Fairbanks, Alaska Solar & Weather Information Factsheet

EEM-01355

Narrative Climatological Summary

Fairbanks is located in the Tanana Valley of Interior Alaska. The area has a definite continental climate. The sun is above the horizon from 18 to 21 hours each day during the months of June and July. During this period daily average maximum temperatures reach the lower 70s. Temperatures of 80° or higher occur on about 10 days each summer with extreme highs of 90° or more occurring in the months of May and August. During the period from November to March, when the sunshine period ranges from 10 to less than 4 hours a day, the lowest temperature readings fall below zero regularly. Extremely cold temperatures of -40° and colder occur on the average only 14 days each winter with extremes of near or below -60° having occurred in the three midwinter months. Snowfalls of four inches or more in a day occur only three times during the average winter, and blizzard conditions are almost never experienced. Severe weather during the summer months is rare.

The snow cover during the winter months is a major contributing factor to the development of extreme cold, since the white surface prevents the absorption of heat from a limited amount of sunshine. December and January maximum temperatures are usually below zero. The surrounding upland areas tend to aid the settling of cold air into The Tanana Valley lowlands.

Ice fog conditions frequently occur with the extreme low temperatures and they tend to persist for periods of a few days to one or two weeks. On the average, low cloudiness is minimal, year-round, and particularly minimal during February through April. Wind speeds are particularly light during the winter months.

Precipitation normally follows a regular pattern. Total annual precipitation is about 12 inches, a little less than is received at Denver and a little more than is received at San Diego. Growing season precipitation, which begins with the occurrence of light rain showers in May, builds up through the summer months to a maximum in August. There is a noticeable decline in precipitation from September through November. April, which averages the lightest monthly precipitation during the year, realizes the greatest percentage of possible sunshine.

The average last date of freezing temperatures in the spring is May 21, and the average first occurrence of freezing temperatures in the fall is August 30, resulting in a growing season averaging 100 days. Summers are warm enough so that vegetables such as broccoli, peas, beans, squash, cauliflower, and other leafy vegetables grow luxuriantly. Select varieties of tomatoes, corn, cucumbers, and melons reach maturity during the three-month growing season. There is a better chance of maturing grain crops in the Tanana Valley than in other agricultural areas of Alaska.

Reprinted From:

Alaska Solar & Weather Information
Western SUN, 715 SW Morrison
Portland, Oregon

Climate Data

Temperature (degrees F)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Aver.Ann.
Average Monthly	-11.9	-2.5	9.5	28.9	47.3	59.0	60.7	55.4	44.4	25.2	2.8	-10.4	25.7
Average Daily Maximum	-2.2	9.3	23.3	40.4	58.8	70.7	71.8	65.8	54.4	33.5	11.7	-1.5	36.3
Average Daily Minimum	-21.6	-14.3	-4.3	17.3	35.7	47.2	49.6	44.9	34.4	16.9	-6.2	-19.3	15.0
Winter/Summer Design	-47						77						
Total Heating Deg-Days for Month	2384	1890	1720	1083	549	211	148	304	618	1234	1866	2337	14344
Total Cooling Deg-Days for Month	0	0	0	0	0	31	15	6	0	0	0	0	52
Percent Relative Humidity (Night)	67	64	63	65	64	70	78	82	76	76	72	67	70
Wind Direction	N	N	N	N	N	SW	SW	N	N	N	N	N	N
Wind Speed (MPH)	2.9	3.3	4.0	3.1	3.1	4.0	2.9	3.4	2.9	4.0	3.5	3.7	4.0

NOTE:
Data is in English units cumulative to 1985. This data does not precisely agree with the newer data that follows, which includes the past 15 years (1985-1999), and also indicates the climate in Fairbanks has warmed (405 °F-days less for the last 15 years, on average).

From: Solar Radiation Data Manual for Flat Plate and Concentrating Collectors, NREL, Andrew Walker, April 2000

Latitude: 64.82° N; Longitude: 147.87° W; Elevation: 138 meters; Mean Pressure: 994 millibars; Station Type: Primary

Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.1	0.8	2.3	4.0	5.1	5.6	5.1	3.7	2.3	1.0	0.3	0.0	2.5
	Min/Max	0.1/0.2	0.7/0.9	1.8/2.6	3.3/4.6	4.5/5.8	4.7/6.4	4.1/5.8	3.2/4.3	1.8/2.9	0.8/1.1	0.2/0.3	0.0/0.1	2.4/2.7
Latitude	Average	0.7	2.2	4.5	5.6	5.7	5.7	5.4	4.5	3.4	1.9	1.0	0.2	3.4
-15	Min/Max	0.3/1.1	1.6/3.5	2.9/5.6	4.2/6.7	4.9/6.6	4.6/6.6	4.1/6.3	3.6/5.3	2.3/5.1	1.4/2.6	0.5/1.5	0.1/0.4	3.1/3.7
Latitude	Average	0.7	2.4	4.7	5.6	5.3	5.2	4.9	4.2	3.4	2.0	1.1	0.3	3.3
	Min/Max	0.4/1.3	1.7/3.9	3.0/5.9	4.1/6.7	4.5/6.2	4.2/6.0	3.7/5.8	3.4/5.1	2.3/5.2	1.4/2.7	0.6/1.7	0.1/0.5	3.0/3.6
Latitude	Average	0.8	2.5	4.7	5.3	4.6	4.5	4.3	3.8	3.2	2.0	1.1	0.3	3.1
+15	Min/Max	0.4/1.3	1.7/4.1	2.9/5.9	3.7/6.4	4.0/5.4	3.6/5.1	3.2/5.0	3.0/4.6	2.1/4.9	1.4/2.8	0.6/1.8	0.1/0.5	2.7/3.4
90	Average	0.8	2.5	4.5	4.9	4.1	3.9	3.7	3.3	3.0	2.0	1.1	0.3	2.8
	Min/Max	0.4/1.4	1.7/4.1	2.8/5.8	3.4/6.1	3.5/4.8	3.1/4.4	2.8/4.4	2.7/4.1	1.9/4.6	1.3/2.7	0.6/1.8	0.1/0.5	2.5/3.1

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.3	1.5	4.1	6.4	7.5	7.8	7.1	5.3	3.4	1.5	0.5	0.1	3.8
	Min/Max	0.2/0.5	1.1/2.3	2.5/5.2	4.7/7.8	6.1/9.0	6.0/9.4	5.0/8.6	4.0/6.6	2.4/5.2	1.1/1.9	0.3/0.8	0.0/0.1	3.3/4.2
Latitude	Average	0.7	2.6	5.7	7.7	8.2	8.3	7.6	6.0	4.4	2.2	1.1	0.2	4.6
-15	Min/Max	0.4/1.2	1.8/4.2	3.4/7.4	5.5/9.5	6.6/10.1	6.3/10.1	5.3/9.4	4.4/7.6	2.8/6.9	1.5/3.0	0.5/1.7	0.1/0.4	3.9/5.1
Latitude	Average	0.8	2.7	5.8	7.7	8.0	8.0	7.4	5.8	4.4	2.3	1.2	0.3	4.5
	Min/Max	0.4/1.3	1.9/4.6	3.5/7.7	5.4/9.6	6.4/9.8	6.0/9.8	5.0/9.1	4.3/7.4	2.8/6.9	1.5/3.2	0.6/1.9	0.1/0.5	3.9/5.0
Latitude	Average	0.8	2.8	5.8	7.4	7.6	7.6	6.9	5.5	4.2	2.3	1.2	0.3	4.4
+15	Min/Max	0.4/1.4	1.9/4.7	3.4/7.7	5.2/9.3	6.1/9.3	5.7/9.3	4.7/8.6	4.0/7.1	2.7/6.8	1.5/3.2	0.6/2.0	0.1/0.5	3.7/4.9

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	0.8	2.8	5.8	7.7	8.4	8.7	7.9	6.0	4.4	2.3	1.2	0.3	4.7
	Min/Max	0.4/1.4	1.9/4.7	3.5/7.7	5.5/9.6	6.8/10.3	6.6/10.5	5.5/9.7	4.5/7.7	2.8/7.0	1.5/3.2	0.6/2.0	0.1/0.5	4.1/5.2

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis,E-W	Average	0.6	1.6	2.9	3.2	3.6	3.7	3.3	2.5	2.0	1.1	0.7	0.3	2.1
Horiz.Axis	Min/Max	0.2/1.1	0.8/3.3	1.2/4.4	1.6/4.6	2.3/4.9	2.3/4.8	1.8/4.6	1.5/3.5	1.0/3.8	0.5/1.8	0.2/1.4	0.1/0.5	1.7/2.6
1-Axis,N-S	Average	0.2	0.8	2.4	3.7	4.6	4.5	4.1	2.9	2.0	0.7	0.3	0.1	2.2
Horiz.Axis	Min/Max	0.1/0.4	0.4/1.8	1.0/3.8	1.8/5.3	3.0/6.2	2.8/6.1	2.2/5.7	1.8/4.3	1.1/3.7	0.3/1.1	0.1/0.5	0.0/0.1	1.7/2.6
1-Axis,N-S	Average	0.6	1.8	3.8	4.6	5.0	34.8	4.3	3.4	2.8	1.3	0.8	0.3	2.8
Tilt-Lat.	Min/Max	0.2/1.1	0.9/3.7	1.5/5.8	2.3/6.6	3.2/6.8	3.0/6.4	2.3/6.1	2.1/5.0	1.5/5.2	0.6/2.1	0.2/1.4	0.1/0.5	2.1/3.3
2-Axis	Average	0.6	1.8	3.8	4.7	5.3	5.2	4.7	3.5	2.8	1.3	0.8	0.3	2.9
	Min/Max	0.2/1.2	0.9/3.8	1.5/5.8	2.3/6.7	3.4/7.2	3.2/6.9	2.5/6.6	2.1/5.1	1.5/5.2	0.6/2.2	0.3/1.5	0.1/0.5	2.2/3.5

Average Climatic Conditions

Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-23.4	-19.8	-11.7	-0.7	9.2	15.4	16.9	13.8	7.5	-3.8	-16.3	-21.4	-2.8
Daily Minimum Temp	-28.1	-25.8	-18.7	-6.4	3.3	9.7	11.4	8.4	2.3	-7.7	-20.9	-26.0	-8.2
Daily Maximum Temp	-18.7	-13.8	-4.6	5.0	15.2	21.2	22.4	19.1	12.7	0.0	-11.7	-16.8	2.5
Record Mini. Temp	-51.7	-48.9	-45.0	-31.1	-18.3	-0.6	1.7	-2.8	-12.2	-32.8	-43.3	-52.2	-52.2
Record Maxi. Temp	10.0	8.3	10.6	23.3	31.7	35.6	34.4	32.2	28.9	18.3	7.8	6.7	35.6
HDD, Base 18.3°C	1239	1067	930	572	282	101	68	148	325	687	1038	1232	7744
CDD, Base 18.3°C	0	0	0	0	0	14	25	7	0	0	0	0	47
Relative Humidity (%)	70	66	60	56	50	57	64	71	69	74	73	71	65
Wind Speed (m/s)	1.5	1.9	2.5	3.1	3.5	3.4	3.1	2.9	2.8	2.5	1.7	1.5	2.5

COOPERATIVE EXTENSION SERVICE
Information and Resource Listings

Anchorage ..... **(907) 786-6300**
2221 E. Northern Lights Blvd., #118
Anchorage, AK 99508-4143

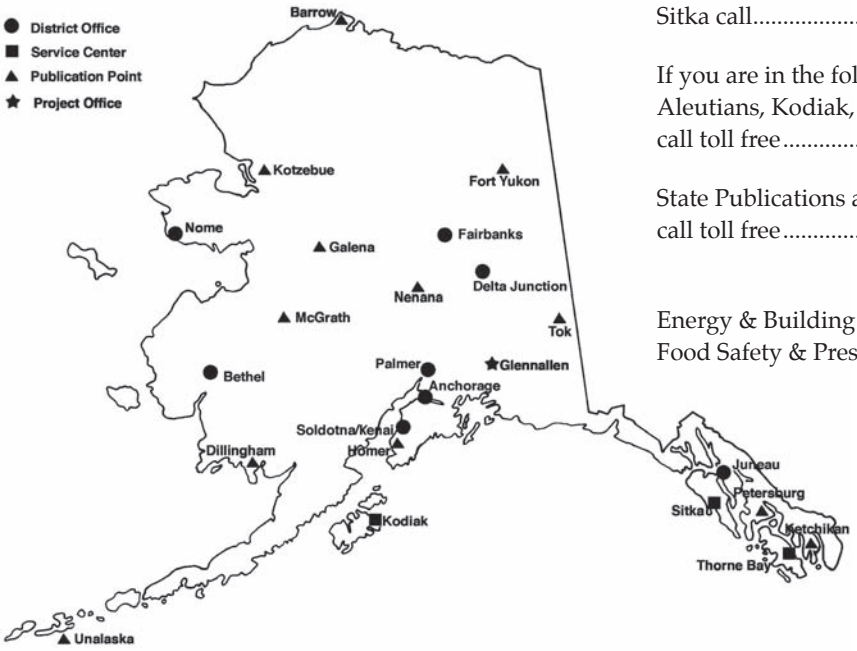
Bethel—Yukon Kuskokwim District ..... **(907) 543-4557**
P.O. Box 368, Kuskokwim Campus
Bethel, AK 99559

Delta Junction District ..... **(907) 895-4215**
Jarvis Office Center, P.O. Box 349
Delta Junction, AK 99737

Fairbanks State Office ..... **(907) 474-7246**
University of Alaska Fairbanks
P.O. Box 756180
Fairbanks, AK 99775-6180

Fairbanks—Tanana District ..... **(907) 474-1530**
University Park Bldg, Room 138
P.O. Box 758155
Fairbanks, AK 99775-8155

Glennallen ..... **(907) 822-4477**
P.O. Box 454
Glennallen, AK 99588



Juneau District ..... **(907) 465-8749**
3032 Vintage Blvd., Suite 104
Juneau, AK 99801

Nome—Northwest District ..... **(907) 443-2320**
Box 400, Northwest Campus
Nome, AK 99762

Palmer—Copper River/Mat-Su District ... **(907) 745-3360**
809 South Chugach Street, Suite # 2
Palmer, AK 99645

Soldotna—Kenai Peninsula District ..... **(907) 262-5824**
43961 K-Beach Road, Suite A
Soldotna, AK 99669-9728

Tanana Chiefs Conference ..... **(907) 452-8251 ext. 3248**
122 1st Avenue, Suite 600
Fairbanks, AK 99701

Thorne Bay ..... **(907) 828-3207**
P.O. Box 19190
Thorne Bay, AK 9991

Other Important Cooperative Extension Service Phone Numbers

If you are located in the city of
Sitka call..... (907) 747-6065

If you are in the following areas:
Aleutians, Kodiak, Sitka, or Southern Southeast
call toll free..... 1-877-482-3223

State Publications and Distribution Center
call toll free..... 1-877-520-5211

Hotlines

Energy & Building 1-800-478-8324
Food Safety & Preservation 1-888-823-3663

This information was printed to support the Alaska Million Solar Roofs Coalition.

Visit our website at: www.uaf.edu/coop-ext/faculty/seifert and/or www.sustainalaska.org

UNIVERSITY OF ALASKA
FAIRBANKS
College of Rural Alaska
Cooperative Extension Service

462/7-00/RS/1000 Reprinted November 2004