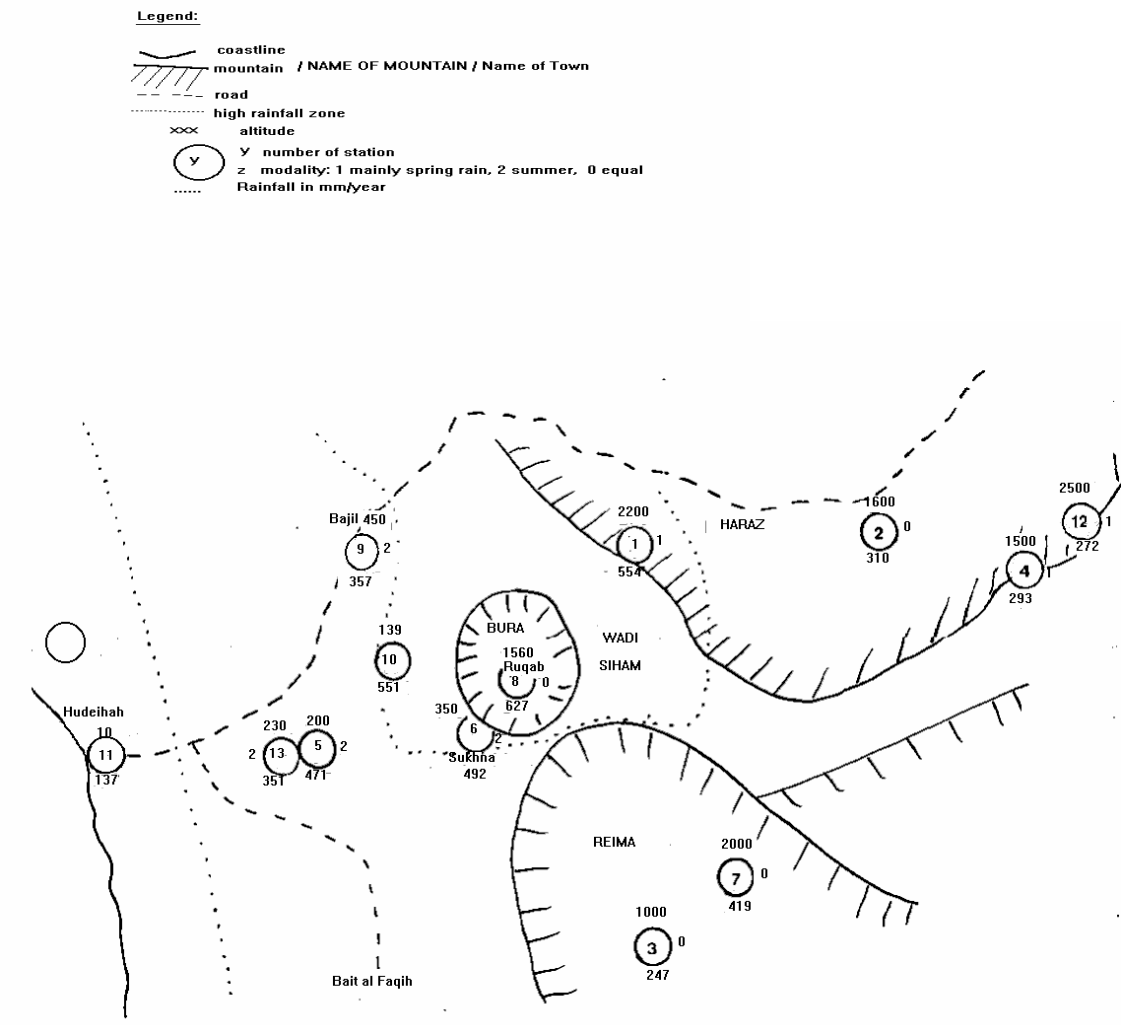
Jebel Bura, a volcanic intrusion in the Tihama foothills, shows the highest rainfall at the top (station no 8: Maghraba), as could be expected. But opposite to our expectations, the increase of rainfall with altitude seems minimal. The adjacent plains receive just 20% less rainfall than the mountains. Bura' seems to create a high rainfall zone around it and catches most of the rain. That's why the dependency of rainfall on the distance from the sea doesn't show a clear correlation. From Hudheidha to Bura' (and Reima) the rainfall is increasing, behind this first mountain range it decreases strongly. Even the high altitudes of eastern Harraz just get about half the amount of Bura'.

The distribution is bimodal with a maximum march-mai & july -

4.1.1.2.1 Analysis of Rainfall around Jebel Bura'[1])



Rainfall Distribution in the Area around Jebel Bura'.

[1]) Wadi Siham Meteorological Stations.

september (s. table below).
If we classify 3 modalities we get some further hints:

1 main rainfall during spring
2 " " " summer
0 approximately equal rainfall in spring and summer

The dry Tihama (nearby the sea), as well as the second range of mountains, seems to get mainly spring rains. The "wetter" Tihama near to the foothills gets mainly summer rains. Inside the mountain massifs the distribution is fairly equal (Bura, Reima and Haraz).

Meteorological Stations:

no	station	altitude	rainfall	modality
1	Al Amir	2200	554	1
2	El Heima	1600	310	0
3	Al Dabira	1000	247	0
4	Al Fowara	1500	293	1
5	Mahal Shamiri	200	471	2
6	**Sukhna**	**350**	**492**	**2**
7	Al Hamal	2000	419	0
8	**Maghraba**	**1560**	**627**	**0**
9	Deir Zinkah	450	357	2
(10	Al Khalifa	139	551	2
(11	Al Hudheidha	10	137	1
12	Wallan	2500	272	1
13	Waqir	230	351	2

Stations with less than 10mm rainfall:

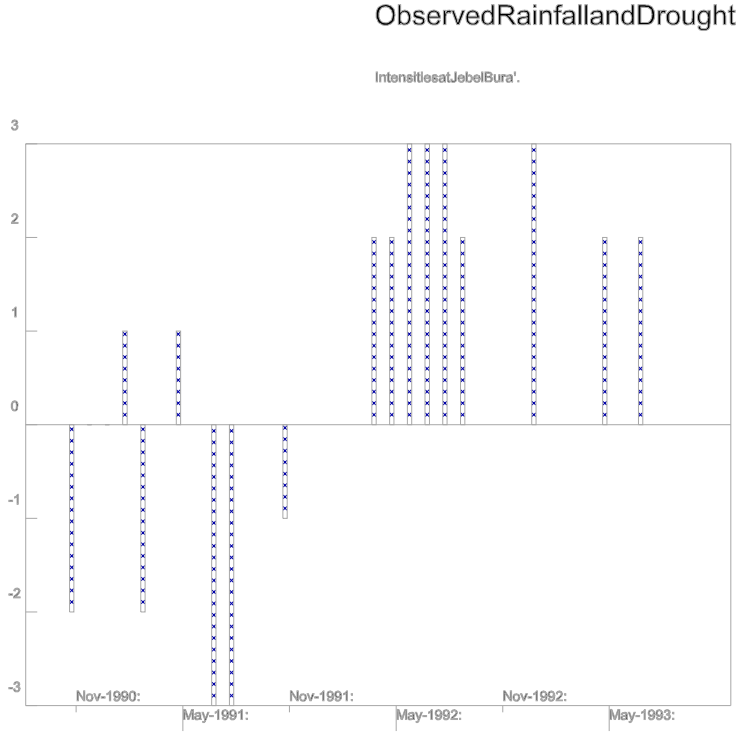
year	April	august
1979	3	4
1980	5,13	1,4
1981		12
1982	5,6	
1983	5	13
1984	1,2,4,5,6,8,9,12,13	2,3,9,12
1985	2,5,6	2
1986		
1987	5,6,7	11
1988	5,6,7,11	
1989	5,6	4,11

station: no of droughts in April+	August	=	year	* rank
1:	1		1	* 2 * 5
2:	2		2	* 4 * 3
3:	1		1	* 2 * 5
4:	1		3	** 4 * 3
5:	**8**		0	* 8 * 1
6:	**6**		0	* 6 * 2
7:	2		0	* 2 * 5
8:	1		0	* 1 * 6
9:	1		1	* 2 * 5
(10:	0		0	* 0 * 7)*
(11:	1		2	* 3 * 4)*
12:	1		2	* 3 * 4
13:	2		1	* 3 * 4
sum:	27	+	13	= 40
avg:	**5**		**11**	**3** (expected period of repetitions in years).

* Those stations are only 3, resp. 4 years at work.

As the data after 1989 could not be "made available", I only got some lists of zeros, we have to content ourselves for this period with some qualitative observations:
Legend: -3 very dry 0 average +3 very wet

Graph 8: Qualitative observations on rainfall.



Summary of wet and dry years:

Origin of Data	wet	dry
Kopp	1975	1969-72
Meteo	1981/82, 1989	1984
Herzog (observ.)	1992	1991
Period of repetition	**5**	**10**

Comments:

Drought is a very relative notion. Statistics and tables generalise and we might just take the year 1984 for very dry, because all stations really showed drought. But for the people around stations 5 and 6 the fact of lacking spring rains in 6-8 out of 11 years is quite tragic as well. Summer rains anyhow look to be much more reliable. As an average they only failed once in eleven years. Years as 1984 and 1991, when rain fails in both seasons, are very tragic and have a high impact on economy and society.

Institutional Problems with Meteorological Data:

The history of meteorological data collection in Yemen is a sad one. Kopp [1981 p 34] said already: "*The only characteristic feature of all meteorological data in Yemen is their incompleteness, unreliability and so their minor value as evidence.*" While Betzler [2]) was still able to obtain data from the old airport, the same source (*Civil Aviation and Meteorology Authority*) insisted 1990 that "*no data are available from before 1970*"!
The problem is manifold on a) the institutional and b) the technical level.
a) Data collection, processing and storage is done by a multitude of badly or not at all integrated organisations:
- Civil Aviation and Meteorological Authority.
- TDA
- Ministry of Petrol and Mineral Resources.
- Development Projects

The strong project dependency leads to a short life span of the measuring points. Soon after project closure the installations are just "rotting" away (e.g. Jihana, Mawsa (Harraz Project, closed 1986, "decayed" already in 1988), Sukhna (1991) ...)
At the institutional level there seems to be a "lack of purpose and meaning" seen in data accumulation, and parallel to it, as

[2]) s. E. Betzler, Tab 1, p. 25, years 1938-47, p. 63-66:

might be expected, a strong lack of motivation ("irresponsibility"), what in the end leads to a lack of (reliable) data.
On the technical level e.g., the rainfall station at Ibb should be checked once, as it delivers increasingly "strange" results. Somebody there must have the intention to go for "Guinness Book of Records". In the mid eighties some project made a map and indicated for Ibb some 1300 mm, what looked already quite exceptional. More reasonable data were delivered 1985, indicating some 1000 mm. An estimate of the Department of Hydrology (undated, but about the same as up) resulted in "only" 800 mm.
The most extreme one so far has been produced by Scholte [3]) with (no not some, but precisely:) 1849 mm! It is surely not an average. Even as a maximum it is a bit 'extravagant', while I would not say impossible. But if I see a rainfall map with a point receiving 1849 mm a year I would definitely expect some rainforest there.
The following graph indicates potential rainfall of over 1000mm, but it is wrong, substantially. Jebel Saber at Taiz reaches 3000m, as well as Jebel Ba'adan. As rainfall is decreasing rapidly behind mountains the indicated situation is not possible. Water condenses and rain falls as the clouds are forced by the mountains to raise, what leads to cooling. Behind the obstacle the air is dry, and while falling and warming up, it gets even dryer.
More reliable is the analysis presented before (chapter 4.1.1.2.1) on Jebel Bura'. Bura' with an altitude of 2200m is the first isolated mountain massif of the Serrat range from the west. The first measuring station (west to east) is Hudaidah with 140mm, then the Central Tihama with 350mm, the Tihama at the foot of Bura with 500mm, the top of Bura' 630mm. A station at the same altitude on Jebel Harraz, in the wind-shadow of Bura' still receives 550mm, but in the shadow of Reima the amount is already reduced to 400mm! The stations east of Bura' in upper Wadi Siham are all around 300mm.
Ibb is not in such an extreme situation, but it has mountains in the north-west, north of Udain, and in the south-west (J. Ta'kar) that reach 3000m, about the same as Jebel Ba'dan just east of Ibb. Jebel Ba'dan surely traps a fair amount of rain - but by no means 1749 mm. I guess the rain gauge must either stand under a gutter, does catch drifting rain or somebody is p... in it before he takes the measurement.

[3]) Scholte; Kessler; Al Khuleidi; (1991):