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Ministry of Agriculture, Fisheries, Petroleum & Minerals .

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Water Resources Department .

CLIMATE OF THE BATINAH .

1973 - 1977 .

F.A.O. Project OMA/77/001 .

Field Document No. 4 .

FOOD AND AGRICULTURE ORGANIZATION  
OF THE UNITED NATIONS .

Muscat, December, 1977.

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Project OMA/77/001.

Water Resources Field Document No. 4.

CLIMATE OF THE BATINAH.  
(1973 - 1977).

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J.B. Nielsen                    F.A.O.

This paper has been produced as a part of the work of the Water Resources Department of the Directorate General of Agriculture, Ministry of Agriculture, Fisheries, Petroleum and Minerals.

This field document has yet to receive the endorsement of the Food and Agriculture Organization of the United Nations and does not necessarily present the opinions or recommendations of that Organization.

Previous Water Resources Field Documents -

- No. 1 - Rainfall in Muscat
- No. 2 - Climate of Jebel Akhdar (Said).
- No. 3 - Rainfall in Oman, 1974 - 1976.

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## FOREWORD

It was originally intended to publish all past data in this paper, for record purposes. However, as subsequently described, the several records available have many differences in recording techniques, and types, and periods; making direct comparisons difficult.

It has therefore been decided that this paper should comprise only a general description of the climate, with a "typical" data sample for each site, derived from available record. This will suffice for most users. Meanwhile, however, all past record for Water Resource Department stations has been scrutinized and reviewed in the preparation of this paper, and is available on file. Access to such record may be readily obtained on application to the Director, Water Resources Department, Directorate General of Agriculture.

These records embrace only general climate statistics. For meteorological information, application should be made to the Chief Meteorologist, Met Dept., D.G.C.A., P.O. Box 3002, Seeb. (Tel. 619330).

Early record for W.R.D. stations was compiled by the various consultants carrying out Water Resource Surveys, as shown in the individual station records; for those periods, record is generally quoted directly from the consultant reports. Latterly, the following staff have been mainly concerned with the records:-

Sohar : Mr. Sultan Juma and Mr. Mohamed Nassir

Other WRD stations : Mr. Salim Salas and Mr. Ali Manthri.

All record has been scrutinized and checked by the authors of this paper.

We acknowledge with grateful thanks Mr. T. Hoopes and Mr. L. Baistone of FanAm, and Mr. Bretz and Mr. Purdie of P.D.(C) for personal help; and the respective agencies for kindly making record available.

## I. INTRODUCTION.

### (a) Available Record.

There have been numerous stations in the Batinah region in the recent period.

In the past, some climate data for Muscat has been collected since the 1870's, by the then Muscat Political Agency. Subsequently, a climate station was maintained by the Government of India: brief notes on this may be found in a later part of this report. This station was closed in May 1959 (rainfall record continued).

In 1973 and 1974, four stations were installed by various consultants carrying out Water Resource Surveys: in addition to the meteorological station at Seeb Airport and the climate station at Mina al Fahal, maintained by Petroleum Development (Oman). These stations are listed in Table I: further particulars are shown in the individual station records in Section III.

Besides these, several thermometer/hygrometer sets are maintained by individuals, in private farms, hotels etc. Record from such sites has not been examined, because of the possibility of nonstandard exposures, observation methods, etc.

Even within the formal climate stations, there have been considerable variations in instrumentation, exposure, and observation practice. Wind runs have been variously measured at two, four and ten meters: temperature and humidity records have been from thermohygrographs controlled by check thermometer readings, or else from single readings of the max/min and psychrometer. An objectionable feature has been the total dependence upon a single part time observer, to maintain the record. It is optimistic to expect any man to be able to maintain continual readings through every one of the days of the year, sickness or holiday included. (Even worse, was the expectation that a single part trained and part time observer would be able to maintain three readings daily - inevitably he started to synthesize his readings, and this increased progressively when the first examples were not detected).

As a result, there are gaps in many records: and for some stations there are considerable periods for which nominal record exists but cannot be used because it is certainly unreliable.

All record formally finalized on file in the Water Resources Department, is free from major error. However, because of the uncertainties mentioned above, it cannot be guaranteed that some temperature records are better than plus/minus half degree, or that humidity records are absolutely concise.

These comments do not apply to stations maintained by other agencies.

The present and future policy of the Water Resource Department is to reduce the number of stations, in favour of improved quality: so that it may be certain that apparent minor differences between stations, or years, are real and not in error. In planning the number of stations, due recognition is given to the availability of record

Table 1

Past and Present Climate Stations  
BATINAH COAST, OMAN

NAME	LAT	LONG	ALT (m)	STARTED	NOTES
Muscat	23° 27'	58° 36'	5	c 1873(?)	Closed, May 1959
Der Salt	23° 37'	58° 32'	(25)	1973	
Mina al Fahal	23° 38'	58° 31'	3	May 1967	P.D.(0)
Seeb Int. Airport	23° 35'	58° 16'	14	1973	Met. Dept, D.G.C.
Rumais	23° 41'	58° 00'	15	1974	Closed APRIL 1976
Rostaq	23° 23'	57° 27'	350	1974	Interior of plain
Sohar	24° 21'	56° 43'	(15)	end 1973	

from the increasing number of stations operated by the Met Dept., and other agencies. Within the stations themselves, the objectives are standardization of instruments and exposure, and the provision of additional autographic instruments against observer absence. Finally, quality control in the scrutiny and processing of data, is being steadily improved.

(b) Main seasonal influences on the local climate

In winter, the climate of the area is determined by the Asian continental high, and a general low pressure area over the Indian Ocean in summer, by the northward movement of the Inter Tropical Convergence Zone (I.T.C.Z.).

Thus two distinct periods can be recognized in the climatic year: the winter months November through mid April, with a predominant airflow from the northwest or north, and the summer months late June to mid September, with a basically southwest wind component. The intermediate months are transitional between these periods: in autumn the ITCZ retreats rapidly and is replaced by drier continental air.

These patterns determine the climate, and broad rainfall expectations, of the area. In winter the predominant airstream is basically dry; but is interrupted by a series of synoptic situations of cyclonic or frontal type migrating in from the northwest: clear skies give way to overcast and heavy and widespread rain can result. The massif of the Hajar - Jebel Akhdar mountains may or may not effect the direction of these systems but certainly does not isolate the Batinah plain from their influence.

Whereas in summer, the ranges seem to provide a fairly effective physical barrier to the southwest source, and the Batinah experiences its own typical tropical maritime climate, with only occasional incursions of continental air which provide the temperature extremes. Humidities are however high, from air of maritime origin. Rainfall very rarely occurs along the coast in summer; but is not infrequent in the foothills of the inner edge of the Batinah, caused either by orographic influence or "carry over" of storms from the watershed.

Tropical cyclones are rare but can on occasion track toward Muscat. They are too infrequent to represent a important contribution towards the water resources of the area: their significance lies in the fact that the possibilities of damaging winds and floods can not be excluded.

In summer, there is a well documented cold current off the Dhofar coast. Personal experience suggests that there is a similar but less marked drop in sea temperature at Muscat (and the beaches are invaded by jelly fish) but there is no factual data on this point.

These broad influences determine the basic climate of the area, and also the regional variations such as the cooler winter of Sohar, discussed later.

Atmospheric pressure is highest in midwinter, when it averages about 1117 mb: it falls steadily to a low of just under one thousand in mid-summer, and then increases steadily again to the winter high. There are of course short term fluctuations, around these means. Monthly means are shown in the Seeb record.

## II. GENERAL DESCRIPTION OF CLIMATE

### (a) Temperatures

The Muscat summer has a very evil reputation. In fact, the statistics show, as would be expected, that the climate is comparable with other coastal cities of similar latitude in the tropics, which also experience very hot and unpleasant summers.

In the Muscat capital area, however, the heat is possibly more noticeable because of the "bowl" effect of the surrounding mountains: and also because of the low winds, particularly at night when the oppressive effects of the heat are most felt.

The spatial variation of the temperature, in the different parts of the region, are larger than would be expected.

In the interior parts of the plain, along the foothills, the maritime influences are less predominant: consequently there is a greater daily temperature range, with maxima tending to be slightly higher and minima correspondingly lower. This is normal.

However, in Sohar, some two hundred kilometers to the north west the winter minima are several degrees lower than around the capital area. This is a larger difference than can be accounted by the difference of latitude, and is attributed to the greater proximity and predominance of the continental influence of the Asian land mass.

The hottest part of the year is from late May through early July (In later July and August temperatures are about two degrees lower: but with high humidity the climate remains oppressive and there are still occasional days of very high temperature). At this time, mean maxima are around 41°; that is, usually between 38° and 43°; temperatures of 45° or more occur only a very few times a year.

The highest temperature definitely recorded anywhere has been 47.8° (Seeb). The minimum temperatures in summer are not lower than 25°, and average about 30°, at this time.

During winter, the climate is pleasant indeed. The coolest period is usually from mid December through early March; the maxima average around 25° to 26° at this time. Average minima around Muscat - Seeb are usually between 16° and 18°, and seldom lower than 14°.

Inland, and at Sohar, the minima are considerably lower: Averages are around 10° to 12° and temperatures below 10° are not infrequent. However, the lowest so far recorded is 5.4° (Sohar, 1974) and freezing temperatures never occur.



Mean annual temperature averages around 27° to 28° at Muscat, and about two degrees less at Sohar.

Temperatures are of course stabilized by the proximity of the sea, which is a dominant influence; and temperature ranges are correspondingly limited. Diurnal range is commonly seven to ten degree near the coast, and slightly greater inland.

The main statistics are summarized in the table following

BATINAH COAST - NORTHERN OMAN

SUMMARY TABLE, - TEMPERATURES

	<u>MUSCAT/SEEB</u>	<u>SOHAR</u>
		<u>Summer</u>
Normal maximum temperature	45°	45°
Mean maximum temperature	41°	40°
Mean minimum temperature	30°	27°
		<u>Winter</u>
Mean maximum temperature	25°	25°
Mean minimum temperature	16°	12°
Normal minimum temperature	14°	8°
Extreme max (available record)	47.8	47.4
Extreme min (available record)	10.6	5.4
Annual mean temp.	27.5 - 28.5	26.

Humidity

Available record is not completely clear and comprehensive. Stations record variously mean relative humidity, the means of the daily maxima and minima of humidity, or single psychrometer readings at 09.00. Absolute humidity has received little attention. Nevertheless, the statistics, though not absolutely concise, are generally inter consistent and allow the broad patterns to be described. Relative humidities show the normal daily fluctuations with temperature, with maxima around dawn, and minima shortly after noon. Along the coast at least, absolute humidities will also show a small daily fluctuation with the land/sea breeze: this is substantiated by the Seeb record, which shows dawn values averaging one or two millibars lower than those of late noon. Synoptic fluctuations of both absolute and relative humidity, are superimposed on this normal daily pattern.

Seasonally, relative humidities are high most of the year, with mean maxima in the middle eighties and mean minima in the middle forties except the period April - June when both tend to average some fifteen units lower. Actual humidities are lowest in mid winter, rising to a peak in late summer before steadily declining again. There is usually a clear rise in actual humidity in July, August and September: and since there is at the same time a drop in temperature, the rise in relative humidity is even more marked: (thus these months are often considered the most oppressive of the summer, even though the temperature is lower).

There is insufficient data to define the spatial variability: but such record as is available for Rostaq suggests that absolute humidities are only slightly lower than those of the coast.

The occurrence of dew is sufficiently frequent not to be remarkable through usually the dawn humidity is just below saturation.

At Rumais, vapour pressures exceeding thirty five millibars were recorded some forty to fifty times a year. Extreme maximum is possibly about 45 mb. Considerably higher values have been recorded: but since in these cases the dewpoint considerably exceeds both the minimum temperature of a few hours earlier, and the probable sea temperature, such readings have been assumed to be errors, and have been rejected.

Typical values are as follows

	J	F	M	A	M	J	J	A	S	O	N	D
Vp mb	15	17	18	20	22	26	30	32	30	25	20	17
Mean Max R/H %	80	85	85	73	60	70	85	85	85	85	77	85
Mean Min R/H %	45	45	40	35	25	40	55	50	45	40	40	50

### Sunshine and insolation

Sunhours are now recorded only at Seeb and Sohar: previously they were also measured at Rostaq and Rumais. Radiation was also measured at these two later sites, using a Kipp and Zonen solarimeter: bimetallic actinographs have been installed in Sohar and Dar Sait, in April 1977.

The majority of days have clear skies, or very little cloud. During winter especially, there are a greater or lesser number of days of extensive cloud or overcast, reducing the mean monthly value, which can vary considerably from year to year. Generally, however, the incidence of insolation is high.

Record for Rostaq appears to show generally slightly lower values for sun hours and insolation: probably this is due to the proximity of the mountains, shortening the end of the day. It also seems that Sohar has more cloudiness and less insolation than the Eastern Batinah: but more record is needed before this can be definitely established.

Typical values are as follows:-

	J	F	M	A	M	J	J	A	S	O	N	I
Mean sun hours	7.5	8.0	9.0	9.5	11.0	11.0	9.5	9.5	9.5	9.5	9.3	8.
Insolation (cal/cm <sup>2</sup> /day)	350	430	530	550	600	610	550	530	530	470	400	34

#### Atmospheric pressure

Is only measured at Seeb (and other Met Dept stations outside the Batinah). See record for Seeb, and general comment in section I.

#### Winds

Again, the various records are rather dissimilar. At water Resources stations, daily wind runs have been variously recorded at two, four, and ten meters. For the latter sites, (Rumais and Rostaq) wind runs at two meters have been calculated from the ten meter record, and these values are shown in Appendix A of the Final Report of Sir Alexander Gibbs and Partners.

During 1977, instruments have been installed at 2 meters at all Water Resource Stations: anemographs recording also the wind direction, have been used at Sohar and Dar Sait, and a new anemometer at Rostaq: the previous instruments have also been retained. From the small sample so far available, it seems probably that the calculated two meter values are too high. From the short anemograph sample for Dar Sait, it seems that the typical daily pattern is for most of the daily wind run to occur during the day, with only very light breezes at night. Both these aspects will be better clarified when a longer sample is available.

Several of the records show an apparent progressive slight decrease with time. This is almost certainly due to slight wear of the instruments, and is being rectified with new instruments and calibration checks. Meanwhile, the earlier record has been preferred for the data samples quoted here.

Generally, over the Batinah, winds are moderate to low throughout the year. In the northern part, both Rostaq and Sohar show ~~some~~ lower values than for Rumais/Seeb/Dar Sait.

Annual mean daily wind run are:-

Dar Sait (4 meters)	190 km/day
Rumais (10 meters)	240 km/day
Rostaq (10 meters)	110 km/day.

These values suggest that for Dar Sait and Rumais, the value at 2 meters might be about 150 km/day: for Rostaq it will be substantial: below 100 km/day, and at Sohar it is about 75 km/day.

There is no very marked variation between the different seasons. At Sohar and Rostaq, averages are lowest in winter, being about  $\frac{1}{3}$  the summer values: Rumais and Dar Sait appear to show the same pattern but to a much less marked degree.

Despite the low average values, strong gusts and winds can occur during stormy periods. Highest speed of gust recorded at Seeb, since mid 1973, has been 57 knots (105 k.p.h.)

### Evaporation

Evaporation has been measured in Class A Pans at Rostaq and Rumais: similar pans were installed at Sohar and Dar Sait during 1976.

During the Water Resource Surveys, potential evaporation was calculated by the consultants, according to the Penman formula. Since that time, we have not attempted to compute Penman evaporation, because of uncertainties in the base data: it is hoped to resume in 1978.

Evaporation rates are a function of all the climatic parameters previously described: and hence vary throughout the region. Thus, the markedly lower evaporation of Sohar is consistent with the slightly lower temperatures and higher humidities (hence, lower saturation deficit), the slightly lower radiation, and especially, the lower wind speed. Rostaq is also lower than Rumais, because of lower windrun, despite the drier atmosphere.

Available record shows the following values for potential (Penman  $E_0$ ) evaporation, in mm/day.

Station	J	F	M	A	M	J	J	A	S	O	N	D
Rumais	3.4	4.5	6.5	7.9	9.2	9.9	8.9	7.7	7.7	6.4	4.5	3.4
Rostaq	2.9	3.9	6.0	7.0	8.5	9.0	7.6	7.2	6.8	5.5	4.1	3.0
Sohar	2.6	3.3	4.5	5.7	7.2	8.0	8.0	7.0	6.4	4.6	3.4	2.7

However, (especially for Rumais, and in May and June), comparison of the Penman against Pan gives a very high coefficient. As noted previously, calculated wind runs for these sites may be high: the use of a single daily humidity reading may also lead to slight over estimation. These factors are particularly significant in arid climates with high evaporation opportunity, where the third term of the evaporation equation represents a large proportion of the total. It is noteable that the (lower) Sohar values were derived from more complete basic data. It is therefore felt that further record might show slightly lower values. Meanwhile, it may be further noted that the sites are for typical agricultural exposures in the region: these values may therefore be used with confidence and the probability, for Rumais, of a slight safety margin.

SECTION 3

INDIVIDUAL STATION RECORDS

Muscat (old station)

Dar Sait

Mina al Fahal (P.D.(O))

Seeb Airport (Met Dept., D.G.C.A.)

Rumais

Rostaq

Sohar.

Station Records - Muscat

Raingauge and some thermometers were maintained at the civil hospital, by the then Muscat Political Agency, from 1873 at least. Brief summaries may be found in old volumes of the reports of the Agency, published by the India Foreign Office.

Subsequently (circa 1893?) the site was maintained as a regular climate station of the then Government of India. The station was closed, excepting the raingauge, in May 1959.

Instruments and observation practice are not known, but were presumably standard.

Data summaries have been published in various meteorological publications. The sample shown here, was extracted from the Water Resources report of Renardet, the original source being one of the publications aforementioned.

It may be noted that the summer mean maxims are lower, and the winter mean minima higher, than contemporary record for nearby stations.

MUSCAT

Climate Summary

Various years, between 1893-1929

1935-1944.

	J	F	M	A	M	J	J	A	S	O	N	D		
TEMP. Abs Max	30.6	32.2	41.7	40.6	44.4	46.7	45.0	42.2	41.7	40.6	35.6	33.3		} Over 24 years
Mean Max	25.0	25.0	28.3	32.2	36.7	37.8	36.1	33.3	33.9	33.9	30.0	26.1		
Mean Min	18.9	19.4	22.2	25.6	30.0	31.1	30.6	28.9	28.3	26.7	22.8	20.0		
Abs Min	10.6	11.7	16.7	18.9	23.9	25.6	25.0	23.9	22.6	20.6	16.7	15.6		
R/H at 08.00	72	73	71	64	58	72	77	82	75	69	59	70		} Over 7 years
R/H at 16.00	71	73	70	68	60	72	77	80	77	74	72	71		
Wind run km/day(2a)	69	69	59	69	69	69	69	69	52	52	52	69		27 years 1935-44
Cloud, 08.00 (Okias)	2.5	2.1	1.8	1.3	0.6	1.4	2.6	2.5	1.0	0.6	1.3	2.2		45 years

Source: Renardet report - see text

Lat. 23° 37'

Long 58° 32'

Alt. 25m. a.s.l. (approx)

Location: In the Port Authority (old Hochtief) residential compound, on a small spur overlooking the Dar Sait valley: approx 1.8 kilometers inland from the sea.

Equipment

Originally small screen with simple max/min (to 10), dry/wet and thermohygrograph (added late '74?). Daily rain gauge, totalizing anemometer at 4 meters, and Colorado pan (hardly used).

Class A pan substituted for Colorado pan, April 1976. Rain recorder, anemograph at 2 meters, and actinograph added early 1977.

Additional anemometers at 2 meters, for calibration control.

History and available record.

Is not exactly documented. Apparently installed by Sir Alexander Gibb & Partners in Nov. 1973 and maintained by them through June 1974 - summaries for this period have been found in old "Gibbs" files. Subsequently transferred to Renardet, until Feb. 1975: mentioned in their report of this date. Record to February 1975 is quoted from these sources. Original field sheets can not be found.

Operation was then continued by Water Resources Department. Record for 1975 (except December, missing) is tabulated, but the veracity of the elaboration is doubted. It has not been attempted to recheck this record, as the base data is known to be unreliable. Following frequent checks, data quality was improved during 1976: but the reliability of observers readings again deteriorated during 1977 and he has been replaced.

The station is maintained:-

- (a) As the nearest practical site to Muscat.
- (b) For training purposes
- (c) For instrument calibration trials, etc.

However, Mina al Fahal is probably more directly comparable with the old Muscat site.

Record sample

The sample shown is based on the record Dec 73 - Nov 74, 1976, and 1977 as far as now available (not complete as of date of publication)

Recorded extremes during these periods are:-

Maximum temperature 44.5 (12.8.76)

Min temperature 14.0 (Dec 1973, Feb. 1974)

Max R/H - sometimes reaches saturation, with dew, at dawn.

Wind: Prior to 1977, only daily totals available. The anemograph now installed allows determination of mean speed over about 1/4 hour but not maximum of gusts.



DAR SAIT

Typical Climate Statistics

	J	F	M	A	M	J	J	A	S	O	N	D		
TEMP. Abs Max	32.5	30.5	38.5	42.5	44.0	43.5	42.0	44.5	38.0	36.5	33.0	29.5		
Mean Max	24.2	24.4	29.8	32.8	37.7	38.8	38.1	37.0	34.7	33.3	28.7	25.8		
Mean Min	17.1	17.7	22.2	25.4	30.8	31.5	30.8	28.9	27.3	23.6	20.1	18.3		
Abs Min	14.5	14.0	15.0	18.5	24.0	26.5	25.0	26.5	24.5	23.0	16.0	14.0		
Mean max R/H	(85)	90	80	85	50	70	85	87	90	75	75	85		
Mean min R/H	(55)	60	50	40	20	30	40	50	52	40	45	55		
Solar Radiation	Started mid 1977													
Wind run km/day (4m)	223	216	215	194	192	190	194	195	185	155	166	146		
Wind run (2m)					156	165	177	184	131	129	120			
Pan Evaporation (mm)						346	352	291	260	243	166			
Based on available record, Nov 1973 to date, with gaps (especially 1975)														

Station Record - Mina al Fahal

Lat. 23° 38'

Long 58° 31'

Alt 3 m.a.s.l. (approx)

Location - Open area adjacent the main offices of Petroleum Development (Oman): some half a hundred meters from the beach.

Equipment

Daily raingauge; black bulb thermometer. Large instrument screen with max, min, dry, wet thermometers, and thermohygrograph. Charts from the latter are not at present elaborated, but could be made available for consultation.

History and available record

Consult P.D.(O)

Record sample

Water Resources Department have so far only requested complete rainfall, and temperature records since 1973: the latter are shown in this paper, from summaries kindly provided by P.D.(O).

Record from this site is of particular interest:-

- (a) As the most complete and homogeneous sample of the recent past.
- (b) For its location on the sea shore (extremes are therefore slightly less than other nearby stations).

Note that summer mean maxima are slightly higher, and winter mean minima slightly lower (as also at Dar Sait) than the old record sample for Muscat.

SULTANATE OF OMAN  
Water Resources Department

سلطنة عمان  
دائرة موارد المياه

MINA AL FAHAL (P.D.(0))

Temperature Summary  
1973 - Oct 1977

	J	F	M	A	M	J	J	A	S	O	N	D		
Abs Max.														
	1973-77	34.7	34.0	37.0	43.0	44.6	46.2	44.0	43.0	41.0	39.0	34.0	30.1	
Mean Max														
	1973	24.5	26.9	30.5	35.5	40.0	37.9	36.0	34.3	33.0	33.5	28.7	26.1	
Mean Min														
	1974	26.3	25.0	30.6	33.5	38.1	39.6	40.1	36.5	36.3	33.6	30.6	27.4	
Abs Min														
	1975	25.6	25.7	29.4	33.3	39.0	40.8	35.8	34.9	35.1	32.9	29.2	26.5	
Mean Min														
	1976	25.0	23.8	27.2	30.8	38.0	38.4	36.7	35.0	34.8	33.3	29.0	26.3	
Abs Min														
	1977	24.1	25.4	29.9	33.1	38.6	38.6	35.4	35.2	35.5	33.6			
Mean Min														
	1973	15.3	18.6	23.5	24.6	29.7	30.1	29.2	27.4	26.9	24.5	20.9	18.4	
Abs Min														
	1974	17.8	17.1	23.0	24.2	29.1	30.4	30.9	26.5	26.7	23.1	19.8	18.5	
Mean Min														
	1975	17.2	17.0	19.0	23.3	27.5	28.2	26.7	26.5	25.9	24.2	19.8	17.5	
Abs Min														
	1976	17.0	17.5	20.0	22.5	28.1	29.6	28.1	26.9	26.9	25.6	20.2	17.8	
Mean Min														
	1977	16.8	17.5	20.3	25.5	30.2	30.2	29.4	28.1	27.2	26.1			
Abs Min														
	1973	12.0	14.0	15.0	17.0	22.9	25.3	22.8	23.8	22.7	18.2	15.7	13.0	

Station Record - Seeb International Airport.

Lat 23° 35'

Long 58° 16'

Alt 14 meters a.s.l.

Seeb Airport is a full scale meteorological station, currently operated by PANAM on behalf of the Met Dept., Directorate General of Civil Aviation.

The new airport became operational during 1973. Originally, there was only a small range of climate instruments available, and only limited record exists for the earlier period.

Since the responsibility for the station was transferred to PANAM, the range of equipment and interpretation has been steadily increased. From January 1976 regular daily summaries have been published each month: record quoted here is from these and other summaries, kindly made available by the Seeb Met Office in coordination with the D.G.C.A. For further details, consult the Met Office (see Foreword)

Noteable extremes during the period have been :-

	<u>Since mid 1973</u>	<u>Since Jan 1976</u>
Abs max temp.	47.8°	47.0° (29/6/77)
Abs min temp.	12.5°	13.0° (25/1/77)
Max gusts (knots)	57 (11/3/76) next max	50 (9/8/77)

Days with gusts exceeding 25 knots occur some ten to fifteen times a year

SFEB INTERNATIONAL AIRPORT

Typical Climate Statistics

	J	F	M	A	M	J	J	A	S	O	N	D		
Temp: Abs max	31.2	33.0	41.2	42.3	45.5	47.0	45.0	46.8	41.2	38.8	33.0	30.0	Jan 76 - Aug 77	
Mean max	25	25	29	32	38	40	37	36	36	34	30	28		
Mean min	17	17	21	23	29	30	30	28	28	24	20	18		
Abs. min.	13.0	14.2	15.7	19.4	24.0	26.1	26.6	25.0	25.0	23.0	15.8	14.9	Jan 76 - Aug 77	
Mean max RH	80	85	85	73	60	71	86	83	84	85	77	84		
Mean min RH	47	46	40	31	22	34	47	46	46	48	48	50		
Vapour pressure (a)	15	19	19	21	22	26	30	32	29	23	20	18		
Vapour pressure (b)	14	15	16	18	20	24	29	31	27	18	16	16		
Mean pressure (a)	1016	1015	1012	1009	1004	998	996	997	1004	1010	1015	1016		
Mean pressure (b)	1016	1016	1012	1009	1004	998	997	998	1004	1010	1015	1017		
Sun hours	7.8	9.8	9.7	9.5	11.4	11.3	9.8	10.0	10.2	10.1	9.6	9.0		

a - At approx time of max temp  
b - " " " min temp

Sources: Met Dept data summaries, and daily summaries 1976-Aug 1977

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Station Record - Rumais Experimental Farm

Lat 23° 41'

Long 58° 00

Alt. 15 meters a.s.l.

Location

In the Rumais Experimental Farm: irrigated environment a few kilometers inland from the coast and the coastal farming strip.

Equipment

Large compound with observers office. Small screen with max/min and dry/wet: daily raingauge and recorder. Sunshine recorder, Kipp & Zonen solarimeter, totalizing anemometer at 10 meters, and Class A pan.

History and available record

Station was installed by Sir Alexander Gibb and Partners at the extreme end of 1973; and operated by them through October 1975; then by Water Resources Department. There is complete record through end 1975, except gaps in July/August. Early 1976 station became ineffective, and was closed (except rainfall station).

The site remains, and the station could be revived with new equipment. However, any such reactivation would have to be a function of a research operation (and with more frequent observation than in the past) because it is not justified to maintain numerous stations within a small region, in the context of the national water survey.

RUMAI S

Typical Climate Statistics

	J	F	M	A	M	J	J	A	S	O	N	D	mean/total
Temp. Abs Max	30.7	30.2	36.7	39.9	45.0	47.0	46.4	41.7	41.4	38.0	34.0	29.0	
Mean Max	24.7	24.5	29.3	33.1	38.2	40.0	40.4	36.6	35.8	33.0	29.8	26.2	32.5
Mean Min	13.5	14.5	17.5	20.5	24.5	26.6	28.1	26.3	24.5	19.2	16.6	15.2	20.7
Abs Min	9.0	9.8	11.3	16.2	19.9	24.0	24.8	24.0	21.0	14.0	12.4	11.5	
Mean R/H @ 09.00	66	67	60	51	45	51	65	68	58	57	67	70	
Mean Vp @ 09.00	17.0	16.8	18.5	21.3	23.8	31.1	34.3	33.7	27.9	24.3	22.0	19.0	
Sun hours	8.0	8.3	9.3	9.6	10.9	10.8	9.7	(10.6)	9.3	9.6	9.7	8.7	
Radiation	350	435	555	573	615	633	553	528	543	479	421	358	
Windrun km/day													
(10m)	229	253	240	241	249	251	273	253	229	223	205	205	
Class A Pan (mm)	140	154	233	275	353	347	415	349	271	245	170	143	3,095
Penman Evaporation	105	126	200	238	286	298	277	238	230	297	236	105	2,436

Means for 1974 - 1975 (with gaps)

Station Record - Rostaq

Lat. 23° 33'

Long 57° 27'

Alt 350 m.a.s.l. (approx)

Location

In the interior of the Batinah, at the foot of Jebel Akhdhar. The station is in an open area adjacent the hospital, between the hospital and the date groves, on the south (inner) side of the oasis.

It is probable that the proximity of the mountains shortens direct sunshine in the late evening.

Equipment

Large compound with observers office. Small screen with max/min and dry/wet, daily raingauge and rain recorder. Sunshine recorder, Kipp & Zonen solarimeter, totalizing anemometer at 10 meters, and Class A pan.

Sunshine recorder removed 1976; rain recorder changed early 1977. Totalizing anemometer at 2 meters, added mid 1977.

History and available record.

Station was initiated in March 1974, but record was uncertain and very broken through October. Since then, continuous, - excepting only small gaps from instrument failure (solarimeter battery, etc.). Observer is medical assistant at hospital, and makes provision for his absences on leave.

Station was maintained by Sir Alexander Gibb and Partners through October 1975, and subsequently by Water Resources Department. Summaries quoted here, are based on record since November 1974.



**SULTANATE OF OMAN**  
Water Resources Department

ROSTAQ

سلطنة عمان

دائرة موارد المياه

Typical Climate Statistics

	J	F	M	A	M	J	J	A	S	O	N	D	mean/total
TEMP Abs Max	32.0	34.5	38.5	40.5	45.0	46.5	46.0	45.5	42.0	39.5	34.5	31.5	
Mean Max	24.7	25.8	30.7	34.5	41.3	43.0	41.5	40.7	39.1	35.1	30.4	26.9	34.5
Mean min	11.0	12.1	15.1	17.5	22.3	25.1	27.6	24.9	23.7	20.0	15.3	14.0	19.1
Abs Min	7.0	6.0	9.0	12.5	16.5	18.5	23.5	17.5	20.0	10.5	9.5	8.0	
Mean R/H (09.00)	65	72	64	53	50	52	75	52	55	55	53	65	
Mean Vp (09.00)	14.3	14.0	16.3	19.2	23.7	25.7	34.6	27.1	26.8	20.0	17.3	17.0	
Sun hours	7.0	7.0	8.7	9.6	10.3	10.7	8.9	7.9	8.7	8.9	8.7	7.5	
Radiation	347	413	511	535	576	587	533	521	505	453	385	330	
Windrun (10m)	92	103	120	122	135	143	145	130	114	83	77	81	
Windrun (2m)	x	x	x	x	(75)	75	77	80	68	54	48	x	
Class A Pan (mm)	112	147	200	234	336	369	358	313	284	208	130	107	2,798
Penman Evaporation	90	108	135	210	265	270	236	222	203	272	122	91	2,174

Station Record - Sohar

Lat 24° 21'

Long 56° 43'

Alt: 15 m.a.s.l. (approx)

Location

In the Government farm, adjacent the Water Resources Department: irrigated farm environment. Some three to four kilometers inland the sea, and the coastal oasis belt.

Equipment

Large screen with max/min, psychrometer and thermohygrograph. Daily raingauge, sunshine recorder, and totalizing anemometer at two meters.

Class A evaporation pan added, late 1976.

Anemograph at 2 meters, actinograph, and rain recorder added during 1977 and anemometers moved to half meter.

History and available record.

Station was installed by ILACO at the end of October 1973: and maintained by them through March 1975. Subsequently, it has been operated by Water Resources department, the readings being taken by staff from the office. Record is continuous, but with gaps because of non availability of appropriate charts and other causes. Recently operation of the thermohygrograph has been erratic and a replacement instrument is expected. Humidity statistics have not been shown in the climate summaries: previously mean RH was computed, and latterly means of the maxima and minima.

As noted elsewhere in this report, evaporation rates and winter temperature minima are substantially lower than in the south eastern Batina.

**SULTANATE OF OMAN**  
Water Resources Department

سلطنة عمان  
مديرية موارد المياه

SOHAR

Typical Climate Statistics

	J	F	M	A	M	J	J	A	S	O	N	D	Mean/total
Temps Abs Max	28.8	30.0	38.0	42.5	46.5	47.2	46.7	46.1	42.2	39.5	34.4	29.5	
Mean max	23.8	23.9	28.5	31.3	38.3	39.1	37.3	36.6	36.1	33.7	28.9	26.0	32.0
Mean min	12.0	12.8	15.8	17.8	23.2	25.5	27.3	27.1	23.9	28.8	14.0	12.7	19.3
Abs min	6.5	7.2	9.3	12.5	18.7	20.6	21.2	22.8	19.1	10.2	5.4	7.5	
Sun hours	7.2	7.5	7.8	8.5	10.3	9.9	8.9	8.5	9.4	9.2	8.8	7.3	
Windrun (km/d).2m	64	68	72	74	86	94	89	88	73	58	50	48	
Penman Evap.(mm)	80	91	139	172	222	239	241	216	192	143	102	32	1,919
Class A Pan(mm)	95	112	163	197	265						137	94	

Penman evaporation Nov 73 - March 75, (Pan) evaporation since Nov 76