

TEMPERATURE AND HUMIDITY IN ARCO TUNNEL

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In August, 1960, Ranger-Naturalist Peter G. Sanchez, suggested that it would be interesting to record and evaluate the temperature and humidity in Arco Tunnel for a period of at least one year. Data such as this could provide useful information for answering visitor questions about the lava tubes and might, in addition, identify additional lava tube studies for consideration.

As a result of this suggestion negotiations were completed with the U.S. Weather Bureau for the loan of a recording hygrothermograph for one year. The instrument was received in November, 1960 and, after a short period of adjustment to this climate, began recording usable data on December 1, 1960. The instrument was placed at Station 10 as indicated on the Arco Tunnel Survey Map. The gathering of data was terminated on October 30, 1961.

Daily tabulations of temperature and humidity were made from the charts and these figures were averaged by month and appear on the attached table. For a more graphical presentation of these averages reference is made to the attached line graph. The original tables and hygrothermograph charts are being retained for possible future analysis.

It is believed that, even though the data period is very short, a relationship exists between humidity in Arco Tunnel and the outside temperature and precipitation. In other words, the amount of precipitation, and thus seepage through the lava into the tunnel, largely determines the relative humidity in the tunnel. Seepage in winter and early spring depends on the rate of snow melt. (In April and May water virtually rains from the ceiling of the tunnel).

Because of the nature of lava, temperatures inside Arco Tunnel fluctuated very slowly and within a very narrow range. The mean annual temperature was 11.0 degrees F. below the mean annual temperature outside. Barometric pressure and air movement probably also effect temperatures in the tunnel but no correlation was possible in these studies.

If similar microclimate studies are conducted in the future it is suggested that a remote gathering hygrothermograph be utilized. Just one person entering Arco Tunnel once a week to change charts may have effected the relative humidity around the instrument for rather long periods. Except during the early winter of 1960, breath moisture condensed rapidly and thickly throughout the study period. For this reason it was also very difficult to obtain accurate sling psychrometer readings.

Month	Temperature in Arco Tunnel			Humidity in Arco Tunnel			Temperature & Precipitation Weather Station at Headquarters			
	Average High	Average Low	Extremes	Average High	Average Low	Extremes	Average High	Average Low	Extremes	Precip.
Dec	32.4	31.3	34-29	85.0	72.7	97-61	33.3	13.9	42-0	.29
Jan	29.1	28.1	30-27	73.1	60.9	88-48	34.9	11.6	44--2	.12
Feb	30.7	29.9	32-28	92.4	84.2	99-68	37.0	21.2	46-10	.89
Mar	31.5	31.2	33-29	92.1	84.1	99-66	42.7	22.0	56-9	.38
Apr	33.5	32.9	34-32	97.7	94.2	99-90	52.7	27.1	68-14	.67
May	33.9	33.8	34-33	97.5	95.8	99-94	64.9	36.9	80-22	1.46
Jun	34.2	34.0	35-34	97.2	96.2	98-96	81.3	50.3	91-40	.50
Jul	36.3	35.8	39-34	96.7	96.4	98-96	86.0	53.1	90-44	.59
Aug	39.2	38.7	40-38	97.8	97.6	99-96	84.5	55.0	95-48	1.49
Sep	39.7	39.3	41-38	98.4	98.1	99-98	62.0	37.3	78-23	3.57
Oct	37.5	37.0	38-35	98.4	98.2	99-98	54.6	29.2	72-17	1.36

COMPARATIVE AVERAGE MONTHLY
TEMPERATURES, HUMIDITY AND PRECIPITATION

December, 1960 through October, 1961