Meteorological Pursuit in University of Gujrat, Pakistan (Part 2)

Umeed Maalik (es.u.maalik@gmail.com)

University of Gujrat - Hafiz Hayat Campus: University of Gujrat https://orcid.org/0000-0002-1186-0618

Research Article

Keywords: Urban Meteorology, Hydrological Conditions, Meteorological Findings, Meteorological Forecasting, Meteorology UOG, PK.

Posted Date: June 7th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-598069/v1

Title Page

Please make sure your title page contains the following information.

Title **Meteorological Pursuit in University of Gujrat, Pakistan (Part 2)**

The title should be concise and informative.

Author information

- The name(s) of the author(s) **Miss Umeed Maalik**
- **Miss Umeed Maalik passed BS & M.Phil. from Department of Environmental Sciences University of Gujrat, Hafiz Hayat Campus, Gujrat, Pakistan.**
- **She is now working as a Research scholar and Lecturer in Lasbella University of Agriculture Water and Marine Sciences, Uthal, Lasbella, Balochistan, Pakistan.**
- es.u.maalik@gmail.com
- If available, the 16-digit ORCID of the author(s)
- 0000-0002-1186-0618

Contents

Table of Figures

List of Tables:

METEROLOGICAL PURSUIT IN UNIVERSITY OF GUJRAT, Pakistan (Part 2)

ABSTRACT

Meteorological observation activity continued for 3 months in University of Gujrat small scale observatory. The cell phone message send to headquarter is uploaded there to the official website of Meteorological Department. This internet updating of weather is also a part of our discussion to check how important working of our station, other Regional stations and the World over. It is importance in various fields of Science, Technology, Hydrology, Aviation, Agriculture, and Defense for saving, wellbeing, and development of mankind and life on the Planet Earth. Chapter three and four are included in this part 2 of this Meteorological pursuit.

Keywords: Urban Meteorology, Hydrological Conditions, Meteorological Findings, Meteorological Forecasting, Meteorology UOG, PK.

CHAPTER THREE

3.0- FINDING

Weather Observation is presented in the form Reporting. Therefore after carefully taking readings from outdoor installed instruments, these readings are specifically note down in the Pocket Register**,** and then Sign up is formed.

Filling of pocket register: is done in duty hours for each reading time, from directly measured readings of parameters like: Dry & Wet Temperature, Wind Direction & Speed, and Rain along with consulting of Hydrometeric Table for picking values of parameters such as Dew Point & Relative Humidity, which are either directly measured or dependent on the directly measured parameter's values for their measurement. Also values of these relative parameters remains constant for a constant set of directly measured parameters. Filling Pocket Register is by using codes as given in the Surface Weather Code, 1995. In this way Observation is manually recorded for the whole month at one place.

3.1- Reporting

Weather Reporting is in the coding form, this coding is specific Meteorological coding, given in Aeronautical code book1995, and Surface Weather Code book1995, etc.

STATEMENT OF PROBLEM: ***HOW TO SIGN UP_____?***

For Sign Up Reporting is in the form of Metar & Synaptic

> **REPORTING**
>
> - **AFTER EVERY 1 HOUR_____METAR {**Meteorological data **}**
> - **AFTER EVERY 3 HOURS_____SYNAPTIC{**Summary**}**

Filling of Synaptic Sheet: Synaptic Sheet is filled for Reporting in the form of Sign up & Metar manually. This sheet is another form of data collection /making record of Met Observation at a station where there is no use of automated observation and digital data collection.

3.2- Metar

Metar is from Meteorological data. It is the way of Weather Reporting after every 1 hour. It is important for Aviation, Airplanes Root weather.

Table3.1: Model of Metar & its description

Parameters that are used to make Metar	**Presentation in code/symbol**	**Model of Metar**	**# of figures & digits used**
Station nam:Pakistan+UOG	Pak.code+station.code	**OPUG**	2 + 2 figures
Wind direction.+ Wind Speed	Code+ value (Knots)	**13006Kt**	3 +2 digit (unit)
Visibility	Value in kilometers	**9999**	4 digits
Thunder storm + Rain	Symbol + Symbol	**TSRA**	2+2 figures
# of Octas + Lower cloud	Symbol+code+name	**Few 035CB**	3f + 3d + 2f
# of Octas + Medium Cloud	Symbol + code	**Sct 040**	3f+ 3d
# of Octas + High Cloud	Symbol + code	**BKN100**	3f +3d
Dry temperature& Dew Point	Both Whole numbers	**29** / **10**	2d + 2d
Barometer reading	unavailable	**Q** ////	4d
Relative Humidity	Whole # in %	**RH 31%**	2f +2d(unit)

Source3.1: Class Work, by consulting Pocket Register's data. Accessed at 15-05-2013.

Description of Metar: Metar is formed by reporting following considerations, from above table of Metar Model:

OPUG: is the Station name from (Pakistan+ UOG), OP is the code figure of Pakistan used for Reporting of Metar, and UG is code figure for UOG Meteorological Observatory.

13006Kt: is the Wind Direction +Wind Speed in Knots, 130 is code in 3 digits form for SE (135°) Direction of Wind observed by Wind Vane, and 06 is Wind speed given in 2 digits, as calculated from the 2 readings of Anemometer in Knots(Unit of Wind Speed).

9999: is the code for Visibility, given in the 4digits form, from code 99, representing for day light observation of objects at a distance of more than 10,000meters/10km.

TSRA: is the code figure (2 +2) for Thunder storm & Rain, as note down in the Pocket Register.

Few 035 CB: is the number and type of Lower Clouds, where Few: from 1**-**2 Octas, 035: code for lower clouds, CB: type of lower clouds.

Sct 040: is for number of medium clouds, where Sct represents 3-4 Octas, and 040 is code of Medium clouds.

BKN 100: is for number of higher clouds, where BKN represents 5-6 Octas, and 100 is code of higher clouds.

29/10: is 2digits representation of Dry thermometer reading to show present temperature, along value of Dew Point in 2digits, here values of both parameters are given as whole numbers by rounding off.

Q////**:** is at a place where Barometer's reading is given, as for absence of Barometer Q with 4 obliges in written, whereas oblige is mostly showing absence of a reading or unavailability of taking an observation.

RH 31%: is the Relative Humidity 31 in %, where RH is for 2figure representation of Relative Humidity, 31 is for 2digits representation of vale of Relative Humidity in units of %age.

This model of Metar is a representation of Reporting Metar which changes as the weather changes that is with alterations in values of different Weather Elements, accordingly signs, symbols and codes.

Metar one after the other are showing slight differences among while any Metar of 1st day of month shows very clear distinction from the Metar of middle day of a month or from a Metar of the last day of month, that can be seen in given examples.

Table3.2 : Metar reporting models of 2-04-2013, 3-04-2013, & 12-04-2013, b/t 0300z-1200z.

OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG
31012Kt	00000Kt	00000Kt	31002Kt	31006Kt	31006Kt	31010Kt	31010Kt	31012Kt
9999	2000	4000	5000Hz	9999	9999	9999	9999	9999
Sct 040	TS Few 035 Cb Sct 040	TS Few 035 Cb Sct 040	TS Few035 Cb Sct 040	Sct 040	Sct 040	Sct 040	TS Few035 Cb Sct 040	TS Few 035 Cb Sct 040
Sct 100	BKN100	BKN100	Sct 100	Sct 100	Sct 100	Sct 100	Sct 100	BKN100
20 / 11	22 / 11	22 / 13	22 / 13	22 / 12	22 / 18	22 / 13	22 / 12	21 / 14
Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////
RH 56%	RH 50%	RH 58%	RH 58%	RH 54%	RH 54%	RH 58%	RH 58%	RH 65%

OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG
05006Kt	05006Kt	05004Kt	05004Kt	05006Kt	05006Kt	05006Kt	05006Kt	05006Kt
9999	9999	9999	9999	9999	9999	9999	9999	9999
Sct 100	Sct 100	Few040 Sct 100	Few035 Few100	Sct 040	SKC	SKC	Sct 040	Sct 040
25 / 10	27 / 11	28 / 11	29 / 10	29 / 11	30 / 9	30 / 9	29/10	29 / 10
Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////
RH 30%	RH 37%	RH 36%	RH 30%	RH 32%	RH 28%	RH 28%	RH 30%	RH 31%

OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG
31004Kt	31004Kt	31004Kt	31004Kt	31002Kt	31002Kt	31004Kt	31004Kt	31006Kt
CaVok	CaVok	CaVok	CaVok	CaVok	CaVok	CaVok	CaVok	CaVok
34 / 12	34 / 12	35 / 13	35 / 13	35 / 10	35 /10	35 / 13	35 / 13	34 / 10
Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////
RH 27%	RH 27%	RH 28%	RH 26%	RH 22%	RH 22%	RH 26%	RH 28%	RH 29%

Source3.2: Pocket Register & Signup Sheets Data Record. From Meteorological Observatory University Of Gujrat, PK. Hafiz Hayat Campus, Accessed at 17-05-2013.

Table3.3: The Models of Metar Reporting of 21-04-2013 & 24-04-2013 showing the differences of closely taken Metar reporting i-e within one day & The Metar Reading of one day in comparison with the Metar Readings of 2 days later.

OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG
13006Kt	13006Kt	13008Kt	13008Kt	13008Kt	13010Kt	13010Kt	05012Kt
9999	9999	9999	9999	9999	9999	9999	9999
BKN 040	BKN040	BKN040	BKN 040	BKN040	Few 040 Sct 100	Few040 Sct 100	Sct 100
24 / 15	25 /15	25 / 13	25 / 13	26 / 11	27 / 12	28 / 12	30 / 12
Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////
RH 60%	RH 54%	RH 47%	RH 47%	RH 39%	RH 38%	RH 36%	RH 33%

OPUG	OPUG	OPUG	OPUG	.	OPUG	OPUG	OPUG
05012Kt	05008Kt	09004Kt	09008Kt	.	00000Kt	05002Kt	05004Kt
9999	9999	9999	9999	.	4000Fu	4000Fu	40000Fu
Sct 100	Sct 100	Sct 100	Few 100	.	Few 100	Few 100	Sct 100
30 / 12	31 / 12	33 / 9	31 / 8	.	32 / 13	27 / 16	22 / 17
Q ////	Q ////	Q ////	Q ////	.	Q ////	Q ////	Q ////
RH 33%	RH 33%	RH 25%	RH 24%	.	RH 33%	RH 50%	RH 74%

OPUG	OPUG	OPUG	OPUG	OPUG	OPUG	OPUG
0000Kt	31002Kt	31002Kt	31004Kt	23002Kt	27004Kt	27004Kt
4000Fu	4000Fu	9999	9999	9999	9999	9999
SKC	SKC	Few 100	Few 040	Few 040	Few 040	Few 040 Sct 100
33 / 14	34 / 14	35 / 14	35 / 13	35 / 10	36 / 11	35 / 13
Q ////	Q ////	Q ////	Q ////	Q ////	Q ////	Q ////
RH 32%	RH 31%	RH 28%	RH 26%	RH 22%	RH 23%	RH 28%

Source3.3: Record of Data, at UOG Meteorological Observatory, collected in the form of filling Pocket Register and Synaptic Sheets. Accessed at 20-05-2013.

3.3- Synaptic

Synaptic is from “Synap” that is summary or average. Sign up or Synaptic Reporting is a way of reporting in which observer reports after every 3 hours. This main step of professional reporting is the key feature of any Meteorological Observatory, from which updates, forecasting and all other phenomena are derived.

Table3.4: Scheme for Reporting in the form of Synaptic for 0300z + 0900z

<table>
<tr><td colspan="5">0300z + 0900z</td></tr>
<tr><td>Date</td><td>Date</td><td>Time</td><td>Time</td><td>4</td></tr>
<tr><td>4</td><td>1</td><td>U</td><td>O</td><td>G</td></tr>
<tr><td>2</td><td>1 / 2</td><td>h</td><td>V</td><td>V</td></tr>
<tr><td>N</td><td>D</td><td>D</td><td>F</td><td>F</td></tr>
<tr><td>1</td><td>0</td><td>T</td><td>T</td><td>T</td></tr>
<tr><td>2</td><td>0</td><td>Td</td><td>Td</td><td>Td</td></tr>
<tr><td rowspan="2">3</td><td>/</td><td>/</td><td>/</td><td rowspan="2">/</td></tr>
<tr><td colspan="3">(This group is Reported in 0000z, 0300z, 0600z, 1200z, &1800z)</td></tr>
<tr><td>4</td><td>/</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>7</td><td>W</td><td>W</td><td>W1</td><td>W2</td></tr>
<tr><td>8</td><td>Nh</td><td>CL</td><td>CM</td><td>CH</td></tr>
<tr><td colspan="2">3</td><td colspan="2">3</td><td>3</td></tr>
<tr><td>5</td><td>/</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>6</td><td>0</td><td>0</td><td>0</td><td>7</td></tr>
<tr><td rowspan="2">7</td><td>R24</td><td>R24</td><td>R24</td><td>R24</td></tr>
<tr><td colspan="3">(This group is Reported Only in 0300z)</td></tr>
<tr><td colspan="5">RH in %</td></tr>
</table>

Source3.4: Class Notes prepared by Met Observer Sir Abdul Ghani, at UOG, PK. Accessed at 21-6-2013.

Table3.5: Scheme for Reporting in the form of Synaptic for 0600z + 1200z

0600z + 1200z				
Date	Date	Time	Time	4
4	1	U	O	G
0 / 1	1 / 2	h	V	V
N	D	D	F	F
1	0	T	T	T
2	0	Td	Td	Td
3	/	/	/	/
4	/	/	/	/
6	0	0	0	1 / 2 / 3
7	W	W	W_1	W_2
8	Nh	CL	CM	CH
3		3		3
Maximum (At 1200z)1	0	Tx	Tx	Tx
Minimum (At 0300z)2	0	T_N	T_N	T_N
5	/	/	/	/
6	0	0	0	7
RH in %				

Source3.5: Class Notes prepared by official Met Observer Sir Abdul Gani, at UOG, PK. Access at 25-05-2013.

These schemes made very clear & easy the Synaptic Reporting. Following this avoid from lot of confusions and difficulties that can raise to know about Synaptic Reporting by consulting large amount of data in code books, internet web sites, guide books, and Meteorological syllabus. It is a comprehensive approach to reach the demand of manual reporting at a Surface Weather station like that of Meteorological Observatory at UOG.

Table3.6: Scheme of sign up, Rain groups.

Date		Date	Time	Time	4
	4	1	U	O	G
When Rain is Reported in both sections like: (0000+0600+1200+1800)	0	1			
When Rain is Reported in only one section i-e before 333	1		h	V	V
When Rain is Reported in just after 333	2	2			
	N	D	D	F	F
	1	0 / 1	T	T	T
	2	0 / 1	Td	Td	Td
This group is Reported in 0300z+0600z+1200z +1800z+0000z	3	P_1	P_1	P_1	P_1
	4	PPP	PPP	PPP	PPP
					1→0600z for 6hours Rain
0000z+0600z+1200z+1800z	6	0	0	0	2→1200z for 12hoursRain
					3→1800z for18hoursRain
	7	W	W	W_1	W_2
	8	Nh	CL	CM	CH
3		3			3
This is for Maximum temp. Reported in afternoon 1200z	1	0	Tx	Tx	Tx
This is for Minimum temp. Reported in Morning 0300z	2	0	T_N	T_N	T_N
	5	/	/	/	/
Just for 3hours Rain Reported in every sign up.	6	0	0	0	7
Daily for 24hours Rain0300z	7	R_{24}	R_{24}	R_{24}	R_{24}
RH in %					

Source3.6: Class notes prepared by Met Observer Sir Abdul Ghani, UOG PK. Accessed at 26-05-2013.

Here Models of Synaptic Reporting for 0300z,0600z,0900z, &1200z are given one by one along with their relevant description, according to the Weather Observations that are carried out at UOG Meteorological Observatory by following above given schemes(0300z-1200z).

Table3.7: Model of Synaptic Reporting for 0300z (02-04-2013)

0	2	0	3	4
4	1	U	O	G
2	1	6	9	7
6	3	1	1	2
1	0	2	0	0
2	0	1	0	9
3	/	/	/	/
4	/	/	/	/
7	2	9	9	2
8	3	4	7	0
3		3	3	
2	0	1	9	9
5	/	/	/	/
6	0	0	0	7
7	0	0	5	2
RH 56%				

Source3.7: Pocket Register & Synaptic Sheet Data Records, at Met Observatory UOG, PK. Accessed at 29-05-2013.

Description of Synaptic Reporting Model for 0300z reading:

02034: This group represents date+date+time+time+code of Anemometer, as **02** is date+date that is 2digits date**, 03** is time+time that is time given in 2digits, and **4** is code of Anemometer.

41UOG: This group represents Country code in 2digits + Station code in 2/3digits. As **41** is the country code for Pakistan, and **UOG** is timely used code, up to now for UOG Meteorological Observatory because this newly formed set up of weather station still has not got any code.

21697: Rain type + Specific phenomena + Height of lowest clouds from surface (h) + Visibility (V V) in 2digits. This is Rain Reporting group. Where **2** is for reporting Rain type I (type one), that is Rain of last 3hours. **1** is from 1 / 2, that is Special phenomena exists / No special phenomena exist, while **6** is code for height above surface of the base of the lowest clouds seen from surface. **97** is Visibility (V V) code in 2digits form that ranges from 00 to 96,97,98,99.

63112: This is NDDFF group, for No. of Octas (N) + Wind Direction (DD) +Wind Speed (FF), in 1+ 2+ 2 # of digits form respectively.Where for **N** (no. of Octas)/ total number of clouds is represented as 0-8, no visibility of sky by 9, and for no observation "/ "is used. For **DD** (Wind Direction) 2digits code to represent direction.

Table3.8: Wind Direction codes which are common and mostly observed

Wind Direction	Code digits	Wind Direction	Code digits
NE	05	SW	23
E	09	W	27
SE	13	NW	31
S	18	N	36

Source3.8: Surface Weather Code, 1995. Accessed at 29-05-2013.

And for **FF** (Wind speed), reading taken by Anemometer, after calculation is taken in 2digit.

10200: This is dry temperature code + station specific temp.'s code + dry thermometer's reading in 1+1+3digits form respectively. Where **1** is code for dry temperature remains constant, **0** is from 0 / 1 that is a code representation, specific to area's temperature as for +ive reading of dry thermometer / -ive reading of dry thermometer, and **200** is actual reading of dry thermometer in 3digits form.

20109: This is Dew Point code (1digit) + station specific D.P's code (1digit) + Dew Point reading (3digits) from Hydrometric Table.

Where **2** is code for Dew Point remains constant, **0** is from 0 /1, code options according

station specification as for +ive reading of Dew Point / -ive reading of Dew Point, while **109**: is for actual Dew Point reading.

3////: This group is for Barometer's reading.**3** is code digit, and //// (4obliges) for no observation.

4////: This group is also for Barometer's reading.**4** is code digit, while //// (4obliges) are for no observation.

72992: This is, 7 W W W_1W_2, group, where **7** is code to represent Specific phenomena exists, then Present Weather condition (**WW**), for which codes are from 00-99 that is 2digit codes, more experienced examples are:

Table3.9: Codes for present weather W W

Code in 2digits form ranges from 00-99	Present weather (W W)
29	Thunder present
17	Thunder was
97	…… and so on

Source3.9: Surface Weather Code, 1995. Page # 52-55. Accessed at 29-05-2013

Then **W_1** is for near past weather, of previous 3hours weather. And the last in this group is **W_2** that represents: far past weather, of previous 6, 12, 0r 18hours.

Code representation for W_1 & W_2 in more detail is available on page 51 of Surface Weather Code, 1995.Pakistan Meteorological Department, 2008.

83470: This is, 8 Nh CL CM CH, group. Where **8** is code digit, **3** is code for Nh and Nh is number of low clouds in Octas or number of medium clouds in Octas, **4** is code for CL (Lower cloud type), **7** is code for CM (Medium cloud type), and **0** is code for CH (Higher cloud type).

333: This is to show end of section 111 & start of section 333.

20199: This is the group to report Minimum temperature; this reading is taken from the thermometer of Stevenson Screen, which is present on the bottom side of Thermometer square. This group is reported only in the morning or in 0300z reporting.

Here **2** is code for Minimum Thermometer's reading,

0 is code from 0 / 1 that is code for –ive thermometer reading / +ive Thermometer reading, &

199 is the reading of minimum temperature showing thermometer, in 3digits form.

5////: This group is to report Barometer reading. 5 is code digit while //// (4obliges) are showing no observation.

60007: This group is to show Rain, to represent just for 3hour's Rain, reported in every signup. Here **6** is code digit to show Rain, **000** is the code for amount of Rain, and **7** is code for 3hours Rain.

70052: This group is for reporting daily 24 hours Rain, at 0300z reporting, where **7** is the code digit, and

0+0+5+2 are codes for R_{24}.

RH 56%: This group is reporting Relative Humidity's value in %age, from Hydrometeric Table.

Table3.10: Model of Synaptic Reporting at 0600z (25-04-2013)

2	5	0	6	4
4	1	U	O	G
0	2	9	9	7
1	0	9	0	2
1	0	3	1	0
2	0	1	3	8
3	/	/	/	/
4	/	/	/	/
6	0	0	0	1
8	0	3	0	0
	3	3	3	
5	/	/	/	/
6	0	0	0	7
RH 35 %				

Source3.10: Data Records of Pocket Register & Signup sheets. Met Observatory at UOG, PK. Accessed at 03-06-2013.

Description of 0600z Model of Synaptic Reporting:

25064: This group represents Date + Date + Time +Time + Anemometer and it is (2+2+1digits).

41UOG: This group represents Country code + Station Code (2+3digits).

02997: This group represents,

0→for both types of Rain type I: Rain for 3 hours & type II: Rain for 6 / 12 / 18hours **2**→for No special phenomenon (when the condition of no special phenomena holds then group 7 W W W_1 W_2 is not reported)**.**

9→code used for height of lowest clouds, and **97**→2 digits code for visibility (V V).

10902: This group represents:

1→ total number of Octas,

09→ Wind Direction code,

02→ Wind Speed.

10310: This group represents:

1→code for dry temperature,

0→code for +ive temperature reading, and

310→ Reading of dry thermometer.

20138: This group represents:

2→code for Dew point,

0→code for +ive reading of Dew Point, and

138→reading of Dew Point

3//// **& 4**////**:** These groups are for reporting Barometer reading.

60001: This group represents: **6000**→code and **1**→code for Rain of 6hours.

333: section 333 starts.

5////**:** This group is to report Barometer reading.

60007: This group is reported just for 3hours Rain.

RH 35%: Relative Humidity is 35 %.

Table3.11: Model of Sign up for 0900z (25-04-2013)

2	5	0	9	4
4	1	U	O	G
2	2	9	9	7
4	2	3	0	2
1	0	3	3	5
2	0	1	2	9
4	/	/	/	/
8	0	0	7	0
3	3	3		
5	/	/	/	/
6	0	0	0	7
RH 29 %				

Source3.11: Data Records of Pocket Register & signup sheets. UOG, PK. Accessed at 4-6-2013.

Description of 0900z sign up Model:

25094: represents date+ date + time + time + Anemometer code.

41UOG: Country code + Station code

22997: Type I Rain (for 3 hours Rain) + No special phenomenon + code for cloud height+ vv.

42302: Total no. of Octas+ Wind Direction code + Wind speed.

10335: dry temp. Code+ code for +ive reading of dry temperature + dry thermometer's reading

20129: Dew Point code+ code for +ive reading of D.P + reading of Dew Point in 3digits.

4////: Barometer's reporting group.

80070: 8→is code, 0→Nh (number of lowest clouds), 0→low cloud type CL, 7→medium cloud type's code (CM), 0→is code for High cloud type CH.

333: section 333 starts, **5////:** Barometer 's reading is reported in this group.

60007: 3hours Rain reporting group in every sign up.

RH 29%: Relative Humidity is 29 in %age.

Table3.12: Model of sign up for 1200z (12-04-2013)

1	2	1	2	4
4	1	U	O	G
0	2	9	9	7
0	2	3	0	2
1	0	3	2	5
2	0	1	0	0
3	/	/	/	/
4	/	/	/	/
6	0	0	0	2
	3	3	3	
1	0	3	4	0
5	/	/	/	/
6	0	0	0	7
RH 27 %				

Source3.12: Data record of Meteorological Observatory UOG, PK. Accessed at 5-6-2013.

Description of 1200z sign up reporting:

12124: Date 12, and then time 1200z so it is also 12, and Anemometer code 4. **41UOG:** Pakistan country code used for Meteorological Observation, & UOG Meteorological Observatory's code (for the time being it is UOG).

02997: code **0** to show both types I & II of Rain, Type I (3 hours Rain represented with code 1), and Type II (6/12/18hours Rain represented with code 2),

2 code to show no special phenomena,

9 code for height of lowest clouds,

97 code of visibility.

02302: code **0** for Total number of clouds, code **23** is for Wind Direction, **02** Wind speed.

10325: Code **1** for dry temperature, **0** is code for positive dry temperature (1 for negative dry temperature), **325** is temperature reading for dry thermometer in 3digits form.

20100: Code **2** for Dew Point, **0**code for positive D.P reading (here appears 1code for negative D.P reading), &**100** is Dew Point reading (3digit).

3//// **& 4**////**:** both the groups are for reporting Barometer readings.

60002: is Rain group where **6000** is code for Rain, while **2** is code for 12 hours Rain.

333: section 111 ends while 333 starts.

10340: Maximum temperature showing thermometer's reading is reported in this group where **1** is code for temperature maximum, **0** is code to show positive reading of maximum temperature showing thermometer, and **340:** is the reading of maximum temperature showing thermometer, in 3 digits form.

5////**:** is the group for reporting Barometer's reading.

RH 27 %: is the group reporting Relative Humidity's value in %age units.

Class Discussions: & Question Answer sections, often add information along with routine work like: Some symbolic representations and indications and their after effects, related to the Met observation are also a part of our work.

Table3.13: Class Discussions

Symbol / representation	**Description of Symbol / Indication**
SKC	Sky clear (it could be when visibility not clear i-e 4000Hz, but no clouds on sky)
SE ,SW wind	No clear visibility
NE	Almost clear visibility
W wind	Sand storm / Dust storm
RRR	Amount of rain fallen during the period proceeding time of observation.
000	No precipitation during reference period

Some important Symbols used in Met Observation's Reporting are also considerable; mostly these are used in record forming of Reporting in Pocket Register.

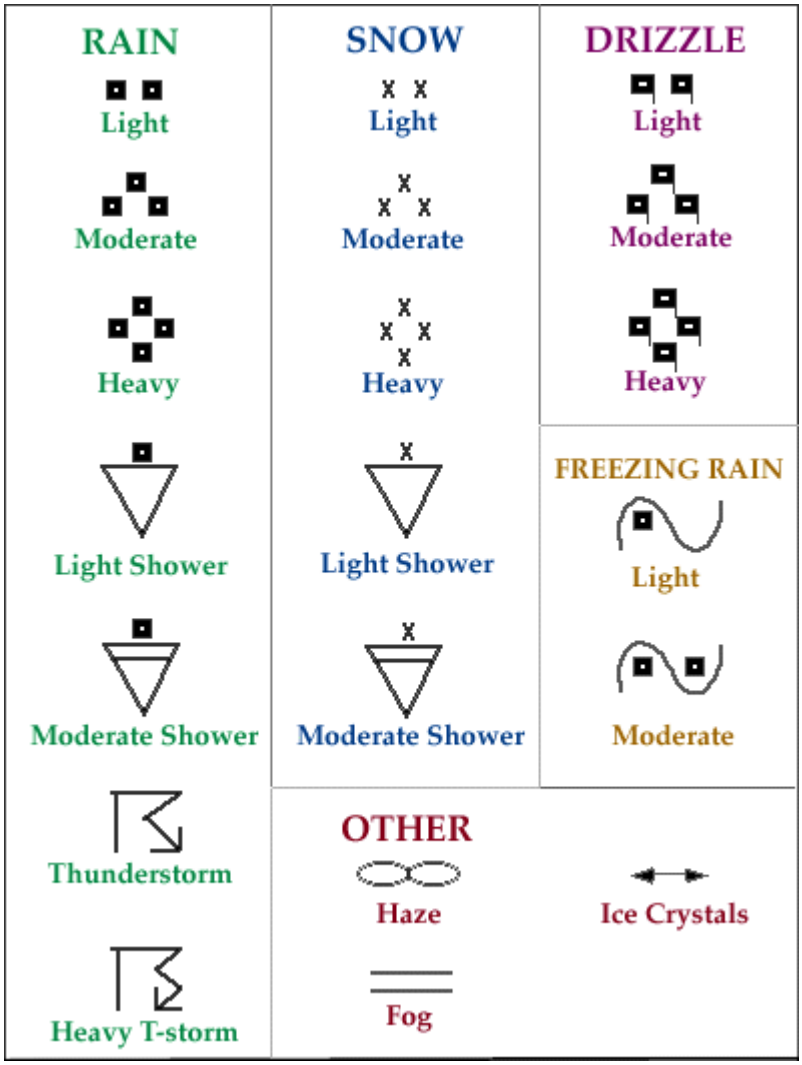

Figure3.1: Weather position representing Symbols

Source3.13: Atmospheric Symbols from Google images

:http://ww2010.atmos.uiuc.edu/(Gh)/wwhlpr/common_wx_symbols.rxml Accessed at 06-06-2013.

Signup Reporting of a starting day of month are quite different from the sign up Reporting of last days of the same month, as the weather parameters show clear distinction of the weather patterns.

A model Reporting as done by **filling Signup Sheets**, involves Synaptic Reporting in the prescribed place on the sheet along with Metar Reporting on the blank portion, then adding signatures of the reporter / Observer.

Table3.14: Model to show a signup sheet's work (12-04-2013) for 0300z.

1	2	0	3	4	
4	1	U	O	G	
2	1	6	9	9	OPUG
6	1	3	0	6	13006Kt
1	0	2	7	0	9999
2	0	1	5	0	TSRA
3	/	/	/	/	Few 035 CB
4	/	/	/	/	Sct 040
7	1	7	9	2	BKN 100
8	2	9	7	0	27 / 15
	3	3	3		Q ////
2	0	2	2	0	RH 49 %
5	/	/	/	/	
6	0	0	0	7	Observer: XYZ
7	0	0	0	0	
	RH	49 %			

Source3.14: Meteorological Observatory UOG's manual Reporting record, Accessed at 10-6-2013.

At UOG Meteorological Observatory 0300z to 1200z Reporting is done to see all these signup reporting of one day consulting its record from Pocket Register and Signup sheets, there is a chance to compare the difference among 0300z, 0600z, 0900z, and

1200z for the same day. And the sign up reporting of one day of a month to the sign up reporting after 2 days in the same month, representing how wide range of changes occur in everyday's weather.

Table3.15: Models of Synaptic sheets for 0300z, 0600z, 0900z and 1200z (21-04-2013) showing weather observation reported from UOG Meteorological Observatory.

2	1	0	3	4		2	1	0	6	4	
4	1	U	O	G		4	1	U	O	G	
2	2	6	9	7		0	2	9	9	7	
5	1	3	0	6	OPUG	4	0	5	1	2	OPUG
1	0	2	3	5	13006Kt	1	0	2	9	5	05012Kt
2	0	1	5	2	9999	2	0	1	1	5	9999
3	/	/	/	/	BKN040	3	/	/	/	/	Sct 100
4	/	/	/	/	24 / 15	4	/	/	/	/	30 / 12
8	5	4	0	0	Q ////	8	0	0	7	0	Q ////
3		3		3	RH 60%	3		3		3	RH 33%
2	0	2	3	6		5	/	/	/	/	
5	/	/	/	/		6	0	0	0	7	By : xyz
6	0	0	0	7	By: xyz		RH	33	%		
7	0	0	0	0							
	RH	60	%								

2	1	0	9	4		2	1	1	2	4	
4	1	U	O	G		4	1	U	O	G	
2	2	6	9	7		0	2	9	9	7	
4	0	9	1	2	OPUG	2	0	9	0	8	OPUG
1	0	2	9	5	05012Kt	1	0	3	0	5	09008Kt
2	0	1	1	5	9999	2	0	7	9	0	9999
4	/	/	/	/	Sct 100	3	/	/	/	/	Few100
8	0	0	7	0	30 / 12	4	/	/	/	/	31 / 8
					Q ////	6	0	0	0	2	Q ////
3		3		3	RH 33%	8	0	0	3	0	RH 24%
5	/	/	/	/		3		3		3	
6	0	0	0	7		1	0	2	9	5	BY: xyz
	RH	33	%		By: xyz	5	/	/	/	/	
						6	0	0	0	7	
							RH	24	%		

Source3.15: Meteorological Observatory UOG 'S Data collection. Accessed at 10-06-2013.

Table3.16: Comparison Models of Sign up 0300z, 0600z, 0900z, &1200z (24-4-2013)

2	4	0	3	4		2	4	0	6	4		2	4	0	9	4											
4	1	U	O	G		4	1	U	O	G		4	1	U	O	G											
2	1	9	9	6	OPUG	0	1	9	9	6	OPUG	2	2	6	9	7											
3	0	5	0	4	05004Kt	0	0	0	0	0	00000Kt4	2	3	1	0	4	OPUG										
1	0	2	2	0	4000Fu	1	0	3	2	5	000Fu	1	0	3	5	0	31004Kt										
2	0	1	7	2	Sct 100	2	0	1	3	7	SKC	2	0	1	2	9	9999										
3	/	/	/	/	22 / 17	3	/	/	/	/	33 /14	4	/	/	/	/	Few 040										
4	/	/	/	/	Q ////	4	/	/	/	/	Q ////	8	2	4	0	0	35 / 13										
7	3	4	0	0	RH74%	6	0	0	0	1	RH 32%	3		3		3	Q ////										
8	0	0	3	0	By :xyz	7	0	5	0	0	By: xyz	5	/	/	/	/	RH26%										
3		3		3		3		3				6	0	0	0	7	By:xyz										
2	0	1	6	5		5	/	/	/	/		RH 26%															
5	/	/	/	/		6	0	0	0	7																	
6	0	0	0	7		RH 74%																					
7	0	0	0	0																							
RH 74 %																											

2	4	1	2	4																							
4	1	U	O	G																							
0	2	6	9	7	OPUG																						
5	2	7	0	4	27004Kt																						
1	0	3	4	5	9999																						
2	0	1	3	3	Few 040																						
3	/	/	/	/	Sct 100																						
4	/	/	/	/	36 / 13																						
6	0	0	0	0	Q ////																						
8	2	4	3	0	RH 28%																						
3		3		3																							
1	0	3	6	6																							
5	/	/	/	/	By: xyz																						
6	0	0	0	7																							
RH 28 %																											

Source3.16: Record of Meteorological Observatory UOG's data, Accessed at 11-6-2013.

3.4: Message Sending

Metar and Synaptic Reporting is manual recording of weather data, and this record is limited to the station. In order to convey this Meteorological Observation data, of Metar and Synaptic form, Reporting is conveyed to the Headquarter through cell phone message.

If internet facility is available then this Reporting is uploaded on the website to make it available on the internet, directly but if this is not the part of our job then the message send from the cell phone to the headquarter is the only source of distributing weather observation and reporting.

The sign up messages send from Meteorological Observatory UOG to Lahore Headquarter, from where it is uploaded to their official website, that can be then seen and utilize at anywhere regarding internet's availability.

The sign up Message which have to send, is in this form

23034, 41UOG, 21996, 30504, 10220, 20172, 3////, 4////, 70400, 80030, 333, 20165, 5////, 60007, 70000, RH 74% .

OPUG, 05004Kt, 4000Fu, Sct100, 22 / 17, Q////, RH 74% .

This message is just ready to press send.

When one sign up reporting is manually completed it is send to the Headquarter, the Regional Met Office Lahore. At Meteorological Observatory UOG sign up is made for 0300z, 0600z, 0900z and 1200z. So accordingly the message is prepared for sending and is conveyed.

This conveying of sign up message is the way to get entrance in the main stream to become a valuable part of Weather Observation carried out within the country and in the entire world.

CHAPTER FOUR

4.0-RECOMMENDATIONS

Surface Weather Observation is a main pillar for the worldwide weather observation, which works for all the basic demands to be fulfilled for which weather observation is officially carried out, like: Defense purposes, update establishment, forecast mechanism & disaster management etc.

Surface weather observation is mostly carried out by manual work involving outdoor instrument working and indoor recording of data captured. Weather observation can also be done by automated weather observation systems.

Considering the importance of surface weather observation, any local level station cannot be ignored. As local stations are reporting to the Regional headquarters, from where this Met reporting is conveyed to the internet via their official website. In this way it can circulate the whole world.

So for Meteorological Observatory UOG is also an important addition in this channel of weather observations, and it can be expanded as for demand of its work is much more irrespective of any other area's weather observation. Because its geographical location is in a sensitive area with respect to weather observation, Gujrat city is located between two rivers Chenab & Jhelum, of Punjab Pakistan. So weather concerning phenomenon can be helped by the observations of this local level station.

As already many professional weather observation steps are in work at UOG Met Observatory. But there are also few things that can be done for making this official work more successful. For making the Met observation more authentic and meeting the demands of interested students who want to learn this interesting and valuable task, and making it possible that this work can continue. Also this Observatory can be expanded to

meet the weather observation needs along with training of upcoming courageous students by making its performance worthy.

This observatory is a source of local weather data collection that can be promoted to give local weather updates, and forecasts, to be beneficial within university premises, &city etc.

4.1- A separate Met Office

The present working of this station is still on initial bases, like: availability of a professional room as office for indoor works, is insufficient to meet the demands of interested students, who ever feels a need for a separate room where they can consume their time for met observation work understanding, and general meteorological discussions with experienced official observers to gain the knowledge of practical application of these observations.

4.2- More Official Observers

Meteorological Observatory UOG is working with just one official observer, Sir Abdul Ghani, although he is so much experienced but he alone cannot meet exceeding duties of observatory. More official observers should be appointed.

One observer alone has to face all the responsibilities, that is difficult to handle for long ago. The chairman of Geo Sciences and Geography Department, an experienced person regarding met observation, is himself sharing these responsibilities but still there is a need for at least one or more fulltime observers.

4.3- Outdoor instrument's security

Outdoor Installed Instruments are not fully secured there is always a feeling of danger from nearby road's traffic load. As there is an ongoing construction work in this part of University so heavy traffic is continuously passing, that can result any unwanted situation like: equipment loss etc.

There is still not a complete precautionary step to avoid the instruments from animal exposure, as Evaporation tank can be used by cats and dogs for water drinking place

when there is a less hustle and bustle in the surroundings, especially on weekends, long weekends, or vacations.

Along with making better and secure outdoor installation of instruments so these can bear, for their normal working the extreme changes of weather conditions, there is a need felt for such instruments which are still unavailable the most important of which is Barometer.

4.4- Barometer

As Met Observatory UOG, is still in its primary stage of working so there is also a space for dealing with these primary needs of instruments, like; Barometer.

Barometer works for giving the understanding of rise and fall of atmospheric pressure. With reference of mercury Barometer's dial shows pressure in inches.

Figure3.2: Barometer

Source3.17: http://www.sciencecompany.com/How-a-Barometer-Works-W135.aspx

Adjust the Screw, when facing the dial its indicator shows clockwise rotation. Use the center knob to set the barometer, at a time in a certain location. Barometer can show about pressure is it falling, rising or is constant.

Mercury Barometer is most commonly used in Meteorological Observation in Pakistan.

CHAPTER FIVE

5.0-RESULTS

Meteorological Observation at UOG is a great opportunity. Before this weather observation was a hidden fact, and was considered a matter of dealing with lot of difficult coding, handling with instruments outdoor, that demands wide range of precautionary measures and with many more this was a tough rout to walk on.

But on entering this was proved otherwise, there are many interesting things to pick rather than difficult. Everyday a new experience of weather conditions is so closely observed even than the weather is changing rapidly. As a rainy day passes a complete cycle of dryness covers and then there is again a rainy day, although it is a common experience but the fact working here is to know how this all happens.

What happens to the winds, clouds, temperature, humidity and dryness that results a complete change of weather pattern.

Weather observation's official work involves instruments handling which is not to difficult, and tools as documents for consulting and collecting weather data observed. These mainly include, like; code books, Hydrometeric Table, Pocket Register and signup sheets all are easy to handle and tackle if stepwise learning occurs in discussion form, because it is not the matter of one day to become a Meteorologist. It demands time to observe and understand certain phenomenon carried out there like: clouds are present at which height to know their type to use relevant code for filling Pocket Register and Reporting sign up.

At the end learning is as form of experience. How better the observation works from the starting day to the middle, and at the end. There is definitely a big difference not only in observation but also now this observation is with understanding that tells how some phenomenon could happen, what can be resulted from such readings of parameters and what its effect could be, better or otherwise, all this lead to weather updating, forecasting, hazard alert, and disaster prediction regarding weather alterations.

This work not only helps us to know the way of weather observation that is how it could be done but also it is a research work so it possess a much more worth than an ordinary course learning, it involves experimental work along with manual data collection that is not only developing an understanding rather it is skill creating, experience gaining and concentration improving work.

This data collection, interpretation, concluding inferences and eventually writing report has developed the knowledge of dealing with research work tasks. Interest of experimental work has been improved that makes it easy to move from theoretical to practical word.

Through this report, our addition to the starting of weather observation at UOG opens, a room for others to approach this practical task to get skill, training, and experience in the valuable Meteorological working.

Being **Environmentalists**, this Meteorological research is acknowledged, the relationship between these two fields of science that together and alone deals with climate change. The most famous and concerned subject to talk now-a-days. Also met information helps improving Hydrological data, so dealing with water scarcity, water reuse management, and water preservation. Air where all pollutants are diluted and dispersed is an important meteorological parameter. Weather patterns like; temperature, pressure, precipitation level, wind's directions & speed decide some where's flora and fauna, food webs, crop yields, and even ecosystem.

The various fields of life, dealing with environmental indicators, are also directly dependent on meteorological information. Like; Agriculture, Trading, Hydrodynamics, Sports, Acid Rain, and Glacier melting etc.

Declarations

Funding My family

Conflicts of interest/Competing interests 'Not applicable'

Availability of data and material

Hafiz Hayat Campus, University of Gujrat, Pakistan.

Code availability 'Not applicable'

Authors' contributions Review and planning study description

Ethics approval 'Not applicable'

Consent to participate 'Not applicable'

Consent for publication 'Not applicable'

CHAPTER SIX 6.1-INDEX

No. in list	Names, places and topics along with the numbers of pages in Report.	Explanations
6.1.1	**Altocumulus** Page no. 21of Report	Altocumulus is small mid-level layers or patches of clouds, also referred as, “cloudlets”. These clouds are usually composed of droplets, but may also contain ice crystals.
6.1.2	**Altostratus** Page no.21 of Report	Altostratus is large mid-level thin grey clouds, usually composed of mixture of water droplets and crystals, thin clouds, Sun can weekly be seen through clouds.
6.1.3	**Barometer** mentioned on page no. 29, & 56. Of Report.	Barometer an air pressure measuring instrument, most commonly used weather barometer is a mercury barometer, in which a mercury filled column is inverted in mercury filled dish, mercury level in column moves up and down giving pressure reading.
6.1.4	**Cirrocumulus** page no.21 of Report	Cirrocumuluses are lot of small white, regularly spaced clouds, composed almost entirely from ice crystals, often arranged as ripples in the sky.
6.1.5	**Cirrostratus** Page no.21 of Report	Cirrostratus transparent high clouds, covering large areas of sky, forming thin arcs around moon.
6.1.6	**Cirrus** Page no.21 of Report	Cirrus, short, hair like clouds found at high altitudes. More white than other clouds in day, taking Sunrise or Sunset colors during rising & setting of Sun.
6.1.7	**Clouds** mentioned on page no.17, 21, 22, and others.	Clouds either composed of ice or water droplets, depending upon height of clouds and the temperature of atmosphere. At temperature -30°c small size droplets, remain as liquid, at extreme height become ice crystals.

6.1.8	**Cumulonimbus** Page no.21 of Report	Cumulonimbus heavy and dense low level cloud, high in the sky extending in towers, plumes or mountain shape peaks, with flat very dark base, commonly saying as, "Thunderclouds". These can be only a few hundred feet high from ground surface.
6.1.9	**Cumulus** Page no.21 of Report	Cumulus, low-level clumps or patches of cloud , bright white to dark grey in color appearance.
6.1.10	**Dew Point, (D.P)** Page no. 17, & 27 of Report.	The temperature and pressure are so that air must cool, and water vapors reach to saturation, that dew begins to form.
6.1.11	**Meteorology** Page 4, 5 of Report	Meteorology is the branch of science that deals with the study of processes and phenomena of the atmosphere, especially as a means of forecasting the weather.
6.1.12	**Meteorological_ __Observation** Page no.4 of Report	Recognizing and noticing the varying conditions of diff. weather parameters or Meteorological Elements, by using instruments or from general observation.
6.1.13	**Met Office** Page no. 4 & others of Report.	Met Office is Meteorological Office / Met station or it is a Weather Observatory. Where Weather parameters are measured, noticed, and recorded that can lead to update, and forecast weather.
6.1.14	**Nimbostratus** Page no. 21 of Report	Nimbostratus dark grey or bluish grey featureless layers of clouds, those are thick enough to block sun, and cover most of sky. The middle-level clouds that can result continuous heavy rain or snow.
6.1.15	**Pressure** Page no. 29 & 56.	The force exerted per unit area /surface by an object, that could be solid, liquid, or even gas or mixture of gases, like that of air.
6.1.16	**PMD** Page no. 9 & 11.	PMD, Pakistan Meteorological Department, working for weather update, monsoon alerts, and weather forecast.
6.1.17	**Relative Humidity** Page no. 17 &	Relative Humidity is the moisture available in the surrounding of an object for consumption need.
6.1.18	**WMO** Page no12 of Report.	WMO, World Meteorological Organization, which is working now under UN, United Nations.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- tp1doc..pdf