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A STUDY ON RAINFALL PATTERN OF ASSAM: BASED ON TREND ESTIMATION

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ABSTRACT

In my paper, I am trying to show the overall trend of rainfall in Assam, using which one can guess the rainfall pattern in the coming years. By using the Trend estimation while estimating the trend a period of 14 years (2005-2019) is being used and the work is done month wise. As in present days one can observe drastic changes in the rainfall pattern.

Index Terms- Trend, pattern, Assam, month, estimation.

INTRODUCTION

The climate of Assam is based on “tropical monsoon rainfall”. With high level of humidity and heavy Rainfall, people here enjoy a moderate climate all throughout the year with warm summer and mild winter. In the monsoon season, the whole state comes alive with the beauty of nature. The neighboring areas like Cherapunji and Mawsynrem have the highest rainfall in the world. The average annual rainfall in the state is min 70inch and max 120inch, which several time, leads to flood at many places.

In Assam at normal conditions;-

*Most of southern Assam including Nagaon, Karbi Anglong and other neighboring districts receive min annual rainfall (40-78) cm and max. Annual rainfall (101-200) cm.

*Most of Brahmaputra valley receives min annual rainfall (78-157) cm and max annual rainfall (201-400) cm.

*Northwest corner of Assam receives more annual rainfall than the other parts of Assam.

But if one looks at the recent scenario some drastic changes would be observed, which in turn has put impact on human environment. For example, Assam is world famous for tea production but very recently it has been told that there is a decline in the tea production and the cause of this decline is attributed as rainfall drop.

Considering this issue in the paper an attempt is made to find the trend on the rainfall data of Assam. The objective of this work is to have a look on the rainfall pattern in the coming days. While estimating the trend a period of 14 years (2005-2019) is being used and the work is done month wise.

OBJECTIVE

The objective of this paper is to find the overall trend of rainfall in Assam, using which one can guess the rainfall pattern in the coming years.

METHODOLOGY

The work is based on secondary data. The data is collected from the archive of 'meteomanz.com'. After collection of data linear trend line estimation is done using least square method. The trend line estimation is a part of 'Time series analyses.

LEAST SQUARE METHOD;

The principle of least square is most popular and widely used method of fitting mathematical function to the given set of data (here relation between rainfall and time).

U= a + bt, a linear trend and a function of time't'.

Principle of least square consists in minimizing the sum of the deviation between the given value of U and there estimation is given by above equations. We have to find a and b such that

$$Z=\text{Sum } (U - a - bt)^2 \text{ is minimum. Then,}$$

$$\text{Sum } U= na + b \text{ Sum } (t)$$

$$\text{Sum } (tU) = a \text{ Sum } (t) + b \text{ Sum } (t^2)$$

Which are the normal equations for estimating a and b, where n is the number of years and 'Sum' stands for summation.

STUDY AREA

The study area assumes the reference period of year "2005-2019".

ANALASIS

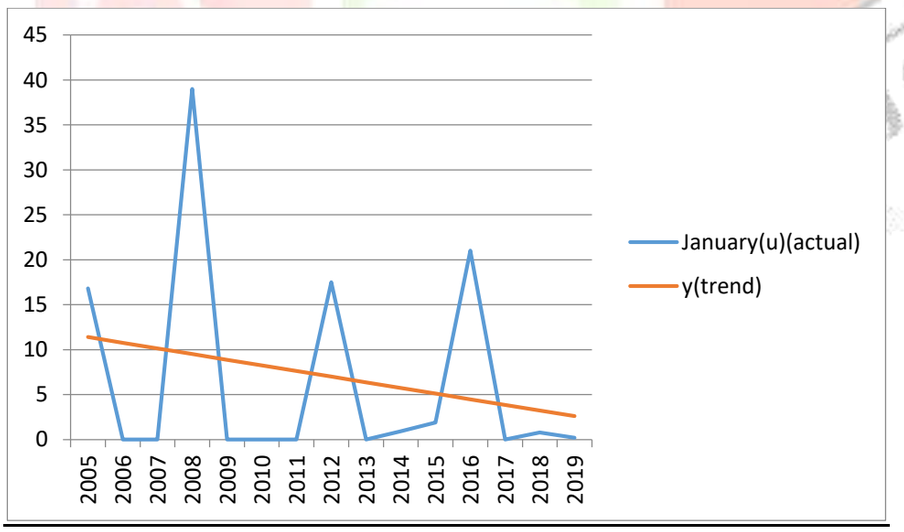
Table: Table showing the month wise data of rainfall in Assam for the period of year 2005-2019 (in mm).

Year/month	January	February	March	April	May	June	July	August	September	October	November	December
2005	16.8	3.4	149.8	143.5	235.8	92.6	154	415.8	78.5	102.7	1.4	0
2006	0	10.6	10	194.9	240.8	120.7	220.3	152.3	86.3	111	8	7
2007	0	93.5	30	268.6	92.1	194	277.4	145.9	259.2	112	31	0
2008	39	3.5	129	140.8	83	330.7	261.9	238	91.8	98.2	8	5.4
2009	0	0	44	71.1	139	126.7	409.2	290.7	182.5	196.2	7	0.6
2010	0	0	1	150.8	393.2	326	251	99	182	71	1.7	0
2011	0	8	0	14.5	140.9	239.9	150.7	385.5	226.9	7	0	1
2012	17.5	1	4	215.3	178.7	569.4	391.5	178.4	125.4	108	0.4	0
2013	0	11	22	91.5	462.8	305.7	258.7	140.3	118.6	213.4	0	0
2014	0.9	27	9.3	22.1	194.7	372	126.5	208.2	337.1	54.5	0.3	0
2015	1.9	19.3	33	195.1	296	228	142.5	261.2	192.6	42	2	20.9
2016	21	4.2	54.9	227.8	285.4	328.8	284.6	99.4	69.1	72.1	0.2	1.4
2017	0	10.2	86.3	281.6	161.5	348.3	369.2	216.7	140	103.7	3.2	0.2
2018	0.8	1	26	113.9	201.8	243.6	137.8	245.8	159.8	10.3	5.2	22.8
2019	0.2	15.6	66.2	185.6	300	164.5	321.2	68.2	333	128.9	15.8	0.1

The information shown in above table is the basic information of the trend estimation.

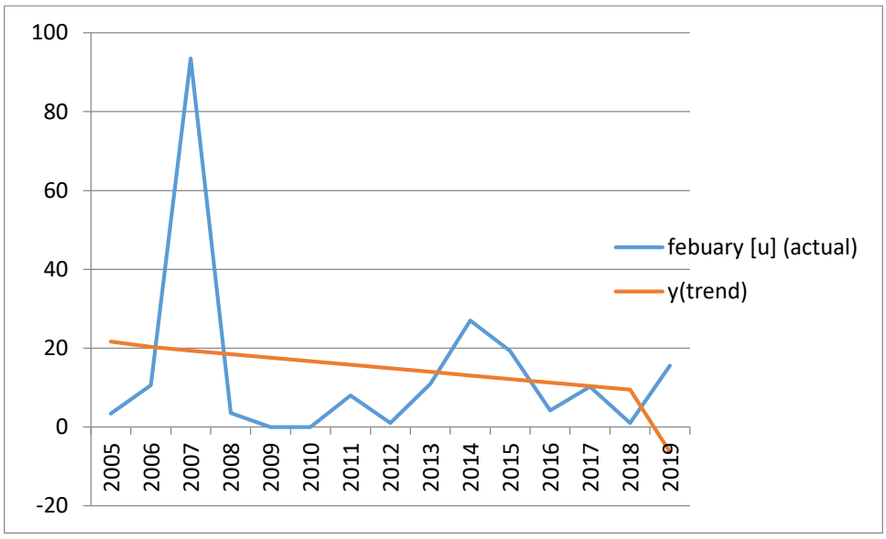
The following diagrams show the month wise rainfall along with estimated trend

1. **January:**



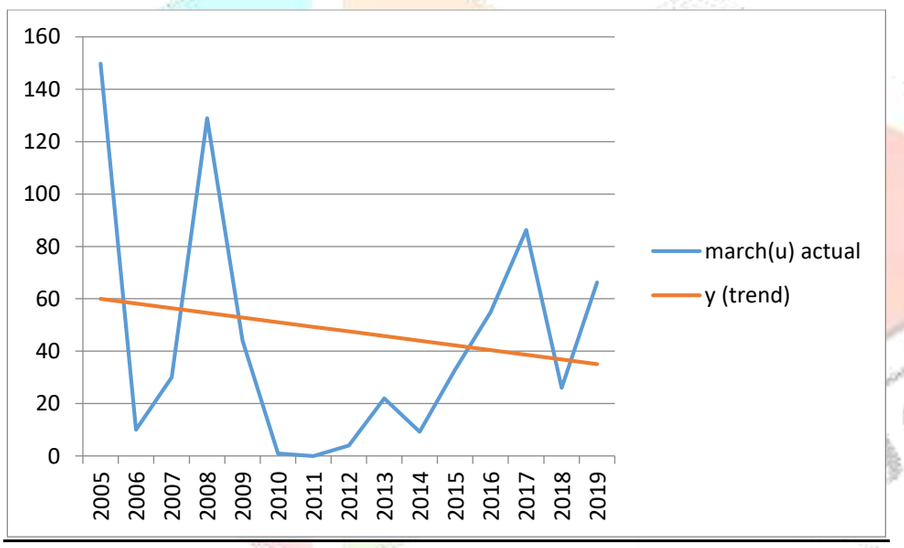
As shown in the diagram, there is sudden fall in the trend of rainfall in the month of January. (u= 6.992857- 0.62821t)

2. February:



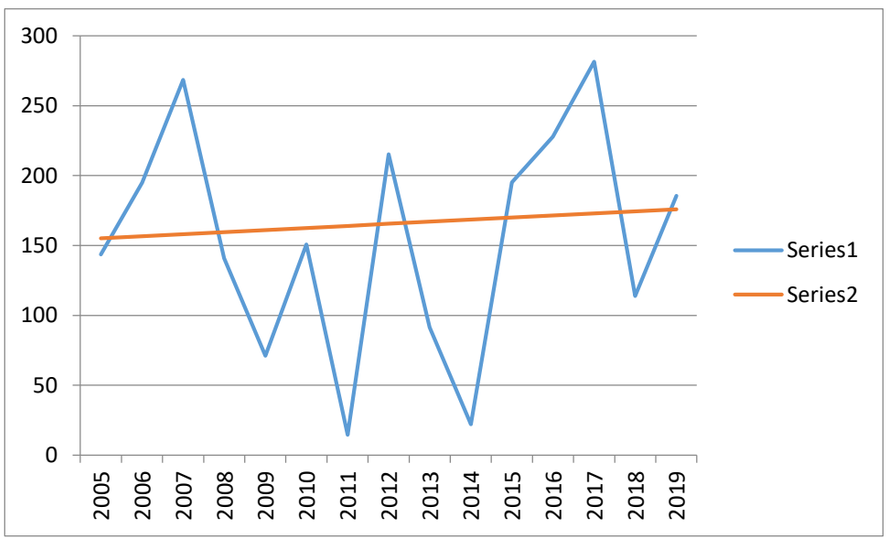
In the month of February also one can notice a decrease in rainfall as in the month of January. (u= 14.87857- 0.96786t).

3. March:



Here one can notice the sharp decline in trend in comparison to the previous months. (u= 47.53571- 1.78036t)

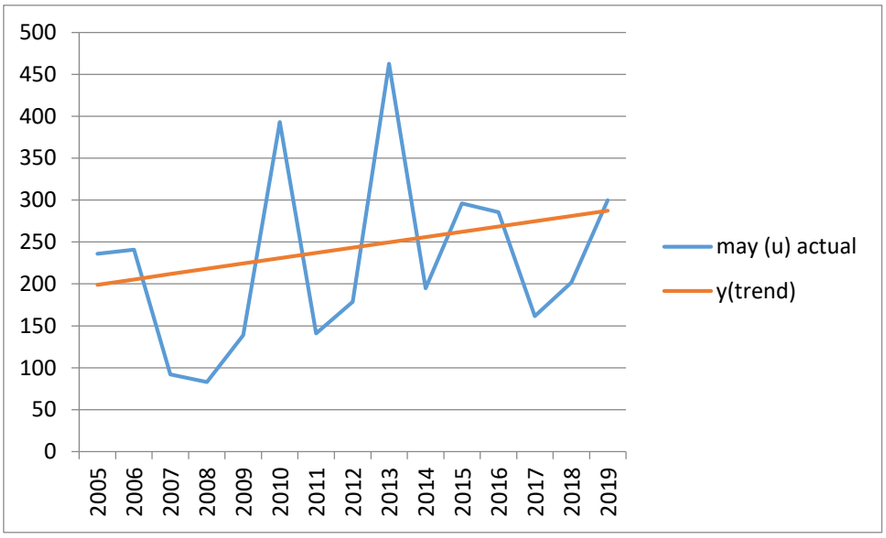
4. April:



Here also the same situation is arising. The rainfall is declining continuously.

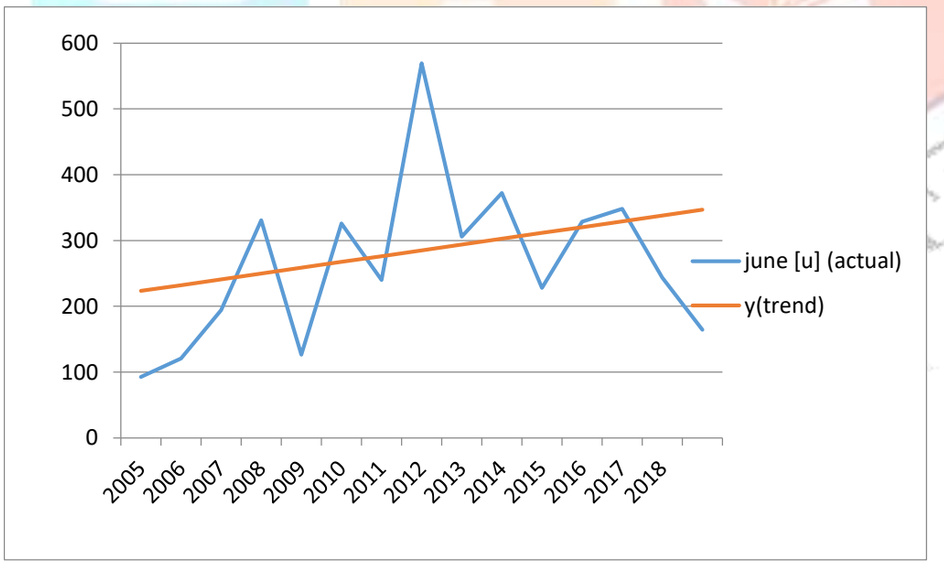
(u= 165.5071+1.476071t).

5. May:



Unlike the previous months, in the month of May one may notice the change that the rainfall is increasing. (u= 243.2643+ 6.313929t)

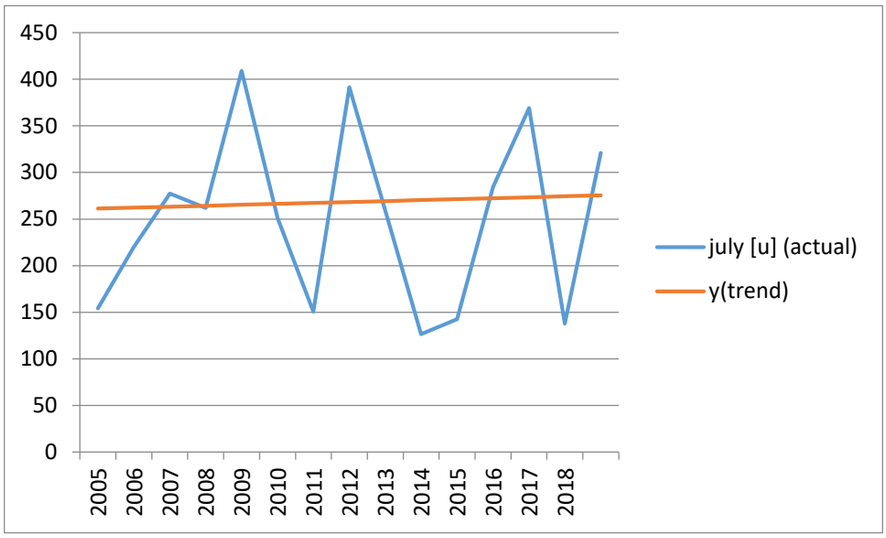
6. June:



At the month of June one can notice that the rainfall is increasing.

(u= 285.0643+ 8.808214t).

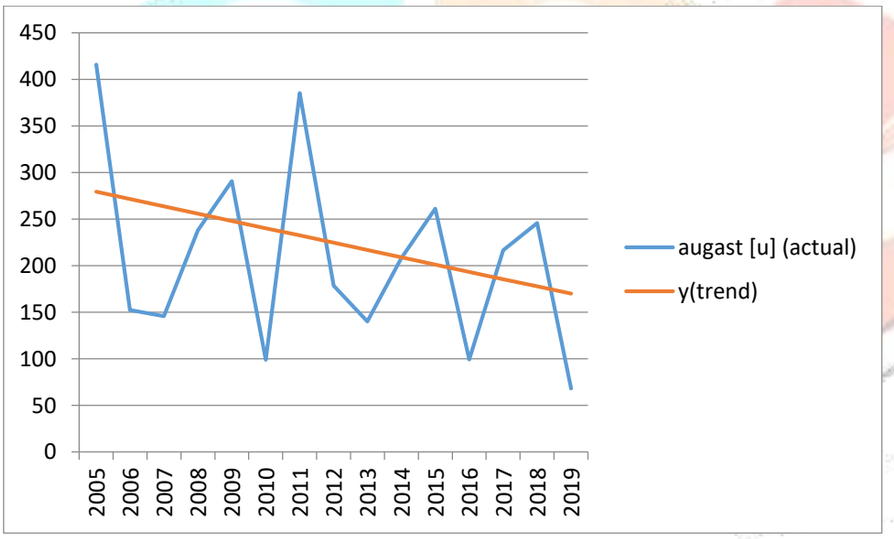
7. July:



In the month of July a slight decrease in the rainfall trend can be observed.

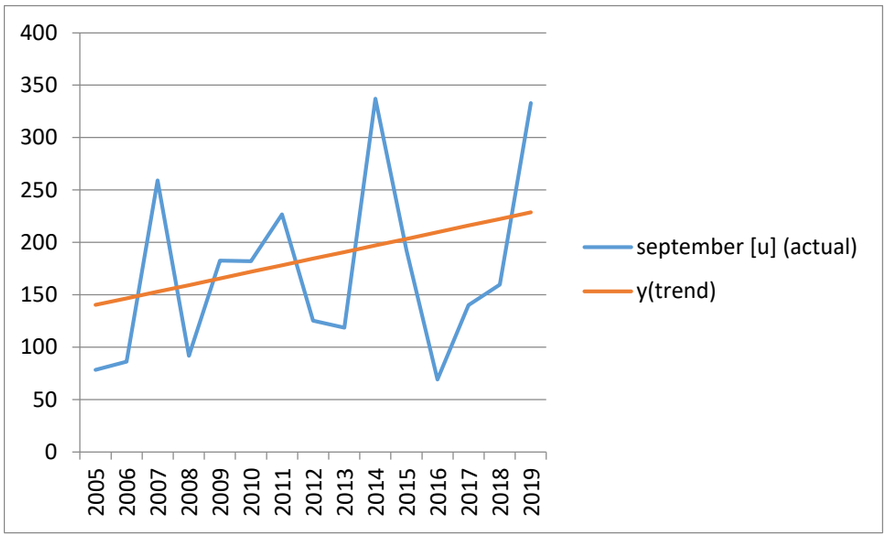
(u= 268.3214+1.014643t)

8. August:



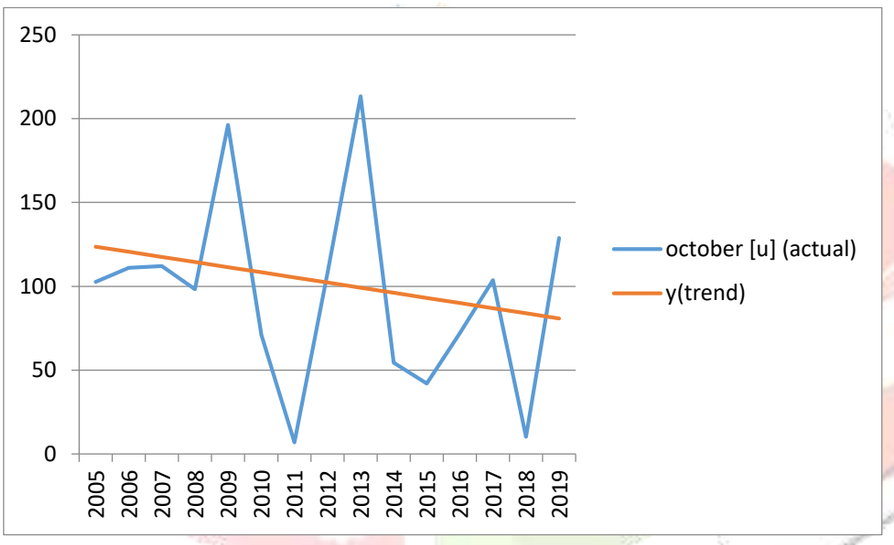
Here also the same picture, decline in rainfall. (u= 224.6714-7.81393t)

9. September:



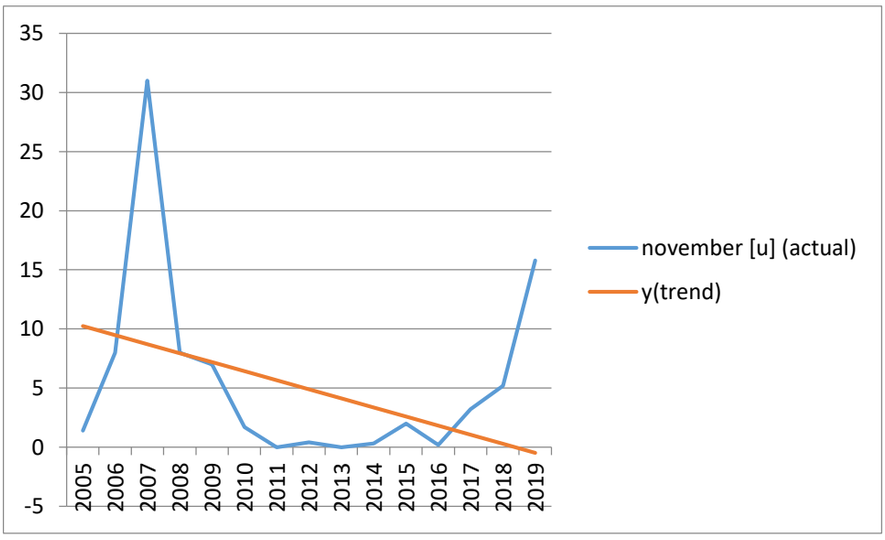
In the month of September increase in rainfall can be noticed. (u= 184.4857+ 6.313929t)

10. October:



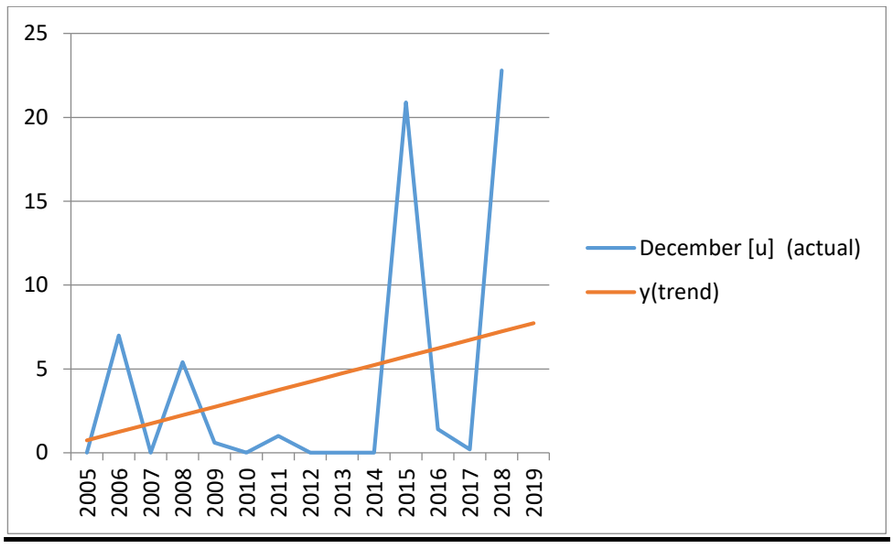
But here we can see that trend shows decline in rainfall. (u= 102.2143-3.05679t)

11. November:



Here one can notice the highest decline in the rainfall among all the months. (u= 4.885714-0.76643t)

12. December:



Here one can notice that the rainfall is increasing. (u= 4.235714+ 0.498929t)

CONCLUSION:

From the above discussions we can conclude that in most of the months (except May, June, September and December) there exists a declining trend in rainfall in Assam. Actually the desired situation is stable i.e. neither increase nor decline whereas here we have observed that in most of the months there is a decline and in three months there exists a rise. Further this instability has been continuously putting impacts on human environments from different angles. Moreover this study might hopefully open discussion on control and mitigation of this major problem.

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