poland	128: Portugal	129: Latvia
130: Lithuania	131: Romania	132: Netherlands, Belgium, Luxembourg		
133: other EU				
140: Iceland		141: Azerbaijan	142: Albania	143: Armenia
144: Ukraine		145: Georgia	146: Croatia	147: Switzerland
148: Serbia, Montenegro		149: Norway	150: Belarus	151: Bosnia-Herzegovina
152: Macedonia		153: Moldova	154: other Non-EU	
<b>Western Russia</b>				
160: West Russia (west of E60)			161: West Siberia (60-90E)	
<b>Eastern Russia</b>				
162: Central Siberia (90-120E)			163: East Siberia (120-150E)	
164: Far Eastern Russian (east of 150E)				
<b>Canada</b>				
172: Canada				
<b>Alaska</b>				
171: Alaska				
<b>North America</b>				

170: continental U.S., Hawaii (Excluding Alaska)		173: Mexico	
174: other North America, Central America·Caribbean islands			
<b>South America</b>			
200: Argentina	201: Uruguay	202: Ecuador	203: Guyana
204: Colombia	205: Suriname	206: Chile	207: Paraguay
208: Brazil	209: Venezuela	210: Peru	211: Bolivia
212: Guiana (French)	213: other South America, Falkland islands		
<b>Oceania</b>			
220: Australia	221: New Zealand	222: other Oceania islands	
<b>Greenland</b>			
240: Greenland			
<b>South Pole</b>			
241: South Pole			
<b>Svalbard, Jan Mayen Island</b>			
242: Svalbard, Jan Mayen Island			

- WST value: [0:1] (0: The dryness degree is weak, 1: The dryness degree is strong)

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