Himalaya[14–17]. Conservation education and awareness programme implementation in the management action plans need to be given proper attention for reducing conflicts[16,18]. If residents of buffer zone villages of NDBR could begin large-scale cultivation of low-volume, high-value crops such as medicinal and aromatic plants to derive greater economic benefits along with improved efficiency of resource use, this might lead to reduced dependence on forests for nonwood products and reduce illegal poaching activity and thus help achieve the objective of conservation of biological resources and better management of Nanda Devi Biosphere Reserve.

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ACKNOWLEDGEMENTS. We thank the Director, G. B. Pant Institute of Himalayan Environment and Development, Kosi–Katarmal, Almora for facilities. Financial support from Mac Arthur Foundation of USA through UNESCO office in Delhi for the work is acknowledged. We also thank the anonymous reviewer for his valuable suggestions and help in revising the manuscript. Views expressed are of authors only and not necessarily of the affiliated organizations.

Received 19 August 1997; revised accepted 12 November 1997.

Change in wheat productivity with time in long-term experiment

P. R. Vaishnav, H. M. Bhatt and S. K. Dixit

Department of Agricultural Statistics, Gujarat Agricultural University, Anand 388 110, India

The use of moving average values reduced the seasonal/irregular fluctuations in the data effectively and gave better fit as compared to that of original set of data. For wheat crop, various degrees of polynomials with different bases ($X^{0.5}$, $1/X^{0.5}$ and X) explained the trend in yield due to various treatments. Majority of the fitted curves showed initial moderate increase, followed by a downward trend in the productivity till a later stage. The initial expected productivity ranged from 1525 (control) to 2544 kg/ha (NsPsKs). The productivity at last point of time ranged from 406 (control) to 2908 kg/ha (NsPsKs). In the medium black soil of Junagadh, under intensive cropping system, NsPsKs treatment was found better as compared to rest of the treatments in wheat crop.

LONG-term field experiments yield information on direct, residual and cumulative effects of fertilizer application. Such experiments also help in studying the changes in the productivity of the soil over time. Though the average performance of the treatment under study over time remains an important measure of productivity, the change over time in either crop or environmental traits or both is the more critical parameter. Obviously, an increasing rather than a decreasing productivity trend is an important feature of a desirable technology.

More recently, the long-term fertilizer experiments are conducted on a crop sequence containing two to three crops instead of single crop. The analysis of data is usually undertaken for the individual crop in the sequence, as no procedure of analysis is available for combining different crops in the sequence[1]. As treatment effects are likely to be different on different crops, it is difficult to decide weight of one crop equivalent to unit weight of other crops. Usual split plot analysis does not provide information about the trend of various treatments over a period of time. In all the long-term experiments, time is a quantitative factor, hence, a common practice is to partition time into components associated with orthogonal polynomials[2]. In most of the cases, a simple linear trend either positive or negative may be sufficient to describe a long-term trend. However, in the case where the performance index (yield) fluctuates substantially over time, the trend may not be easily described. The method of adjustment of such fluctuations in statistical analysis can be studied using time series analysis.

The data for the present study was collected from a long-term experiment conducted by the Department of Agricultural Chemistry in collaboration with the Department of Agronomy, Gujarat Agricultural University for the period 1979 to 1992. The crop sequence tried was groundnut (*kharif*) – wheat (*rabi*) – sorghum (summer) as fodder crop at Junagadh.

The following treatments were imposed on each crop of the sequence.

Control	No nutrient (organic or inorganic) application.
FYM1	Application of FYM @25 t/ha to *kharif* crops only every third year, starting from first year of experimentation.
N50	Half dose of nitrogen as recommended for the crop under irrigated conditions.
NP50	Half dose of N and P_2O_5 as recommended for the crop under irrigated conditions.
NPK50	Half dose of N and P_2O_5 as recommended for the crop under irrigated condition with K_2O application.
N100	Full dose of N as recommended for the crop under irrigated conditions.
NP100	Full dose of N and P_2O_5 as recommended for the crop under irrigated conditions.
NPK100	Full dose of N and P_2O_5 as recommended for the crop under irrigated conditions with K_2O application.
NsPs	Application of N and P_2O_5 as per soil test values.
NsPsKs	Application of N, P_2O_5 and K_2O as per soil test values.
FYM2	Application of FYM @25 t/ha to *kharif* crops every third year, starting from second year of experiments.
FYM3	Application of FYM @25 t/ha to *kharif* crops every third year, starting from third year, of experimentation.

In order to study the trend of wheat productivity under intensive cropping system, an attempt has been made using curve fitting approach, i.e. by fitting different equations (i) using original treatment means, and (ii) using three years moving averages so as to partly take care of the inter-year fluctuations due to climatic differences.

To explore the possibility of identifying the trend equations for various treatments over the period of time, different equations were tried. The form of these equations is given in Table 1.

Table 1. List of equations

Form of equation	Equation name
$Y = A + B*X$	Straight line
$Y = B*X$	Line through origin
$Y = A + B*X^{0.5} + C*X$	2nd deg. poly. with $X^{0.5}$ as base
$Y = A + B/X^{0.5} + C/X$	2nd deg. poly. with $1/X^{0.5}$ as base
$Y = A + B*X + C/X$	Linear and reciprocal
$Y = A + B/X$	Hyperbola
$Y = X/(A*X + B)$	Reciprocal hyperbola
$Y = A + B*X^{0.5} + CX + D*X^{1.5}$*	3rd deg. poly. with $X^{0.5}$ as base
$Y = A + B/X + C/X^2$	2nd order hyperbola
$Y = A + B*X + C*X^2$	Parabola
$Y = A + B*X + C/X^2$	Mod. parabola
$Y = A + B*X + C*X^2 + D*X^3$	3rd deg. polynomial
$Y = A + B/X + C/X^2 + D/X^3$	Reciprocal 3rd deg. polynomial
$Y = A + B/X^{0.5} + C/X + D/X^{1.5}$	3rd deg. poly. with $1/X^{0.5}$ as base
$Y = A*X^B$	Power function
$Y = A*B^X$	Mod. power function
$Y = B^{(1/X)}$	Root function
$Y = A*X^{(B*X)}$	Super geometric
$Y = A*X^{(B/X)}$	Mod geometric
$Y = A*e^{(B*X)}$	Exponential
$Y = A*e^{(B/X)}$	Mod. exponential
$Y = A + B*\ln(X)$	Logarithmic
$Y = 1/(A + B*\ln(X))$	Reciprocal logarithmic
$Y = A*B^X*X^C$	Hoerl function

*X is time.

Using original treatment means the respective equations for each treatment for various crops were fitted and the best-fitted equation was identified as the one having the highest adjusted coefficient of determination (R^2). The adjusted R^2 was calculated as

$$\bar{R}^2 = 1 - \frac{n-1}{n-p}(1 - R^2),$$

where n is the number of years and p is the number of regressors.

In the second approach taking first year of the experiment as the base year, three years' moving average values of the original treatment means were obtained and using these values the best fitted equation was identified from the equations tried for each treatment of the crops under study. The regression coefficients for the fitted equations were tested for their significance using t test.

After identifying the best approach for fitting the trend equation, the best-fitted equations were used to study the trends in yield due to various treatments in different crops over a period of time.

Average productivity over the years for various treatments in different crops under sequence was calculated. Expected response at different points of time was calculated using the best-fitted equations for different treatments for the period under study. For the best-fitted

Table 2. Comparison of trend equations fitted through original data and moving average values in various treatments

Equation no.	Control		FYM1		FYM2		FYM3		N50		NP50		NPK50		N100		NP100		NPK100		NsPs		NsPsKs	
	R_1^2	R_2^2	R_1^2	R_2^2	R_1^2	R_2^2	R_1^2	R_2^2	R_1^2	R_2^2	R_1^2	R_2^2	R_1^2	R_2^2	R_1^2	R_2^2	R_1^2	R_2^2	R_1^2	R_2^2	R_1^2	R_2^2	R_1^2	R_2^2
1	0.70	0.93	0.13	0.22	0.07	–0.04	–0.06	0.73	0.80	0.93	0.14	0.75	–0.08	0.13	0.73	0.88	–0.01	0.39	–0.08	0.24	0.20	0.76	–0.06	0.00
2	0.63	0.92	0.19	0.23	0.24	–0.05	–0.09	0.63	0.72	0.94	0.12	0.76	–0.06	0.12	0.59	0.89	0.04	0.36	–0.08	0.22	0.21	0.77	–0.03	–0.01
3	0.68	0.95	0.31	0.26	0.27	–0.17	–0.04	0.74	0.78	0.95	0.17	0.78	0.00	0.28	0.73	0.93	–0.00	0.40	0.19	0.60	0.22	0.74	0.22	0.46
4	0.76	0.95	0.38	0.45	0.11	–0.07	–0.19	0.76	0.89	0.98	0.33	0.85	0.11	0.51	0.84	0.96	0.02	0.58	0.30	0.80	0.37	0.80	0.31	0.59
5	0.67	0.94	0.37	0.54	0.22	–0.11	–0.15	0.71	0.78	0.94	0.27	0.82	0.10	0.44	0.71	0.90	0.03	0.49	0.31	0.69	0.30	0.75	0.32	0.61
6	0.39	0.68	0.42	0.57	–0.09	0.01	–0.08	0.54	0.39	0.66	–0.08	0.19	0.05	–0.11	0.40	0.68	–0.09	–0.00	0.06	–0.10	–0.06	0.33	0.20	–0.06
7	0.28	0.41	0.62	0.64	–0.06	0.01	–0.08	0.42	0.28	0.42	–0.06	0.20	0.14	–0.10	0.30	0.47	–0.08	0.00	0.18	–0.10	–0.05	0.30	0.34	–0.05
8	0.72	0.97	0.32	0.41	0.21	0.27	0.27	0.80	0.87	0.98	0.33	0.85	0.24	0.67	0.86	0.98	–0.03	0.60	0.40	0.84	0.26	0.73	0.40	0.73
9	0.78	0.92	0.37	0.59	0.03	–0.03	–0.17	0.74	0.89	0.96	0.27	0.77	0.06	0.42	0.86	0.95	–0.02	0.53	0.20	0.65	0.35	0.79	0.24	0.43
10	0.71	0.96	0.21	0.27	0.29	–0.14	0.10	0.78	0.80	0.97	0.09	0.74	-0.13	0.10	0.77	0.96	–0.06	0.33	–0.00	0.31	0.16	0.73	0.02	0.20
11	0.67	0.94	0.37	0.45	0.19	–0.07	–0.17	0.69	0.79	0.93	0.29	0.84	0.09	0.47	0.71	0.88	0.03	0.52	0.29	0.79	0.34	0.76	0.29	0.60
12	0.70	0.96	0.25	0.28	0.22	0.10	0.20	0.82	0.83	0.98	0.33	0.83	0.38	0.82	0.81	0.98	–0.06	0.60	0.44	0.79	0.16	0.71	0.51	0.87
13	0.75	0.95	0.34	0.39	0.01	–0.14	–0.11	0.75	0.89	0.98	0.28	0.85	0.18	0.52	0.85	0.96	–0.01	0.53	0.44	0.82	0.31	0.77	0.41	0.69
14	0.75	0.95	0.31	0.41	0.10	–0.03	0.03	0.72	0.89	0.97	0.26	0.84	0.06	0.46	0.85	0.96	–0.04	0.52	0.32	0.79	0.30	0.78	0.32	0.62
15	0.62	0.83	0.35	0.42	0.00	–0.03	–0.09	0.69	0.67	0.85	0.03	0.52	–0.01	–0.02	0.64	0.86	–0.05	0.21	–0.04	0.01	0.07	0.62	0.07	–0.10
16	0.70	0.94	0.16	0.22	0.16	–0.05	–0.08	0.68	0.79	0.96	0.13	0.76	–0.07	0.12	0.70	0.90	0.01	0.38	–0.09	0.23	0.20	0.77	–0.05	–0.00
17	0.35	0.54	0.52	0.61	-0.08	0.01	–0.09	0.48	0.34	0.54	–0.07	0.19	0.09	–0.11	0.36	0.57	–0.09	–0.00	0.11	–0.10	–0.05	0.32	0.27	–0.05
18	0.67	0.93	0.11	0.16	0.22	–0.04	–0.07	0.64	0.78	0.94	0.15	0.79	–0.08	0.16	0.67	0.84	0.03	0.41	–0.08	0.29	0.23	0.78	–0.07	0.03
19	–0.03	–0.11	0.18	0.39	0.09	0.04	–0.08	–0.10	–0.00	–0.10	0.16	–0.01	0.17	0.28	–0.02	–0.11	0.06	0.07	0.37	0.41	0.17	-0.07	0.31	0.50
20	0.70	0.94	0.16	0.22	0.16	–0.05	–0.08	0.68	0.79	0.96	0.13	0.76	–0.07	0.12	0.70	0.90	0.01	0.38	–0.09	0.23	0.20	0.77	–0.05	–0.00
21	0.35	0.54	0.52	0.61	–0.08	0.01	–0.09	0.48	0.34	0.54	–0.07	0.19	0.09	–0.11	0.36	0.57	–0.09	–0.00	0.11	–0.10	–0.05	0.32	0.27	–0.05
22	0.66	0.92	0.29	0.40	–0.04	–0.03	–0.08	0.74	0.71	0.92	0.02	0.52	–0.04	–0.02	0.69	0.91	–0.07	0.21	–0.06	0.02	0.06	0.63	0.03	–0.10
23	0.53	0.73	0.41	0.43	0.04	–0.04	–0.08	0.62	0.57	0.75	0.03	0.52	0.01	–0.02	0.54	0.78	–0.03	0.20	–0.00	0.01	0.08	0.60	0.11	–0.10
24	0.67	0.93	0.45	0.49	0.39	–0.16	–0.12	0.67	0.78	0.95	0.16	0.81	0.08	0.32	0.67	0.90	0.04	0.41	0.30	0.57	0.24	0.76	0.35	0.51

R_1^2 and R_2^2 are the adjusted R^2 of the equations using original and moving average values respectively.

Table 3. Best-fitted trend equation for different treatments in wheat

Treatment	Equation	Coefficient				R^2
		A	B	C	D	
Control	$Y = A + BX^{0.5} + CX + DX^{1.5}$	1027.14	1249.51*	−889.40*	137.55*	0.98
FYM 1	$Y = X/(A*X + B)$	0.0004	0.0001	–	–	0.69
FYM 2	$Y = A + BX^{0.5} + CX + DX^{1.5}$	−2079.70	6331.93*	−3104.38*	477.82*	0.50
FYM 3	$Y = A + BX + CX^2 + DX^3$	1681.87	54.84*	−32.41*	2.16*	0.88
N50	$Y = A + BX^{0.5} + CX + DX^{1.5}$	546.66	2428.26	−1514.62	233.93	0.99
NP50	$Y = A + BX^{0.5} + CX + DX^{1.5}$	−569.42	4451.37*	−2111.38*	288.34*	0.90
NPK50	$Y = A + BX + CX^2 + DX^3$	1606.22	883.24	−173.19	9.17	0.88
N100	$Y = A + BX^{0.5} + CX + DX^{1.5}$	107.18	2980.98*	−1830.64*	291.67*	0.99
NP100	$Y = A + BX^{0.5} + CX + DX^{1.5}$	−1277.68	5584.60*	−2649.58*	377.87*	0.72
NPK100	$Y = A + BX^{0.5} + CX + DX^{1.5}$	−3366.14	9713.22*	−4315.19*	582.23*	0.89
NsPs	$Y = A + B/X^{0.5} + C/X$	161.99	6564.41*	−4264.74*	–	0.85
NsPsKs	$Y = A + BX + CX^2 + DX^3$	1711.96	1005.87*	−183.07*	9.23*	0.91

*Significant at 5 % level.

curve, for which the point of maxima/minima could be obtained, was estimated as[3]: Let $Y = f(x)$. Then,

$$\text{for the point of maxima : } \frac{dy}{dx} = 0; \quad \frac{d^2y}{dx^2} < 0,$$

$$\text{for the point of minima : } \frac{dy}{dx} = 0; \quad \frac{d^2y}{dx^2} > 0.$$

The average rate of change between the two points (initial to minima/maxima, minima to maxima, maxima to last point) was calculated as:

$$\text{Average rate of change} = \frac{Y_m - Y_n}{m - n},$$

where Y_m = expected productivity at time point m, Y_n = expected productivity at time point n; $(m - n)$ = difference between two time points.

The trend equations fitted through both the methods are presented in Table 2. The results indicated that use of moving average reduced the irregular fluctuations in the data remarkably and gave better fit as compared to the original treatment mean equations.

The results presented in Table 3 revealed that trend in yield due to control treatment could be explained by third degree polynomial equation with $X^{0.5}$ as base. The value of coefficient of determination was 98%. The results presented in Table 4 indicated that after the initial increase at the average rate of 31.36 kg, the crop productivity declined at the average rate of 111.86 kg over a period of time.

The results presented in Table 3 revealed that reciprocal hyperbola equation approximated the trend in yield in case of wheat due to FYM1 treatment ($R^2 = 0.69$). Table 4 indicated increasing trend in the productivity at the average rate of 60.56 kg for the entire period of study. However, the rate of increase in the later stage of experimentation was quite negligible.

The results presented in Table 3 indicated that the trend in yield for FYM2 treatment was explained by third degree polynomial equation with $X^{0.5}$ as base. The variation accounted by the best-fitted equation was 50% only and all the coefficients were found to be significant. Table 4 indicated increase in the productivity at the average rate of 257.12 kg in the initial stage, followed by decline at the average rate of 60.13 kg. However, at a later stage, there was an increase in the productivity at the average rate of 20.90 kg.

The results presented in Table 3 revealed that for wheat crop, the trend in yield due to FYM3 treatment could be approximated by the third degree polynomial equation ($R^2 = 0.88$). The results from Table 4 showed decline in the productivity at the average rate of 72.70 kg up to 9.05 time point, followed by moderate increase at the average rate of 58.93 kg at a later stage of experimentation.

The results presented in Table 3 revealed that third degree polynomial equation with $X^{0.5}$ as base explained the trend in yield due to two levels of nitrogen ($R^2 = 0.99$ for both the levels of N). All the coefficients were significant in both the equations. The results presented in Table 4 indicated similar trend of productivity under both the treatments. A marginal increase in the productivity in the initial phase (24.19 and 45.42 kg) was followed by a rapid decline at the average rate of 129.83 and 135.25 kg for N50 and N100, respectively.

The results (Table 3) showed that third degree polynomial equation with $X^{0.5}$ as base was found to be the best-fitted equation to explain the trend in yield due to application of P in presence of nitrogen at two different levels. Whereas for NsPs, the second degree polynomial equation with $1/X^{0.5}$ as base explained the trend in yield effectively. The variation in yield explained by the best-

Table 4. Average productivity of wheat for different treatments and rate of change under different segments of fitted equations

Treatment	Average product (kg/ha)	Moving average		Expected average		Average rate of change			Time point of	
		Initial product	Final product	Initial product	Final product	*A*	*B*	*C*	Minima	Maxima
Control	881	1545	422	1525	406	31.36	–111.86	8.36	11.75	0.78
FYM 1	2566	2087	2707	2155	2769	60.56	–	–	–	BR.
FYM 2	1689	1637	2028	1626	2205	257.12	–60.13	20.90	7.03	2.70
FYM 3	1556	1733	1186	1707	1243	1.67	–72.70	58.93	9.05	0.93
N50	973	1692	449	1694	474	24.19	–129.83	7.62	10.58	1.13
NP50	1874	2057	1510	2058	1489	198.75	–95.89	2.92	11.16	2.37
NPK50	2533	2329	2544	2325	2567	252.51	–137.99	183.34	9.04	3.55
N100	882	1557	477	1549	498	45.42	–135.25	34.89	9.47	1.23
NP100	2035	2045	1858	2035	1885	245.85	–86.75	35.70	9.42	2.57
NPK100	2909	2630	2714	2614	2623	460.28	–127.82	22.69	10.28	3.00
NsPs	2130	2446	1727	2462	1754	328.87	–100.36	–	–	1.69
NsPsKs	2922	2557	2903	2544	2913	295.73	–136.43	151.09	9.33	3.89

A = Average rate of change in productivity from initial point of time to the point of maxima.
B = Average rate of change in productivity from the point of maxima to minima.
C = Average rate of change in productivity from the point of minima to last point.
BR = Beyond range.

fitted equations for various combinations of N and P was 90, 72 and 85% for NP50, NP100 and NsPs, respectively. From the results (Table 4) it was observed that the application of NP50 and NP100 resulted in an initial increase in productivity at the average rate of 198.75 and 245.85 kg, respectively. This was followed by continuous decline in productivity up to the point of minima. However, at a later stage in case of NP100, the average rate of increase in productivity was much higher than that of NP50. In case of NsPs, the average rate of increase in the initial stage was 328.87 kg, followed by continuous decline in the productivity at the average rate of 100.36 kg.

For wheat crop, the trend in yield due to application of NPK50 and NsPsKs treatments was explained by third degree polynomial equations. While in case of NPK100, third degree polynomial equation with $X^{0.5}$ as base was found to be the best-fitted equation. The values of coefficient of determination were 88, 89 and 91% for NPK50, NPK100 and NsPsKs, respectively. All the regression coefficients were significant. Table 3 indicated that there was an increase in the average crop productivity at different rates during initial phase of experimentation under all the three treatments. This was followed by decreasing productivity at almost similar rates. Later phase of experimentation indicated increase in productivity. However, in case of NPK50, the rate of increase in productivity was the highest (183.34 kg).

Thus, from the above results, it could be concluded that moving average reduced the irregular fluctuations in the data effectively and gave better fit as compared to that of original data. Also it was observed that no single form of equation could explain the trend in yield due to various treatments in wheat crop under the intensive cropping system of groundnut–wheat–sorghum.

The best-fitted equations for various treatments suggested the change in productivity pattern over the period of time in case of wheat crop for different treatments at Junagadh. The form and the coefficients of the best-fitted equations for wheat crop indicated that productivity trend was affected by various treatments. The initial moderate increase in productivity, followed by a downward trend in productivity till a later stage, was characteristic of majority of the curves. Comparison of these trends indicated that the application of phosphorus not only resulted in higher average productivity but had higher average rate of increase in initial and later phase of experimentation. The decreasing slope in the middle segment of the curve was also relatively low in case of NP100. Comparison of the trends for the treatments, where potash is included in addition to nitrogen and phosphorus combination, suggested a positive and appreciable response to potash application. Among the combination of N, P and K tried (NPK50, NPK100 and

NsPsKs), the average productivity over the period was a little high (2,922 kg/ha) in case of NsPsKs in comparison to that of NPK100 (2,909 kg/ha). However, the average rate of increase in the last phase of experimentation was much higher for NsPsKs and resulted in the highest expected productivity at the last point of time (2,913 kg/ha). For FYM1 treatment, the rate of increase in productivity was a little higher and was followed by a very low increase till the last time point. As far as the average productivity over the entire period of experimentation is concerned, NsPsKs ranked first, followed by NPK100. Thus, in the medium black soil of Junagadh under the intensive cropping system, NsPsKs treatment was found to be better as compared to rest of the treatments in wheat crop.

For wheat crop, the recommended dose is NP100. While comparing the dose with the treatment which proved to be superior in this study, it could be noticed that supplementary potash to the already existing recommended dose resulted in higher productivity for wheat in the intensive cropping system (groundnut–wheat–sorghum) at Junagadh. This clearly suggested either the presence of main effect of potash or the presence of the interactions where potash was involved, or both.

Similar observations were made by Singh and Nambiar[4] in their study on crop productivity under intensive use of chemical fertilizer in long term experiments. Acharya *et al.*[5] had also reported that omission of potash decreased the crop yield.

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Received 12 June 1997; revised accepted 31 October 1997

Characteristics of the 1997 Jabalpur earthquake and their bearing on its mechanism

Kusala Rajendran and C. P. Rajendran
Centre for Earth Science Studies, Trivandrum 695 031, India

The occurrence of a moderate earthquake near Jabalpur is an example of stable continental region (SCR) seismicity at lower crustal depths. This event is spatially associated with the Narmada–Son lineament, a continental scale structure where at least five earthquakes of $M \geq 5.4$ have occurred during this century. In comparison to other moderate earthquakes in the Indian peninsular shield, the 1997 event has several peculiarities, including a relatively deeper hypocentre, lower level of aftershock activity and shorter recurrence period. In this paper, we describe certain characteristics of this event and propose a conceptual model to explain its mechanism.

AN earthquake of magnitude M_W 5.8 occurred near Jabalpur, central India on 22 May 1997, emphasizing the point that many parts of the peninsular shield have potential for moderate earthquakes. Unlike the 1993 Killari earthquake, this one did not occur as a total surprise because the Jabalpur region has experienced previous seismicity. Its epicentre was located in the ENE–WSW trending Narmada-Son lineament, a major fault zone in the Indian shield. A Precambrian rift that has subsequently been reactivated several times, this fault zone (hereafter referred to as the Narmada rift) has been the location of moderate earthquakes (i.e. $M \geq 5.0$) as well as many of smaller magnitude in the past. The Son Valley (1927, M 6.5); Satpura (1938, M 6.3); Balaghat (1957, M 5.5) and Broach (1970, M 5.4) earthquakes are the larger events associated with the rift (Figures 1 and 2).

A look at the spatial distribution of moderate earthquakes in peninsular India immediately suggests a relatively higher level of seismicity associated with the Narmada rift (Figures 1 and 2). Despite the large dimensions and higher level of seismicity associated with it, our understanding of the seismogenic character of this continental structure remains rudimentary. Since most previous events in this region occurred before the development of modern instruments, reliable focal parameters are not available, except for the Broach earthquake. The Jabalpur earthquake was well recorded and its focal parameters estimated using data from 12 digital broad-band stations operated by the India Meteorological Department (IMD). Focal parameters have also been computed by the Harvard University (HRV) and the US Geological Survey (USGS) based on data from global stations (Table 1). With well-constrained data on epicentral parameters, focal mechanism and aftershock activity, we can better explain the earthquake and its relation to the Narmada rift. In this paper we present some characteristics of the Jabalpur earthquake and discuss their bearing on its mechanism.

The most striking difference about the Jabalpur earthquake compared to other moderate events in the Indian shield is its deep focus. The initial estimates indicated a