

https://dspace.org/

# Hydrological data interpolation using entropy

**Ilunga, Masengo**

**2006-11-17T07:40:07Z**
http://hdl.handle.net/10539/1826

Downloaded from a DSpace repository. https://dspace.org/

# APPENDIX C

Table C.1 Entropy calculations and statistics at the target gauge 0228495 (19.7 % missing annual total rainfall) using the base gauge 0228458

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 1.722 | 0.2876 | 47.667 | 0.1056 | 0.0097 | 1.041 | 0.998 |
| | McL1 BP (sigmoid hidden layer) | 1.705 | 0.2847 | 48.354 | 0.1045 | 0.0291 | 1.103 | 0.994 |
| | GenerBP (sigmoid hidden layer), lr = 0.35, s = 2 | 1.719 | 0.2871 | 47.679 | 0.1029 | 0.0174 | 1.039 | 0.997 |
| | QBP (hyperbolic tangent hidden layer), acc = 0.025, lr = 0.25, Weight Cond | 1.397 | 0.2333 | 67.007 | 0.168 | -0.0306 | 1.179 | 1.006 |
| | GoldSBP(sigmoid hidden layer), lr = 0.25 | 1.707 | 0.2851 | 48.236 | 0.1038 | 0.0279 | 1.032 | 0.0994 |
| | VLR (sigmoid hidden layer) | 1.647 | 0.2750 | 50.595 | 0.116 | 0.0503 | 1.049 | 0.990 |
| **EM** Techniques | Standard EM | 1.714 | 0.2862 | 48.591 | 0.1042 | -0.0171 | 1.100 | 1.0012 |
| | MEM1-2 (u = 0.95, lr = 0.001) | 1.714 | 0.2862 | 48.591 | 0.1042 | -0.0171 | 1.100 | 1.0012 |
| | MEM3, u = 0.95, lr = 0.001 | 1.715 | 0.2864 | 48.561 | 0.1042 | -0.0171 | 1.066 | 1.003 |
| | ECM1-2 | 1.714 | 0.2862 | 48.591 | 0.1042 | -0.0171 | 1.100 | 1.0012 |
| | ECME1-2 (k = 2) | 1.714 | 0.2862 | 48.591 | 0.1042 | -0.0171 | 1.100 | 1.0012 |

Table C.2 Entropy calculations and statistics at the target gauge 0228495 (30.3 % missing annual total rainfall) using the base gauge 0228458

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 1.523 | 0.2543 | 45.306 | 0.105 | 0.0176 | 1.0282 | 0.9947 |
| | GenerBP (sigmoid hidden layer), s=5 | 1.546 | 0.2582 | 44.621 | 0.104 | 0.00230 | 1.0423 | 0.9993 |
| | QBP (sigmoid hidden layer), acc = 0.015, lr = 0.85, Weight Cond | 1.400 | 0.2338 | 53.70 | 0.1367 | -0.0232 | 1.180 | 1.0068 |
| | GoldSBP (sigmoid hidden layer), lr = 0.25 | 1.536 | 0.2565 | 45.118 | 0.1064 | 0.01047 | 1.025 | 0.9968 |
| | VLR (sigmoid hidden layer) | 1.535 | 0.2563 | 45.722 | 0.1098 | -0.0284 | 1.065 | 1.0083 |
| **EM** Techniques | Standard EM | 1.541 | 0.2573 | 45.24 | 0.1063 | -0.0209 | 1.066 | 1.0061 |
| | MEM1 | 1.541 | 0.2573 | 45.24 | 0.1063 | -0.0209 | 1.066 | 1.0061 |
| | ECM1-2 | 1.541 | 0.2573 | 45.24 | 0.1063 | -0.0209 | 1.066 | 1.0061 |
| | ECME1-2 (k = 2), 3 | 1.541 | 0.2573 | 45.24 | 0.1063 | -0.0209 | 1.066 | 1.0061 |

Table C.3 Entropy calculations and statistics at the target gauge 0228458 (19.7 % missing annual total rainfall) using the base gauge 0228495

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 1.754 | 0.2929 | 44.91 | 0.109 | -0.0147 | 1.048 | 1.003 |
| | McL1BP (sigmoid hidden layer) | 1.737 | 0.2901 | 45.680 | 0.112 | -0.032 | 1.052 | 1.006 |
| | GenerBP (sigmoid hidden layer), lr = 0.35, s = 2 | 1.736 | 0.2899 | 45.089 | 0.114 | -0.0215 | 1.050 | 1.004 |
| | QBP (hyperbolic tangent hidden layer), acc = 0.025, lr = 0.25, Weight Cond | 1.529 | 0.2553 | 54.591 | 0.157 | -0.0121 | 1.135 | 1.002 |
| | GoldSBP (sigmoid hidden layer), lr = 0.25 | 1.735 | 0.2897 | 45.51 | 0.112 | -0.029 | 1.052 | 1.006 |
| | VLR (sigmoid hidden layer) | 1.746 | 0.296 | 44.42 | 0.112 | 0.0016 | 1.041 | 1.000 |
| **EM** Techniques | Standard EM | 1.737 | 0.2901 | 44.428 | 0.116 | -0.0028 | 1.040 | 0.999 |
| | MEM1 (u = 0.95) | 1.737 | 0.2901 | 44.428 | 0.116 | -0.0028 | 1.040 | 0.999 |
| | MEM2, u = 0.95, lr = 0.001 | 1.736 | 0.2001 | 44.44 | 0.116 | 0.0053 | 1.04 | 0.999 |
| | MEM3, u = 0.95, lr = 0.001 | 1.738 | 0.2902 | 44.423 | 0.116 | -0.0028 | 1.040 | 0.999 |
| | ECM1-2 | 1.737 | 0.2901 | 44.428 | 0.116 | -0.0028 | 1.040 | 0.999 |
| | ECME1-2 (k = 2), 3 | 1.737 | 0.2901 | 44.428 | 0.116 | -0.0028 | 1.040 | 0.999 |

Table C.4 Entropy calculations and statistics at the target gauge 0228458 (30.3 % missing annual total rainfall) using the base gauge 0228495

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 1.525 | 0.2547 | 43.923 | 0.1228 | -0.0102 | 1.0864 | 1.0030 |
| | GenerBP (sigmoid hidden layer), s = 5 | 1.518 | 0.2535 | 43.577 | 0.1265 | 0.00224 | 1.0865 | 0.9993 |
| | QBP (sigmoid hidden layer), acc = 0.015, lr = 0.85, Weight Cond | 1.405 | 0.2346 | 48.898 | 0.1483 | 0.00855 | 1.1624 | 0.9975 |
| | GoldSBP (sigmoid hidden layer), lr = 0.25 | 1.523 | 0.2543 | 43.731 | 0.1240 | -0.0042 | 1.085 | 1.001 |
| | VLR (sigmoid hidden layer) | 1.519 | 0.2537 | 43.552 | 0.1254 | 0.0130 | 1.0776 | 0.9961 |
| **EM** Techniques | Standard EM | 1.518 | 0.2535 | 43.311 | 0.1256 | 0.01284 | 1.0710 | 0.9962 |
| | MEM1 | 1.518 | 0.2535 | 43.311 | 0.1256 | 0.01284 | 1.0710 | 0.9962 |
| | ECM1-2 | 1.518 | 0.2535 | 43.311 | 0.1256 | 0.01284 | 1.0710 | 0.9962 |
| | ECME1, Option 2, k = 2, Option 3 | 1.518 | 0.2535 | 43.311 | 0.1256 | 0.01284 | 1.0710 | 0.9962 |

Table C.5 Entropy calculations and statistics at the target gauge 0228495 (7.6 % missing annual total rainfall) using the base gauge 0228170

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 2.852 | 0.4762 | 23.00 | 0.0621 | 0.0309 | 0.9959 | 1.002 |
| | McL1BP (sigmoid hidden layer) | 3.139 | 0.5242 | 16.808 | 0.0543 | -0.0089 | 0.9989 | 1.0006 |
| | GenerBP (sigmoid hidden layer), s = 5 | 2.945 | 0.4918 | 20.810 | 0.0633 | 0.0214 | 0.99667 | 0.9985 |
| | QBP (sigmoid hidden layer), acc = 0.015, lr = 0.85, Weight Cond | 3.047 | 0.5088 | 18.660 | 0.0601 | 0.0226 | 0.9999 | 0.9998 |
| | GoldSBP (sigmoid hidden layer), lr = 0.25 | 2.885 | 0.4818 | 22.251 | 0.0652 | 0.0279 | 0.9962 | 0.9980 |
| | VLR (sigmoid hidden layer) | 2.788 | 0.4656 | 23.000 | 0.0723 | -0.0449 | 0.9923 | 1.003 |
| **EM** Techniques | Standard EM | 2.974 | 0.4967 | 19.998 | 0.0622 | 0.0138 | 0.9965 | 0.9990 |
| | MEM1 | 2.974 | 0.4967 | 19.998 | 0.0622 | 0.0138 | 0.9965 | 0.9990 |
| | MEM,2 (u = 0.89, lr = 0.001), 3 | 2.973 | 0.4965 | 20.027 | 0.0623 | 0.0138 | 0.9964 | 0.9990 |
| | ECM1-2 | 2.974 | 0.4967 | 19.998 | 0.0622 | 0.0138 | 0.9965 | 0.9990 |
| | ECME1-2 (k = 2) | 2.974 | 0.4967 | 19.998 | 0.0622 | 0.0138 | 0.9965 | 0.9990 |

Table C.6 Entropy calculations and statistics at the target gauge 0228495 (13.6 % missing annual total rainfall) using the base gauge 0228170

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 2.386 | 0.3985 | 29.687 | 0.0805 | 0.0033 | 1.0386 | 0.9995 |
| | McL1BP (sigmoid hidden layer) | 2.234 | 0.3731 | 33.832 | 0.0846 | -0.0305 | 1.0569 | 1.0043 |
| | GenerBP (sigmoid hidden layer), s = 5 | 2.407 | 0.4020 | 28.423 | 0.0798 | 0.0019 | 1.038 | 0.9997 |
| | QBP (sigmoid hidden layer), acc = 0.015, lr = 0.85, Weight Cond | 1.765 | 0.2948 | 57.62 | 0.1200 | -0.0426 | 1.10406 | 1.0059 |
| | GoldSBP(sigmoid hidden layer), lr = 0.25 | 2.393 | 0.3996 | 29.383 | 0.0802 | 0.00173 | 1.039 | 0.9998 |
| | VLR (sigmoid hidden layer) | 2.408 | 0.4021 | 28.490 | 0.0794 | 0.00642 | 1.00682 | 1.0015 |
| **EM** Techniques | Standard EM | 2.433 | 0.4063 | 27.964 | 0.0781 | 0.00745 | 1.0378 | 1.001 |
| | MEM1-2 | 2.433 | 0.4063 | 27.964 | 0.0781 | 0.00745 | 1.0378 | 1.001 |
| | MEM3 | 2.435 | 0.4066 | 27.896 | 0.0780 | -0.0073 | 1.0376 | 1.0010 |
| | ECM1-2 | 2.433 | 0.4063 | 27.964 | 0.0781 | 0.00745 | 1.0378 | 1.001 |
| | ECME1-2 (k = 2), 3 | 2.433 | 0.4063 | 27.964 | 0.0781 | 0.00745 | 1.0378 | 1.001 |

Table C.7 Entropy calculations and statistics at the target gauge 0228495 (19.7 % missing annual total rainfall) using the base gauge 0228170

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 1.967 | 0.3285 | 37.362 | 0.104 | -0.005 | 1.098 | 0.999 |
| | McL1BP (sigmoid hidden layer) | 1.966 | 0.3283 | 38.0719 | 0.103 | -0.0081 | 1.102 | 1.002 |
| | GenerBP (sigmoid hidden layer), lr = 0.35, s = 2 | 1.957 | 0.3268 | 37.701 | 0.104 | -0.0036 | 1.110 | 1.000 |
| | BP (hyperbolic tangent hidden layer) | 1.950 | 0.3257 | 37.566 | 0.106 | 0.00545 | 1.100 | 0.999 |
| | QBP (hyperbolic tangent hidden layer), acc = 0.025, lr = 0.25, Weight Cond | 1.60 | | 54.302 | 0.135 | -0.0162 | 1.164 | 1.003 |
| | GoldSBP (sigmoid hidden layer), lr = 0.25 | 1.964 | 0.3280 | 38.001 | 0.103 | -0.0076 | 1.102 | 1.001 |
| | VLR (sigmoid hidden layer) | 1.987 | 0.3318 | 37.66 | 0.0999 | -0.0137 | 1.010 | 1.003 |
| **EM** Techniques | Standard EM | 1.970 | 0.3290 | 37.22 | 0.1025 | -0.0062 | 1.0998 | 1.0012 |
| | MEM1 (u = 0.95) | 1.970 | 0.3290 | 37.22 | 0.1025 | -0.0062 | 1.0998 | 1.0012 |
| | MEM2 (u = 0.95, lr = 0.001) | 1.968 | 0.3287 | 37.10 | 0.1031 | -0.0036 | 1.099 | 1.001 |
| | MEM3, u = 0.95, lr = 0.001 | 1.972 | 0.3293 | 37.129 | 0.1023 | -0.0062 | 1.00993 | 1.001 |
| | ECM1-2 | 1.970 | 0.3290 | 37.22 | 0.1025 | -0.0062 | 1.0998 | 1.0012 |
| | ECME1-2 (k = 2) | 1.970 | 0.3290 | 37.22 | 0.1025 | -0.0062 | 1.0998 | 1.0012 |

Table C.8 Entropy calculations and statistics at the target gauge 0228495 (30.3 % missing annual total rainfall ) using the base gauge 0228170

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 1.787 | 0.2984 | 34.99 | 0.0987 | 0.0152 | 1.0968 | 0.995 |
| | GenerBP (sigmoid hidden layer), s=5 | 1.790 | 0.2989 | 34.577 | 0.1265 | 0.00224 | 1.1002 | 0.9948 |
| | QBP (sigmoid hidden layer), acc = 0.015, lr = 0.85, Weight Cond | 1.611 | 0.2690 | 42.922 | 0.1079 | 0.00913 | 1.1633 | 0.997 |
| | GoldSBP (sigmoid hidden layer), lr = 0.25 | 1.783 | 0.2977 | 35.038 | 0.0992 | 0.0176 | 1.0967 | 0.9947 |
| | VLR (sigmoid hidden layer) | 1.803 | 0.3010 | 34.431 | 0.0967 | 0.0117 | 1.096 | 0.996 |
| **EM** Techniques | Standard EM | 1.803 | 0.3010 | 34.27 | 0.0961 | 0.0139 | 1.0997 | 0.995 |
| | MEM1 | 1.803 | 0.3010 | 34.27 | 0.0961 | 0.0139 | 1.0997 | 0.995 |
| | ECM1-2 | 1.803 | 0.3010 | 34.27 | 0.0961 | 0.0139 | 1.0997 | 0.995 |
| | ECME1-2 (k = 2), 3 | 1.803 | 0.3010 | 34.27 | 0.0961 | 0.0139 | 1.0997 | 0.995 |

Table C.9 Entropy calculations and statistics at the target gauge 0228170 (7.6 % missing annual total rainfall) using the base gauge 0228495

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 2.811 | 0.4684 | 21.407 | 0.0697 | 0.0191 | 1.0081 | 0.9986 |
| | McL1BP (sigmoid hidden layer) | 2.663 | 0.4447 | 25.8511 | 0.0815 | -0.0204 | 1.0099 | 1.0014 |
| | GenerBP (sigmoid hidden layer), s=5 | 2.808 | 0.4689 | 22.011 | 0.0687 | -0.0077 | 1.0079 | 1.001 |
| | QBP (sigmoid hidden layer), acc = 0.015, lr = 0.85, Weight Cond | 2.734 | 0.4566 | 23.538 | 0.0739 | -0.0005 | 1.0099 | 1.000 |
| | GoldSBP (sigmoid hidden layer), lr = 0.25 | 2.825 | 0.4718 | 21.336 | 0.0689 | 0.0051 | 1.008 | 0.9996 |
| | VLR (sigmoid hidden layer) | 2.800 | 0.4676 | 21.806 | 0.0709 | 0.0083 | 1.009 | 0.9994 |
| **EM** Techniques | Standard EM | 2.794 | 0.4666 | 22.404 | 0.0691 | -0.0106 | 1.008 | 1.0007 |
| | MEM | 2.794 | 0.4666 | 22.404 | 0.0691 | -0.0106 | 1.008 | 1.0007 |
| | MEM2 (u = 0.89, lr = 0.001), 3 | 2.795 | 0.4668 | 22.384 | 0.0691 | -0.0106 | 1.008 | 1.0007 |
| | ECM1-2 | 2.794 | 0.4666 | 22.404 | 0.0691 | -0.0106 | 1.008 | 1.0007 |
| | ECME1-2 (k = 2), 3 | 2.794 | 0.4666 | 22.404 | 0.0691 | -0.0106 | 1.008 | 1.0007 |

Table C.10 Entropy calculations and statistics at the target gauge 0228170 (13.6 % missing annual total rainfall) using the base gauge 0228495

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 2.602 | 0.4345 | 21.036 | 0.0624 | -0.0120 | 1.0048 | 1.0017 |
| | McL1BP (sigmoid hidden layer) | 2.389 | 0.3990 | 26.556 | 0.0809 | -0.0067 | 1.0042 | 1.000 |
| | GenerBP (sigmoid hidden layer), s = 5 | 2.604 | 0.4349 | 20.876 | 0.0644 | -0.0093 | 1.001 | 1.001 |
| | QBP (sigmoid hidden layer), acc = 0.015, lr = 0.85, Weight Cond | 2.039 | 0.3405 | 41.301 | 0.1126 | -0.0467 | 1.0728 | 1.0064 |
| | GoldSBP (sigmoid hidden layer), lr = 0.25 | 2.608 | 0.4355 | 20.520 | 0.0651 | -0.000 | 1.0006 | 1.0001 |
| | VLR (sigmoid hidden layer) | 2.607 | 0.4354 | 20.705 | 0.0643 | -0.0106 | 1.0068 | 1.0015 |
| **EM** Techniques | Standard EM | 2.602 | 0.4345 | 20.53 | 0.0655 | 0.0011 | 1.0011 | 0.9998 |
| | MEM1-3 | 2.602 | 0.4345 | 20.53 | 0.0655 | 0.0011 | 1.0011 | 0.9998 |
| | MEM2 (u = 0.89, lr = 0.001) | 2.606 | 0.4345 | 20.93 | 0.0624 | -0.0096 | 1.004 | 1.0014 |
| | ECM1-2 | 2.602 | 0.4345 | 20.53 | 0.0655 | 0.0011 | 1.0011 | 0.9998 |
| | ECME1-2 (k = 2), 3 | 2.602 | 0.4345 | 20.53 | 0.0655 | 0.0011 | 1.0011 | 0.9998 |

Table C.11 Entropy calculations and statistics at the target gauge 0228170 (19.7 % missing annual total rainfall) using the base gauge 0228495

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 2.229 | 0.3722 | 26.198 | 0.0853 | 0.0070 | 0.960 | 0.999 |
| | McL1BP (sigmoid hidden layer) | 2.232 | 0.3727 | 27.556 | 0.0807 | 0.0231 | 0.955 | 0.995 |
| | GenerBP (sigmoid hidden layer), lr = 0.35, s = 2 | 2.280 | 0.3808 | 25.88 | 0.0781 | 0.0086 | 0.961 | 0.998 |
| | BP (hyperbolic tangent hidden layer) | 2.106 | 0.3517 | 29.461 | 0.107 | -0.0029 | 0.941 | 1.000 |
| | QBP (hyperbolic tangent hidden layer), acc = 0.025, lr = 0.25, Weight Cond | 2.330 | 0.3891 | 24.939 | 0.0625 | -0.0178 | 1.042 | 1.003 |
| | GoldSBP (sigmoid hidden layer), lr = 0.25 | 2.253 | 0.3763 | 26.959 | 0.0789 | 0.0190 | 0.957 | 0.996 |
| | VLR (sigmoid hidden layer) | 2.282 | 0.3811 | 26.095 | 0.0742 | 0.0220 | 0.964 | 0.996 |
| **EM** Techniques | Standard EM | 2.316 | 0.3868 | 24.513 | 0.0753 | -0.0032 | 0.970 | 1.000 |
| | MEM1 (u = 0.95) | 2.316 | 0.3868 | 24.513 | 0.0753 | -0.0032 | 0.970 | 1.000 |
| | MEM-2, u = 0.95, lr = 0.001 | 2.319 | 0.3873 | 24.560 | 0.0746 | -0.0006 | 0.970 | 1.000 |
| | MEM3, u = 0.95, lr = 0.01 | 2.314 | 0.3864 | 24.59 | 0.0756 | -0.0031 | 0.970 | 1.000 |
| | ECM1-2 | 2.316 | 0.3868 | 24.513 | 0.0753 | -0.0032 | 0.970 | 1.000 |
| | ECME1-2 (k = 2), 3 | 2.316 | 0.3868 | 24.513 | 0.0753 | -0.0032 | 0.970 | 1.000 |

Table C.12 Entropy calculations and statistics at the target gauge 0228170 (30.3 % missing annual total rainfall) using the base gauge 0228495

| | Description | T (napiers) | DIT | RMSEp (mm) | RMEp | EV | Ratio Variance | Ratio Mean |
|---|---|---|---|---|---|---|---|---|
| **ANN** Techniques | BP (sigmoid hidden layer) | 1.969 | 0.3288 | 26.122 | 0.0851 | -0.00136 | 0.9751 | 1.000 |
| | GenerBP (sigmoid hidden layer), s = 5 | 1.956 | 0.3267 | 26.472 | 0.0860 | -0.01581 | 0.9836 | 1.0047 |
| | QBP (sigmoid hidden layer), acc = 0.015, lr = 0.85, Weight Cond | 1.931 | 0.3235 | 27.394 | 0.0793 | -0.0288 | 1.0556 | 1.0086 |
| | GoldSBP(sigmoid hidden layer), lr = 0.25 | 1.968 | 0.3287 | 26.051 | 0.0856 | -0.00679 | 0.97817 | 1.0020 |
| | VLR (sigmoid hidden layer) | 1.951 | 0.3258 | 26.460 | 0.088 | -0.0261 | 0.990 | 1.007 |
| **EM** Techniques | Standard EM | 1.945 | 0.3248 | 26.797 | 0.0861 | -0.0242 | 0.990 | 1.007 |
| | MEM1 | 1.945 | 0.3248 | 26.797 | 0.0861 | -0.0242 | 0.990 | 1.007 |
| | ECM1-2 | 1.945 | 0.3248 | 26.797 | 0.0861 | -0.0242 | 0.990 | 1.007 |
| | ECME1- 2 (k = 2), 3 | 1.945 | 0.3248 | 26.797 | 0.0861 | -0.0242 | 0.990 | 1.007 |

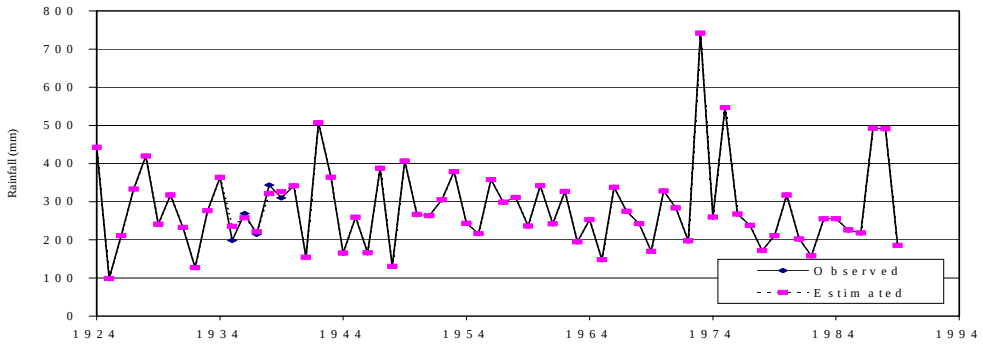



Figure C.1a Annual total rainfall at 0228170 (7.6 % missing from 1935) using standard BP with base gauge 0228495

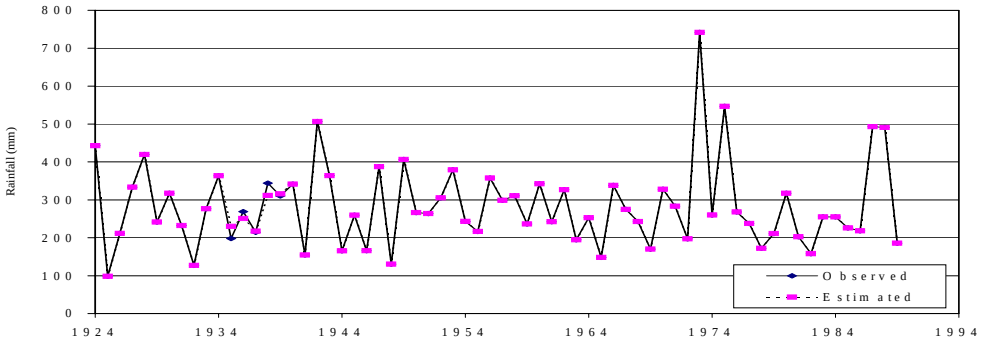



Figure C.1b Annual total rainfall at 0228170 (7.6 % missing from 1935) using McL1BP with base gauge 0228495

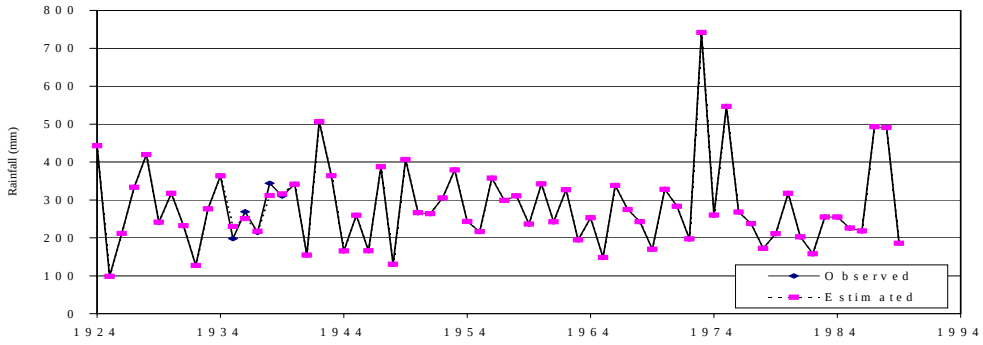



Figure C.1c Annual rainfall at 0228170 (7.6 % missing from 1935) using GenerBP with base gauge 0228495

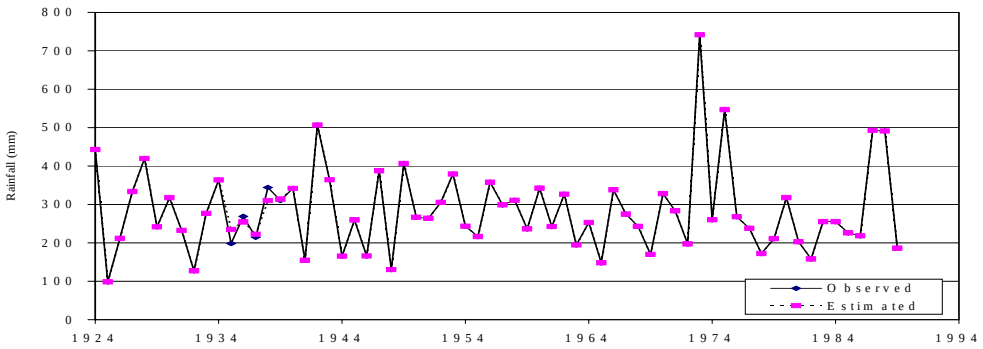



Figure C.1d Annual rainfall at 0228170 (7.6 % missing from 1935) using QBP with base gauge 0228495

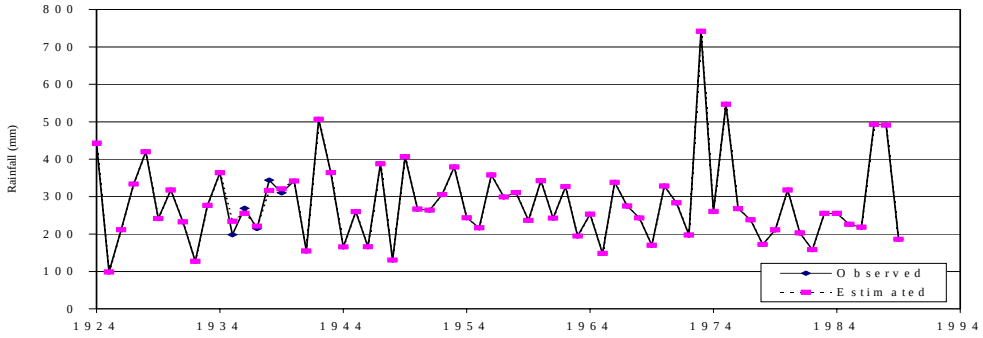



Figure C.1e Annual total rainfall at 0228170 (7.6 % missing from 1935) using GoldSBP with base gauge 0228170

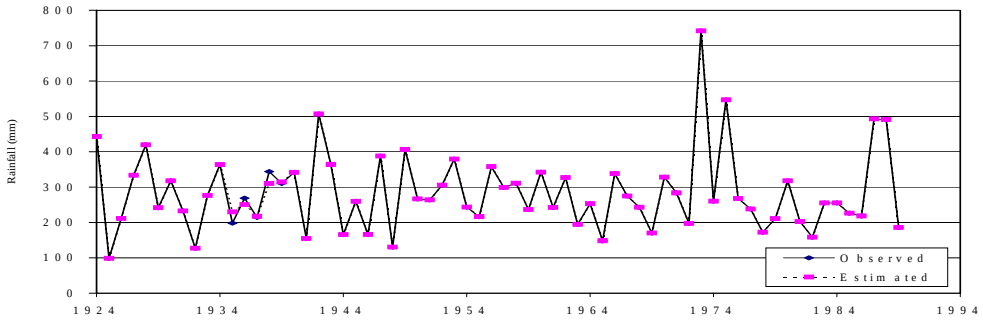



Figure C.1f Annual total rainfall at 0228170 (7.6 % missing from 1935) using VLR with base gauge 0228495

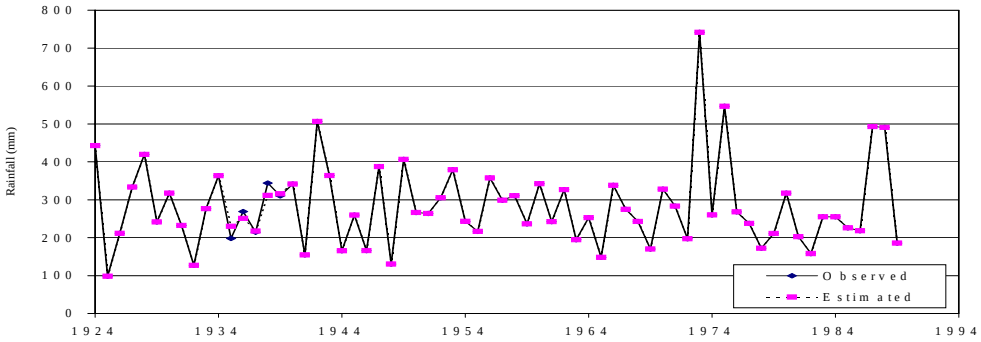



Figure C.1g Annual total rainfall at 0228170 (7.6 % missing from 1935) using standard EM with base gauge 0228495

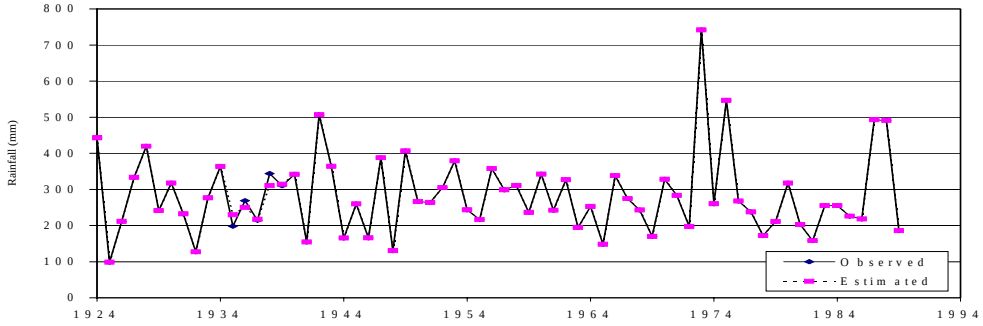



Figure C.1h Annual total rainfall at 0228170 (7.6 % missing from 1935) using ECM1-2 with base gauge 0228495

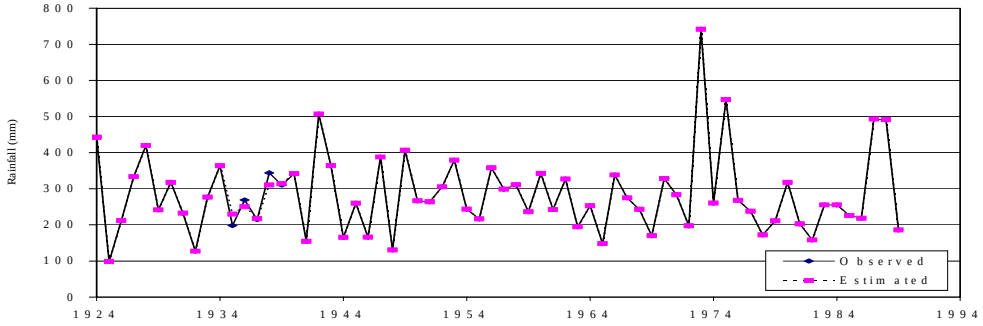



Figure C.1i Annual total rainfall at 0228170 (7.6 % missing from 1935) using MEM1 with base gauge 0228495

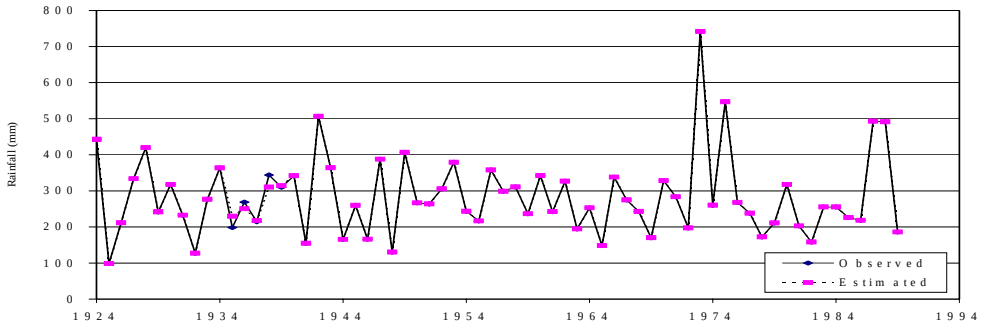



Figure C.1j Annual total rainfall at 0228170 (7.6 % missing from 1935) using MEM2-3 with base gauge 0228495

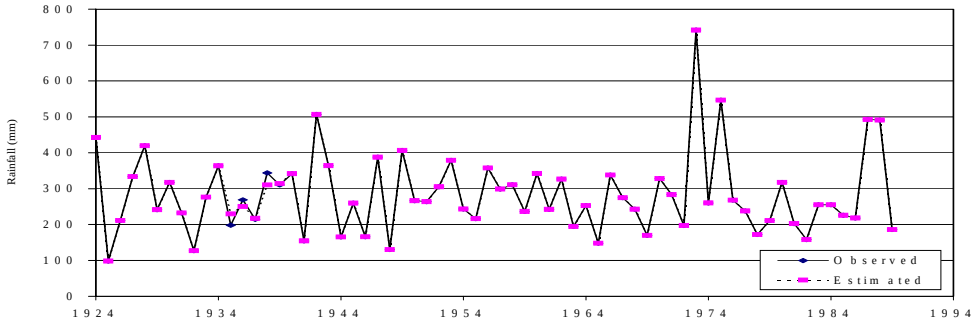



Figure C.1k Annual total rainfall at 0228170 (7.6 % missing from 1935) using ECME1-2-3 with base gauge 0228495

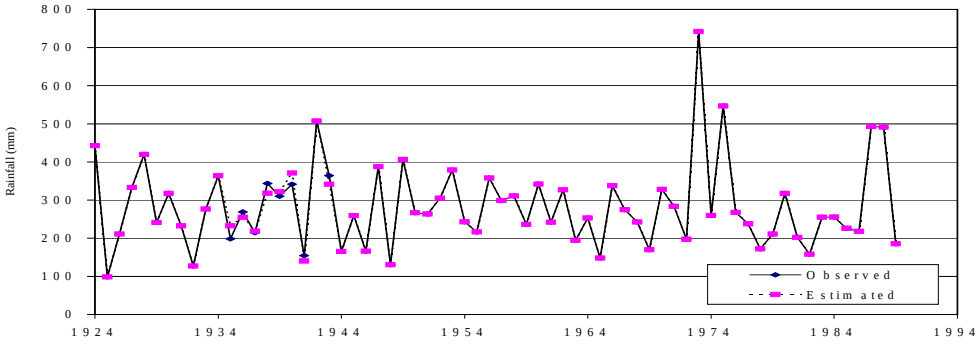



Figure C.2a Annual total rainfall at 0228170 (13.6 % missing from 1935) using standard BP with base gauge 0228495

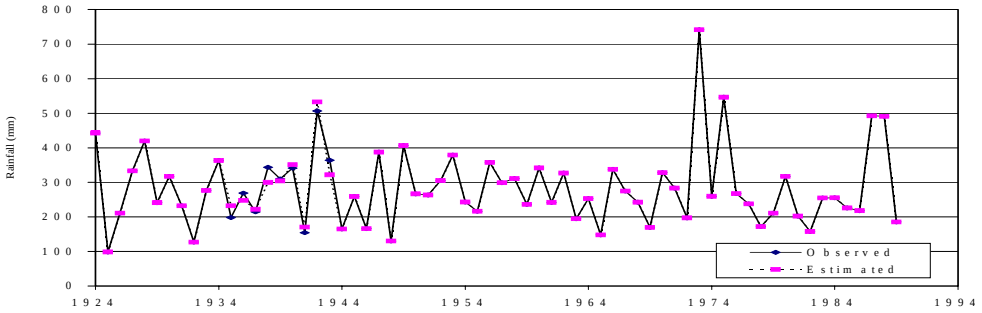



Figure C.2b Annual rainfall at 0228170 (13.6 % missing from 1935) using McL1BP with base gauge 0228495

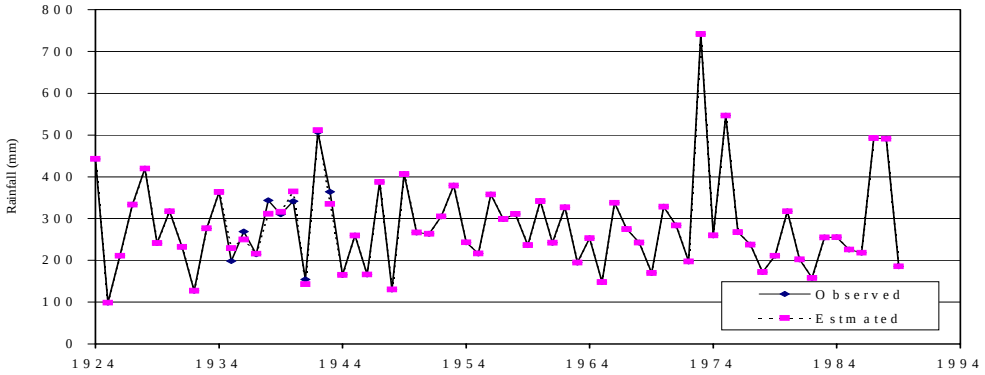



Figure C.2c Annual total rainfall at 0228170 (13.6 % missing from 1935) using GenerBP with base gauge 0228495

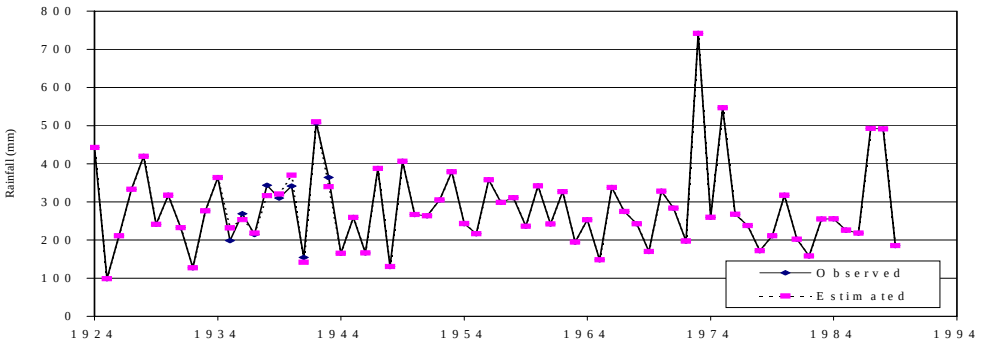



Figure C.2d Annual total rainfall at 0228170 (13.6 % missing from 1935) using GoldSBP with base gauge 0228495

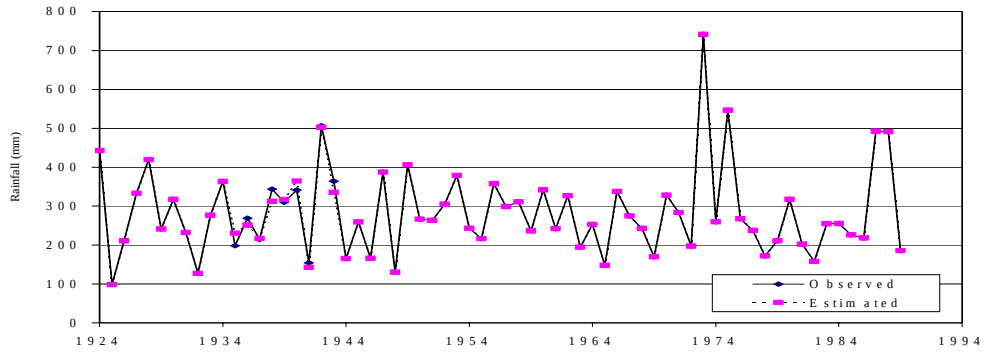



Figure C.2e Annual total rainfall at 0228170 (13.6 % missing from 1935) using VLRBP with base gauge 0228495

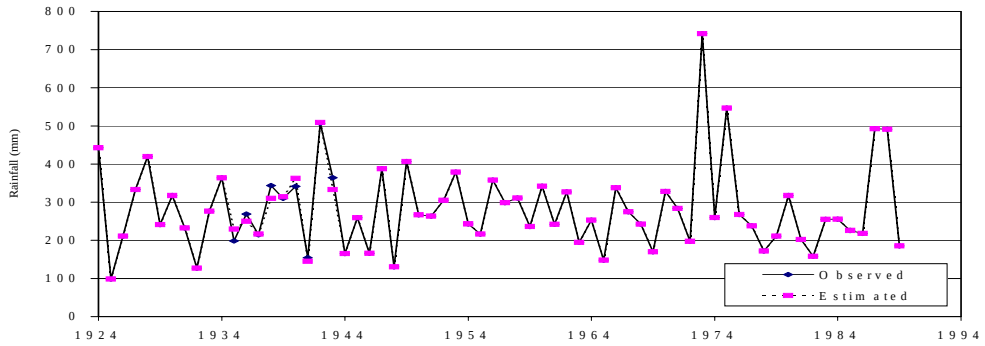



Figure C.2f Annual total rainfall at 0228170 (13.6 % missing from 1935) using EM with base gauge 0228495

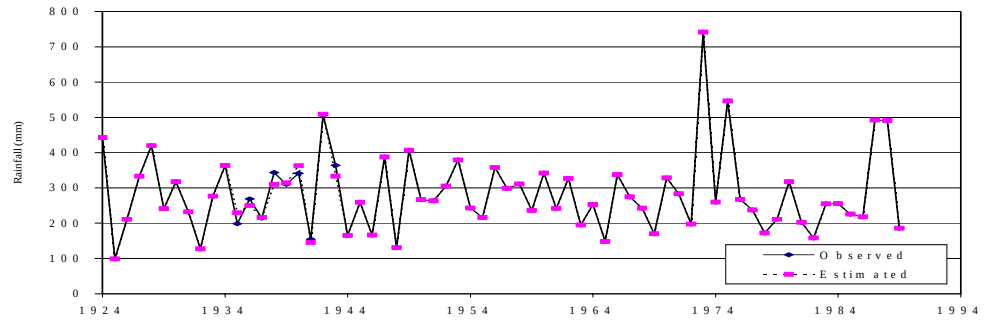



Figure C.2g Annual total rainfall at 0228170 (13.6 % missing from 1935) using MEM1-3 with base gauge 0228495

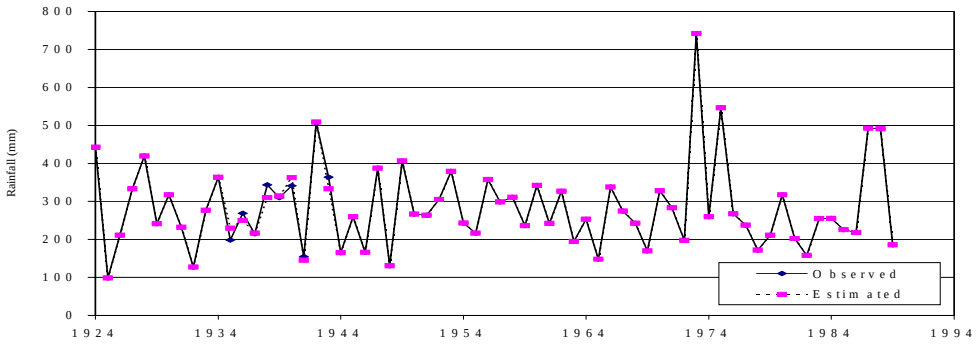



Figure C.2h Annual total rainfall at 0228170 (13.6 % missing from 1935) using MEM2 with base gauge 0228495

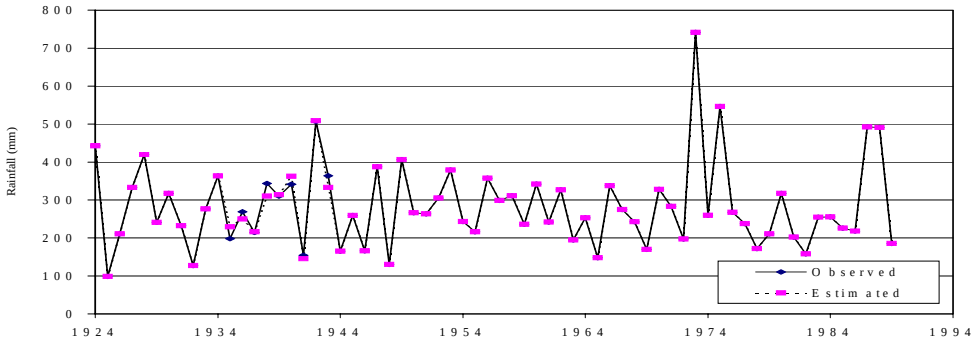



Figure C.2i Annual total rainfall at 0228170 (13.6 % missing from 1935) using ECM1-2 with base gauge

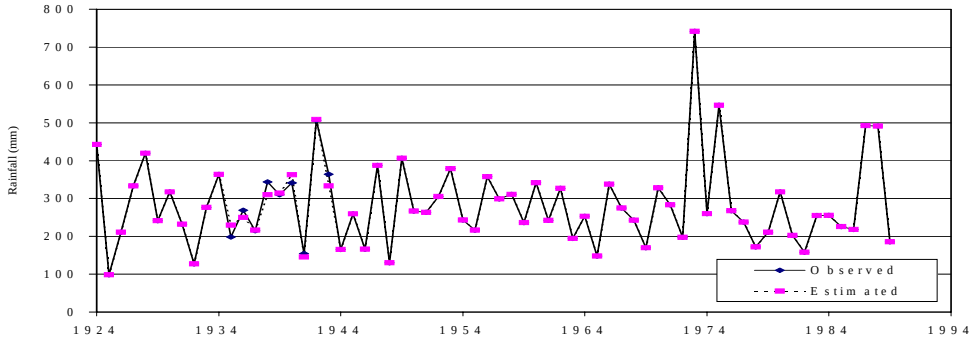



Figure C.2j Annual total rainfall at 0228170 (13.6 % missing from 1935) using ECME1-2-3 with base gauge 0228495

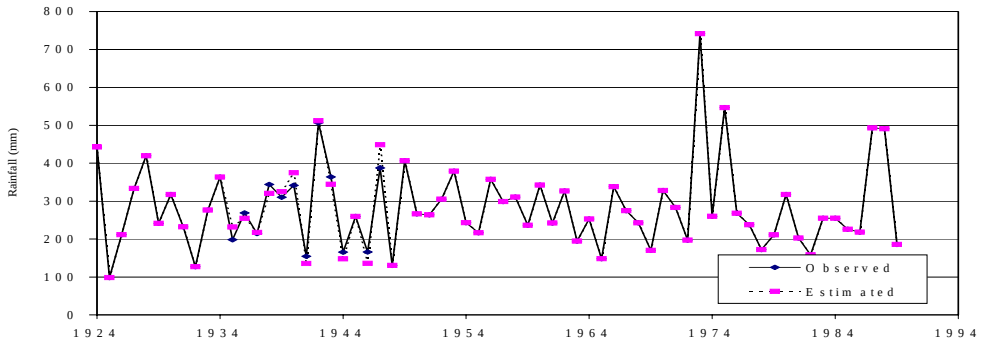



Figure C.3a Annual rainfall at 0228170 (19.7 % missing from 1935) using standard BP with base gauge 0228495

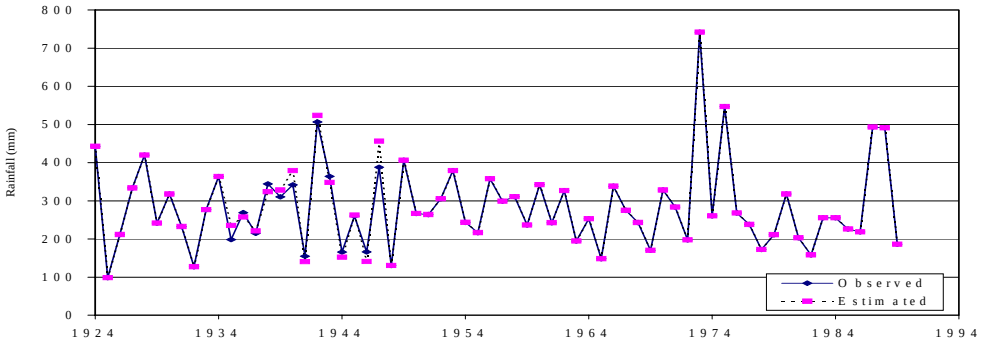



Figure C.3b Annual total rainfall at 0228170 (19.7 % missing from 1935) using McL1BP with base gauge 0228495

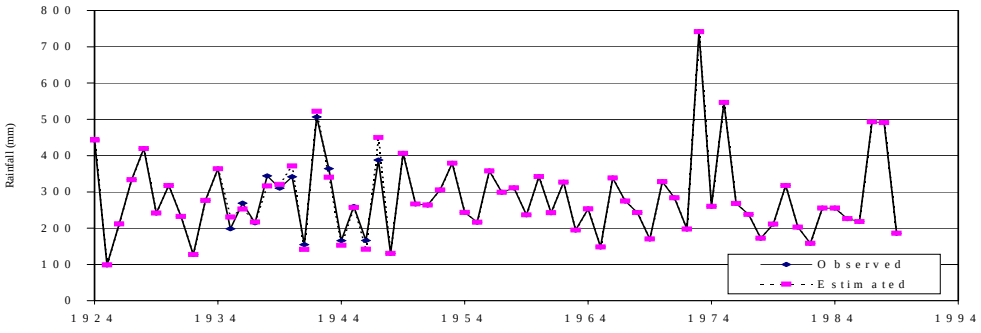



Figure C.3c Annual total rainfall at 0228170 (19.7 % missing from 1935) using GenerBP (s = 5) with base gauge 0228495

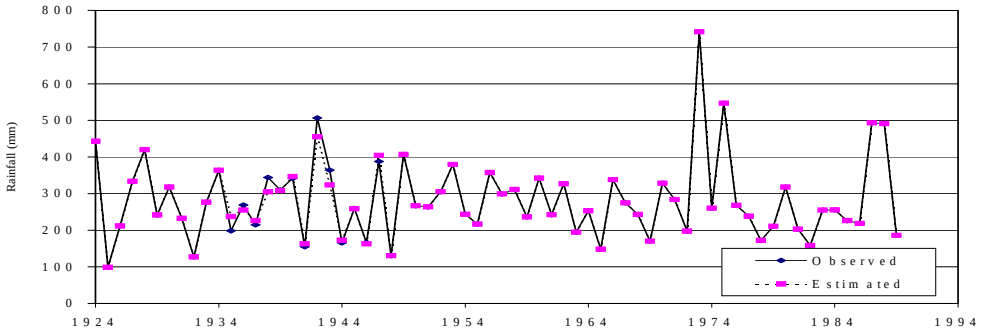



Figure C.3d Annual total rainfall at 0228170 (19.7 % missing from 1935) using QBP (acc = 0.15, lr = 0.85, Weight cond)

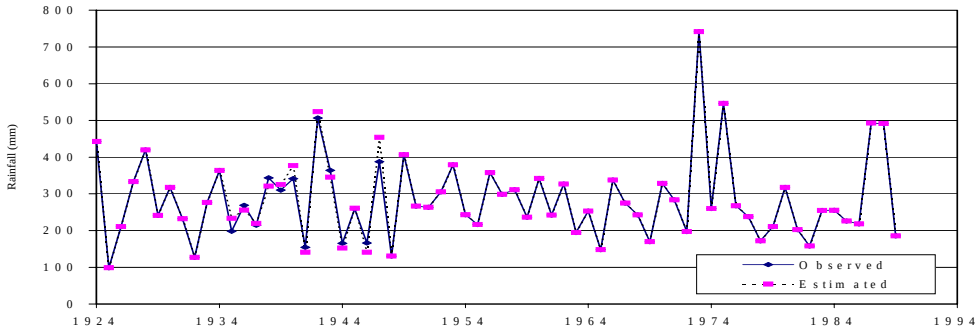



Figure C.3e Annual total rainfall at 0228170 (19.7 % missing from 1935) using GoldSBP with base gauge 0228495

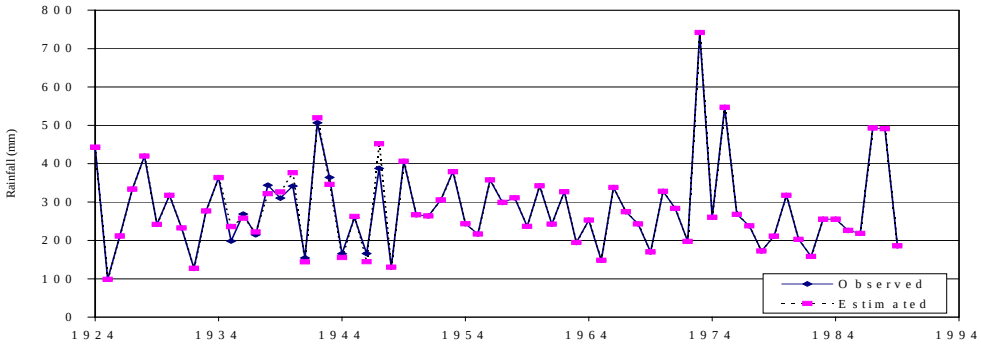



Figure C.3f Annual total rainfall at 0228170 (19.7 % missing from 1935) using VLRBP with base gauge 0228495

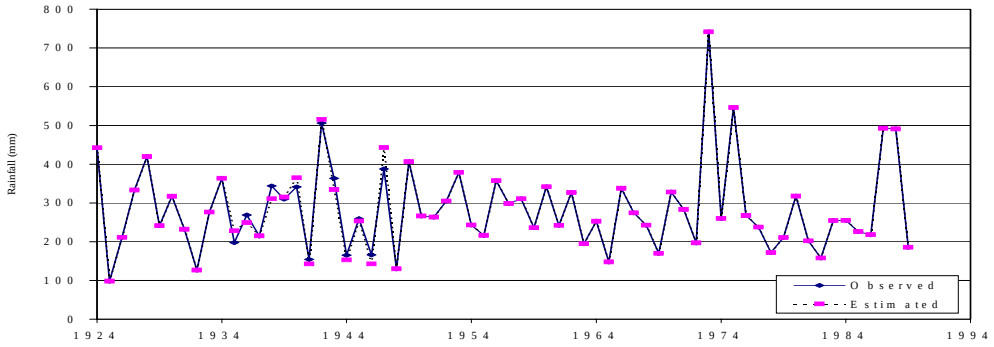



Figure C.3g Annual total rainfall at 0228170 (19.7 % missing from 1935) using standard EM with base gauge

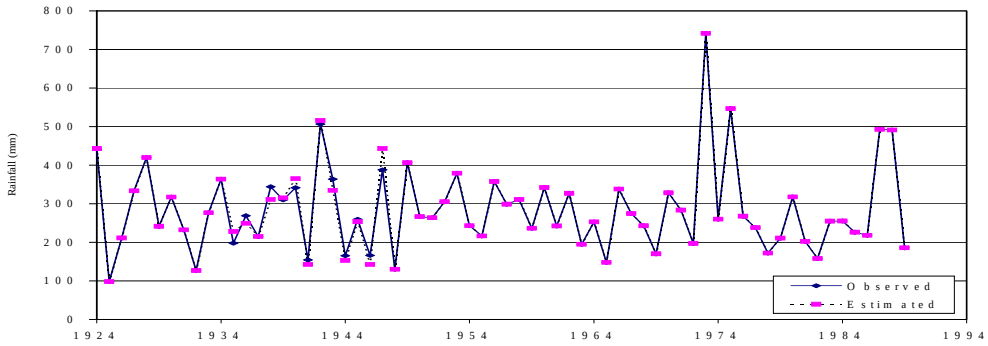



Figure C.3h Annual total rainfall at 0228170 (19.7 % missing from 1935) using ECM1-2 with base gauge 0228495

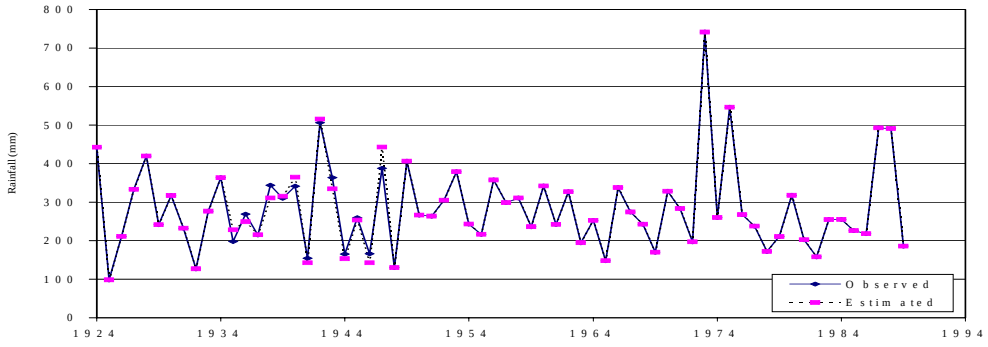



Figure C.3i Annual total rainfall at 0228170 (19.7 % missing from 1935) using MEM1 with base gauge 0228495

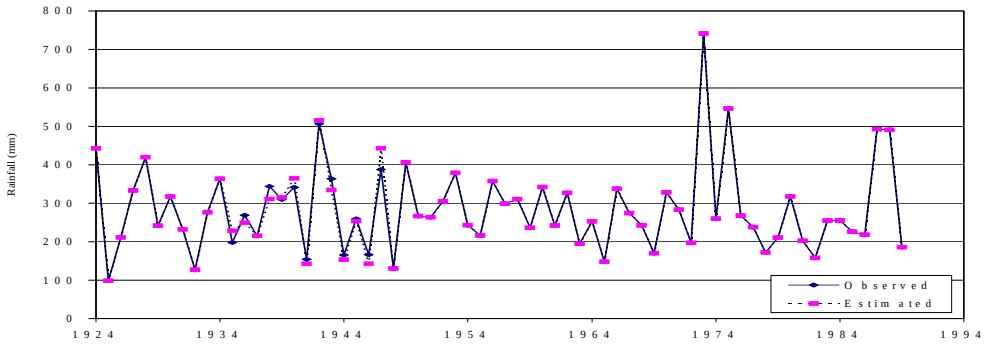



Figure C.3j Annual total rainfall at 0228170 (19.7 % missing from 1935) using MEM2-3 with base gauge 0228495

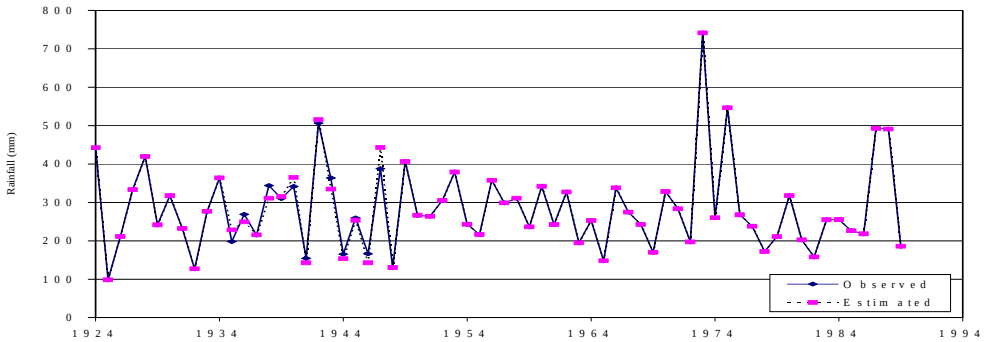



Figure C.3k Annual total rainfall at 0228170 (19.7 % missing from 1935) using ECME1-2-3 with base gauge 0228495

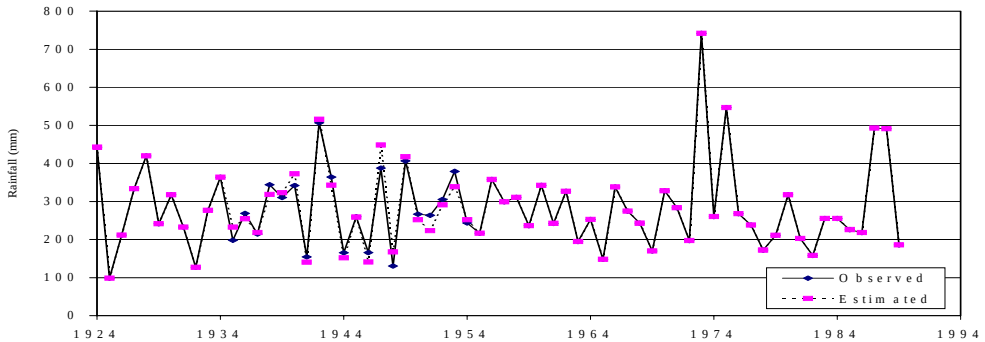



Figure C.4a Annual total rainfall at 0228170 (30.3 % missing from 1935) using standard BP with base gauge 0228495

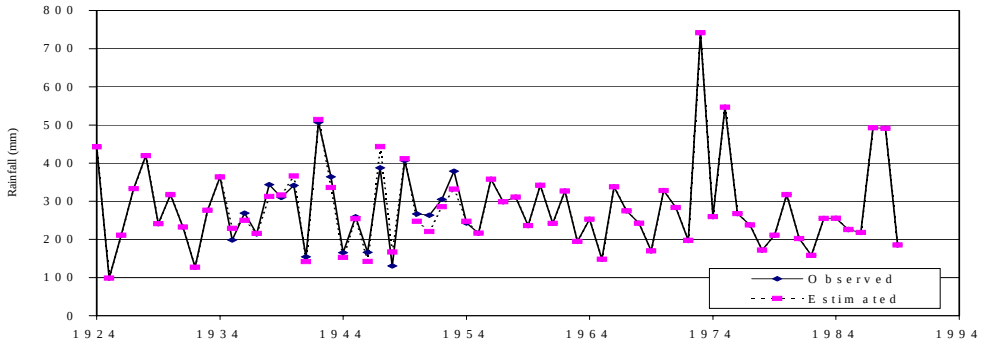



Figure C.4b Annual total rainfall at 0228170 (30.3 % missing from 1935) using GenerBP (s = 5, lr = 0.25) with base gauge 0228495

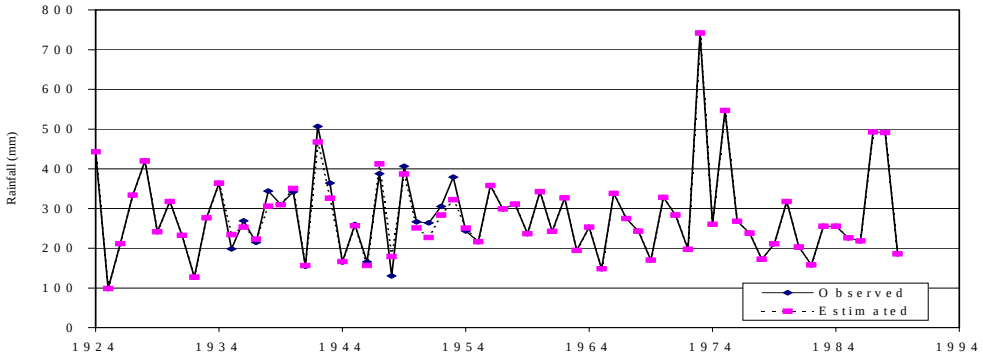



Figure C.4c Annual total rainfall at 0228170 (30.3 % missing from 1935) using QBP (acc = 0.015, lr = 0.25) with base gauge 0228495

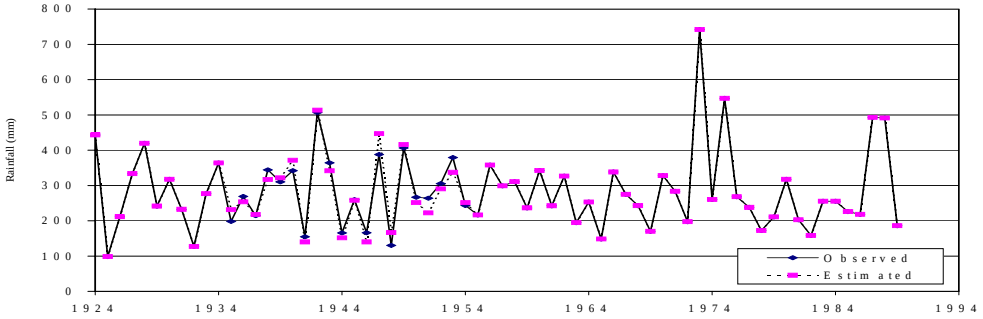



Figure C.4d Annual total rainfall at 0228170 (30.3 % missing from 1935) using GoldSBP with base gauge 0228495

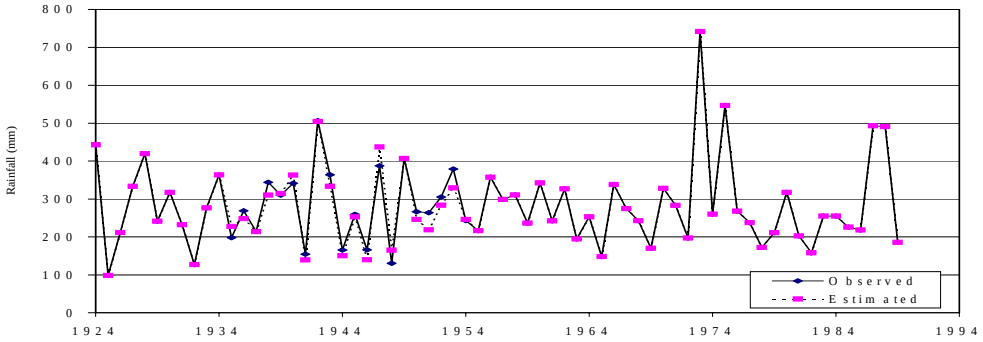



Figure C.4e Annual total rainfall at 0228170 (30.3 % missing from 1935) using VLRBP with base gauge 0228495

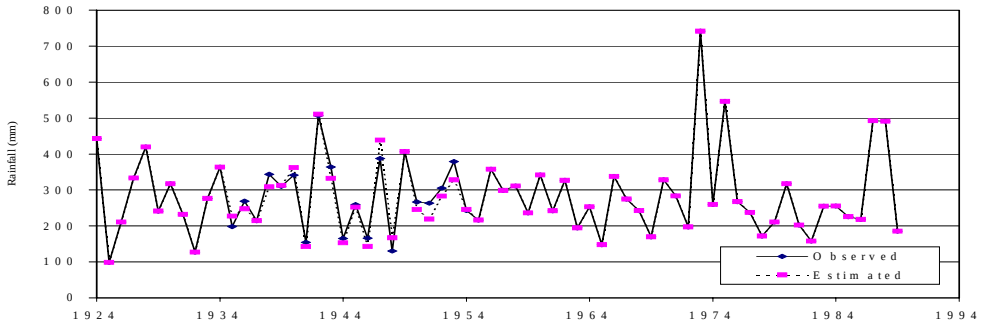



Figure C.4f Annual total rainfall at 0228170 (30.3 % missing from 1935) using standard EM with base gauge 0228495

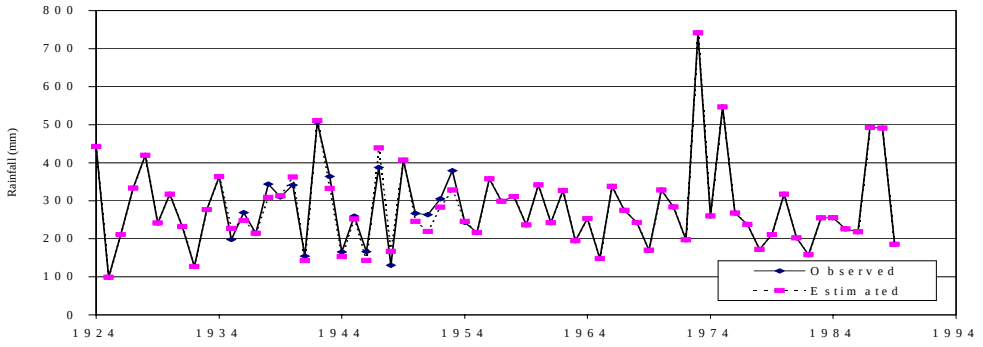



Figure C.4g Annual total rainfall at 0228170 (30.3 % missing from 1935) using ECM1-2 with base gauge 0228495

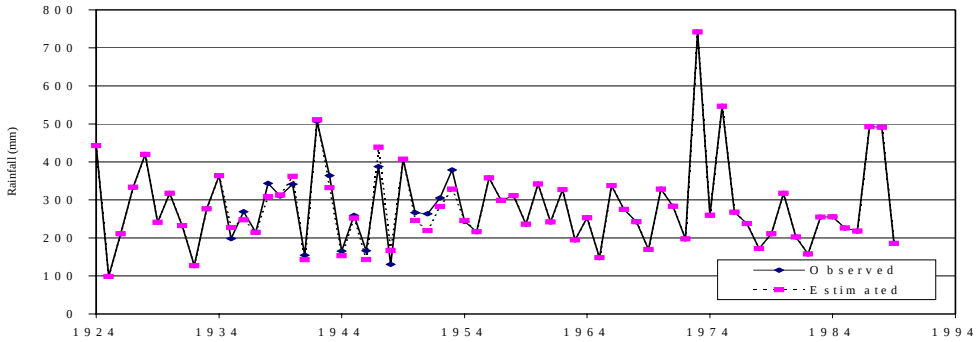



Figure C.4h Annual total rainfall at 0228170 (30.3 % missing from 1935) using ECME1-2-3 with base gauge 0228495

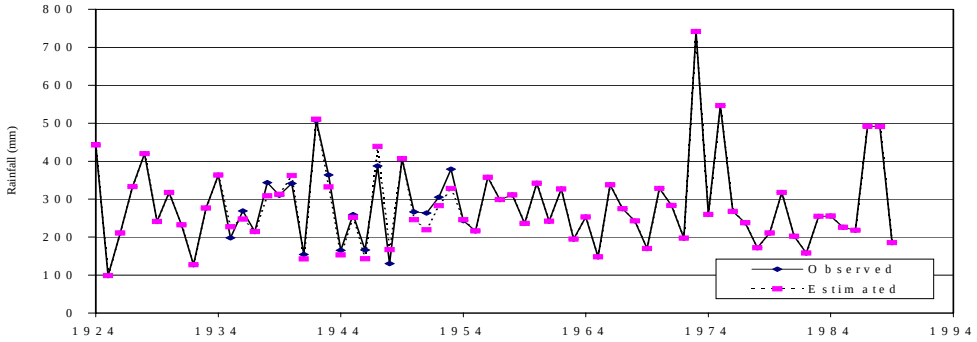



Figure C.4i Annual total rainfall at 0228170 (30.3 % missing from 1935) using MEM1 with base gauge 0228495

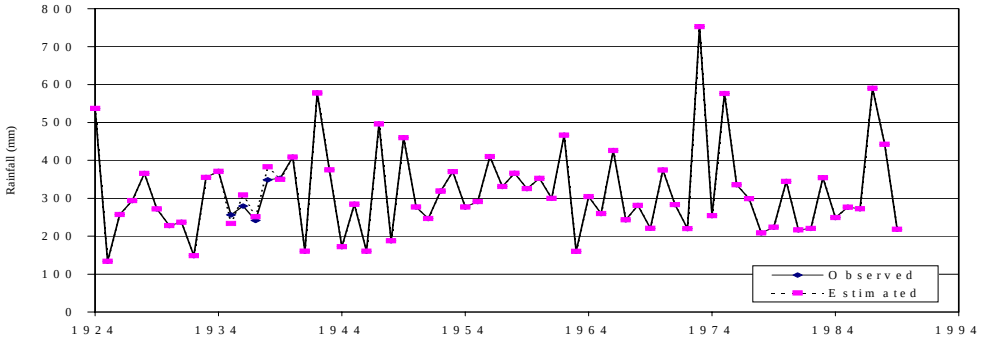



Figure C.5a Annual total rainfall at 0228495 (7.6 % missing from 1935) using standard BP with base gauge 0228170

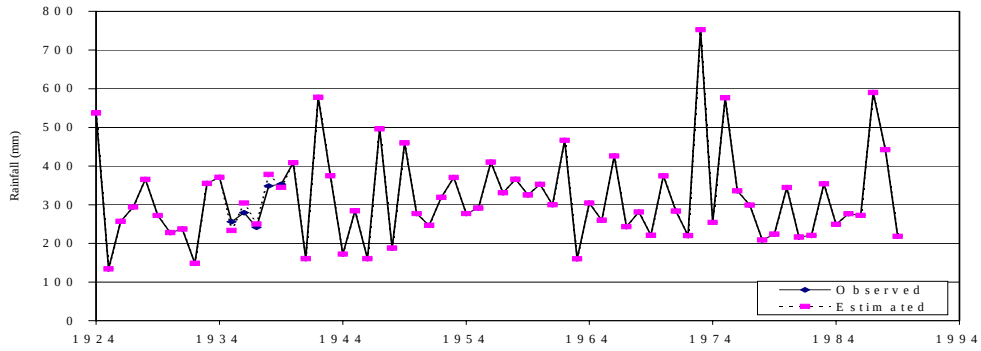



Figure C.5b Annual rainfall at 0228495 (7.6 % missing from 1935) using GenerBP with base gauge 0228170.

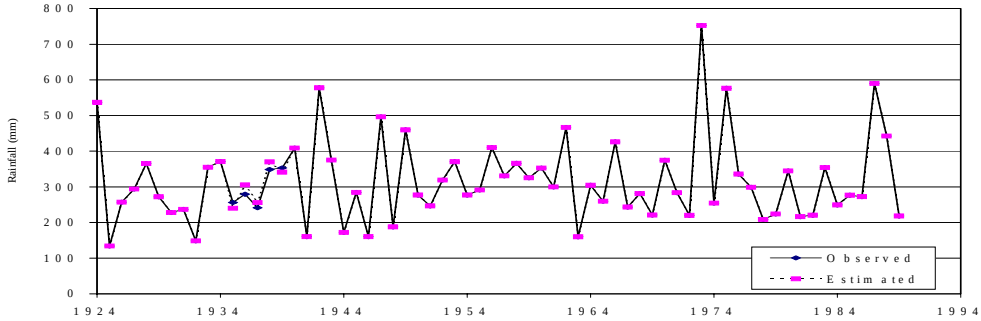



Figure C.5c Annual total rainfall at 0228495 (7.6 % missing from 1935) using QBP with base gauge 0228170

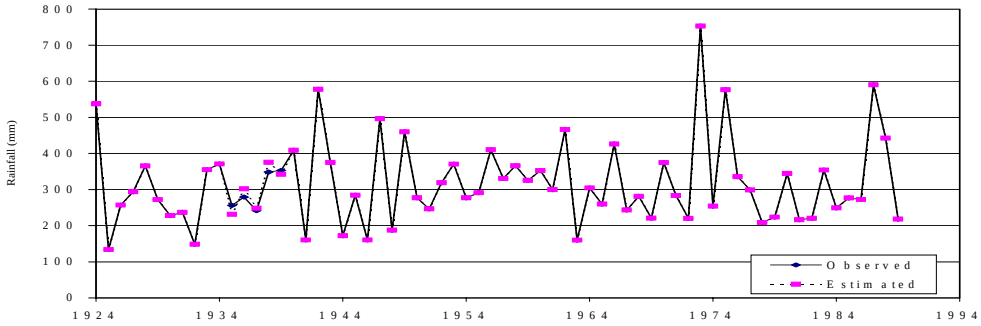



Figure C.5d Annual total rainfall at 0228495 (7.6 % missing from 1935) using GoldSBP with base gauge 0228170

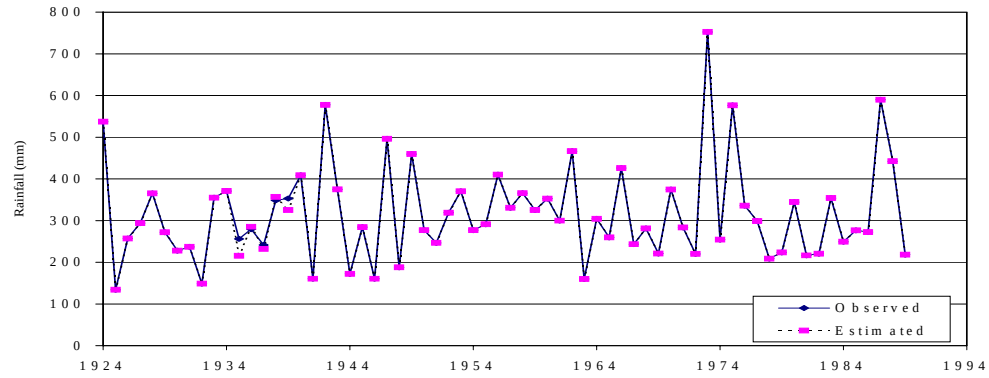



Figure C.5e Annual total rainfall at 0228495 (7.6 % missing from 1935) using VLRBP with base gauge 0228170

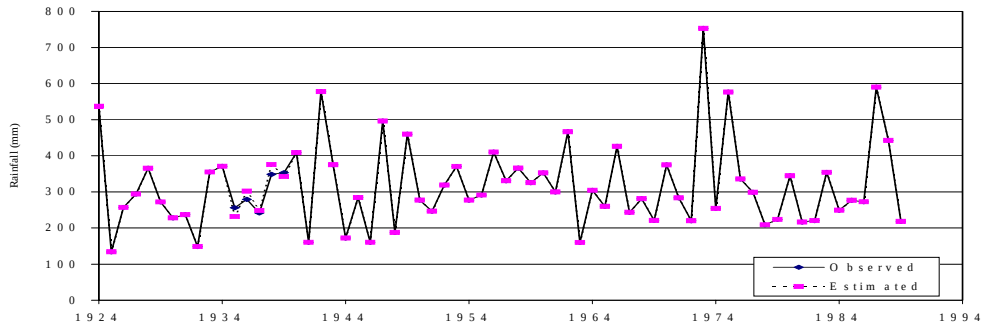



Figure C.5f Annual total rainfall at 0228495 (7.6 % missing from 1935) using Standard EM with base gauge 0228170

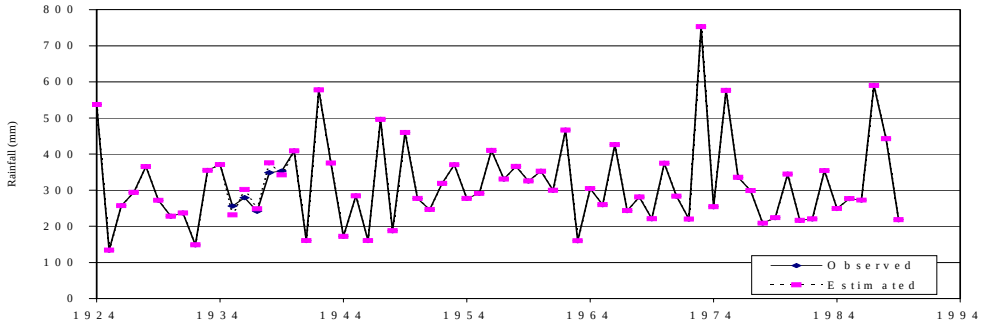



Figure C.5g Annual total rainfall at 0228495 (7.6 % missing from 1935) using ECM1-2 with base gauge 0228170

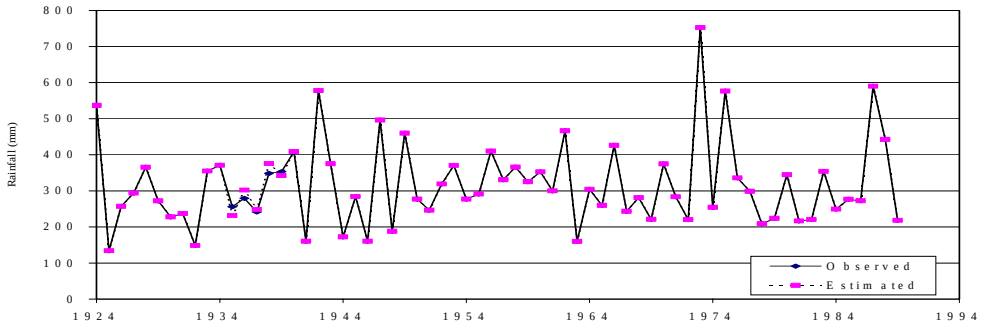



Figure C.5h Annual total rainfall at 0228495 (7.6 % missing from 1935) using MEM1 with base gauge 0228170

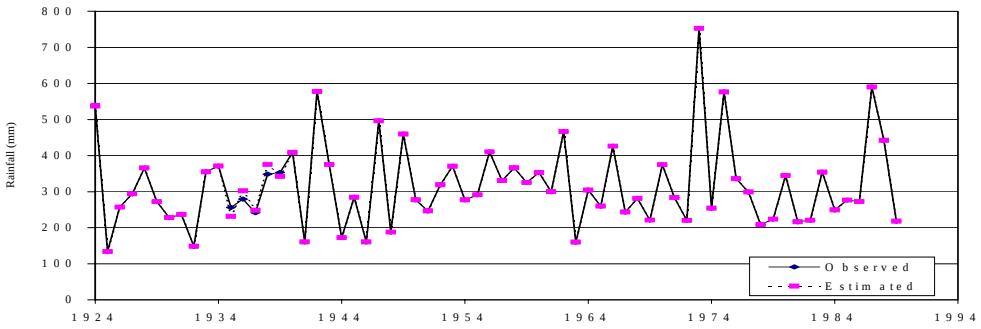



Figure C.5i Annual total rainfall at 0228495 (7.6 % missing from 1935) using MEM2-3 with base gauge 0228

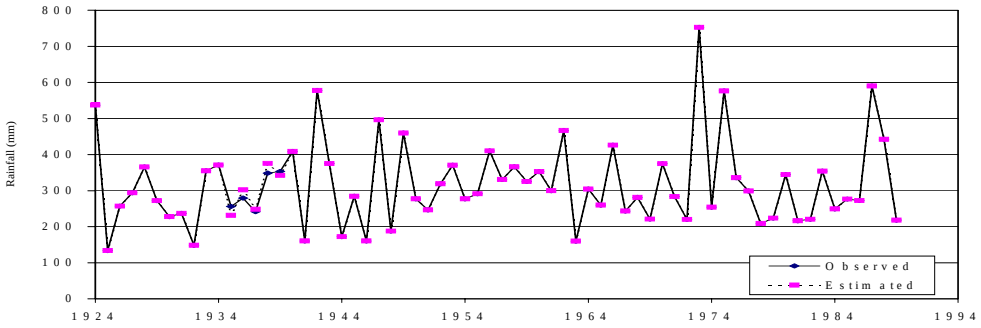



Figure C.5j Annual total rainfall at 0228495 (7.6 % missing from 1935) using ECME1-2-3 with base gauge 0228170

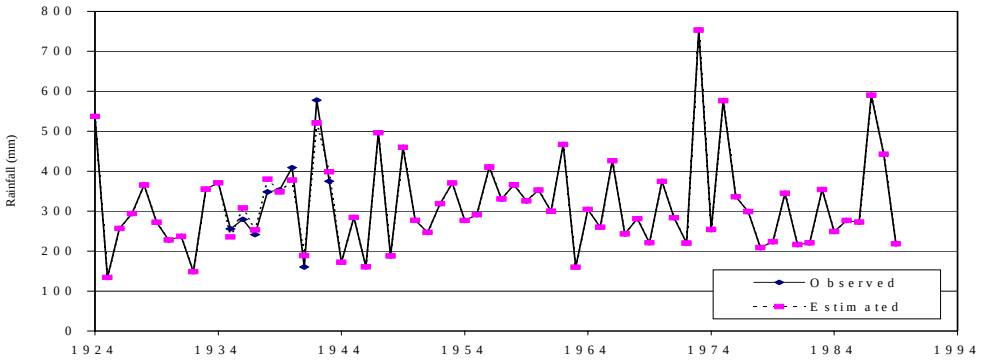



Figure C.6a Annual total rainfall at 0228495 (13.6 % missing from 1935) using standard BP with base gauge 0228170

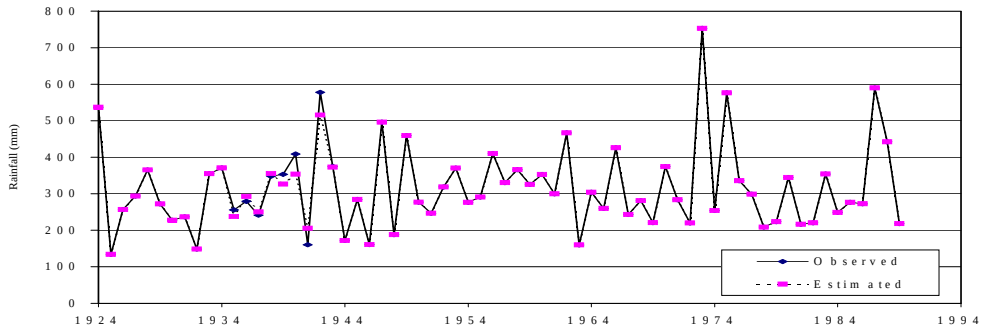



Figure C.6b Annual total rainfall at 0228495 (13.6 % missing from 1935) using McL1BP with base gauge 0228170

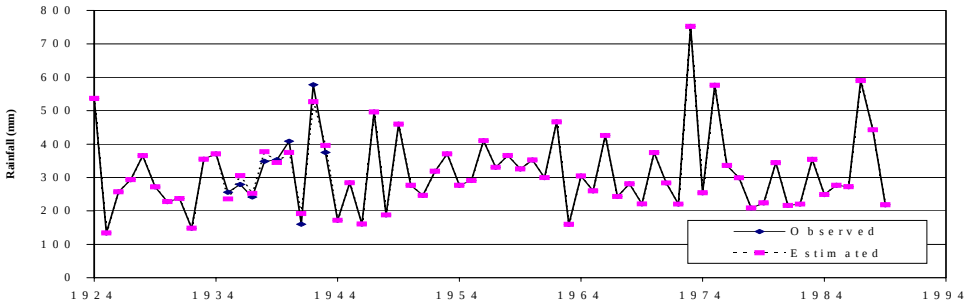



Figure C.6c Annual total rainfall at 0228495 (13.6 % missing from 1935) using GenerBP with base gauge 0228170

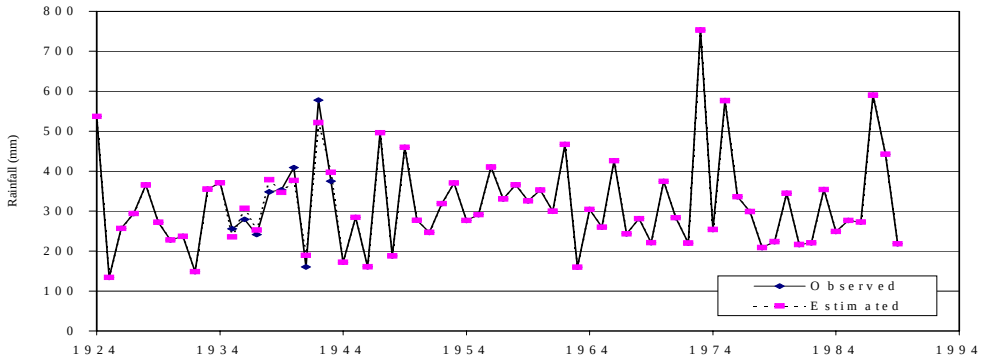



Figure C.6d Annual total rainfall at 0228495 (13.6 % missing from 1935) using GoldSBP with base 0228170

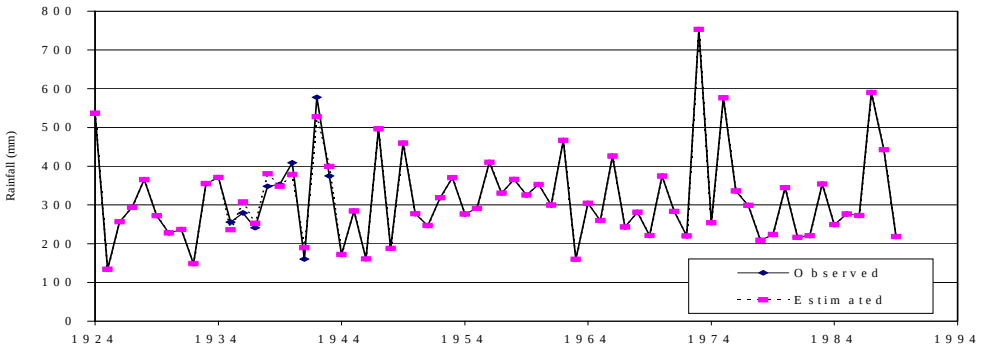



Figure C.6e Annual total rainfall at 0228495 (13.6 % missing from 1935) using VLR BP with base gauge 0228170

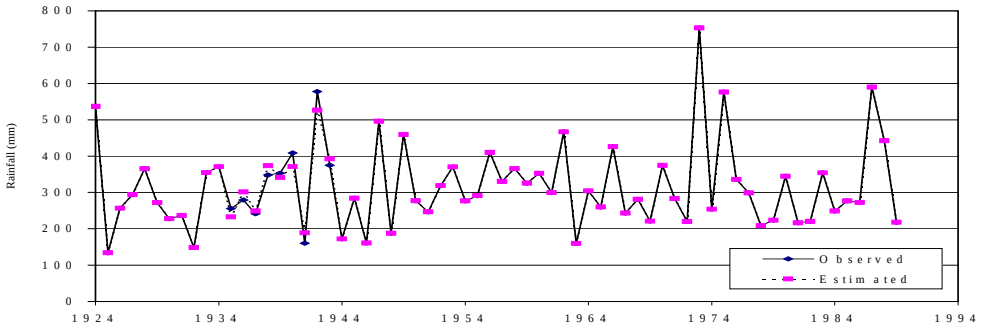



Figure C.6f Annual total rainfall at 0228495 (13.6 % missing from 1935) using standard EM with base gauge 0228170

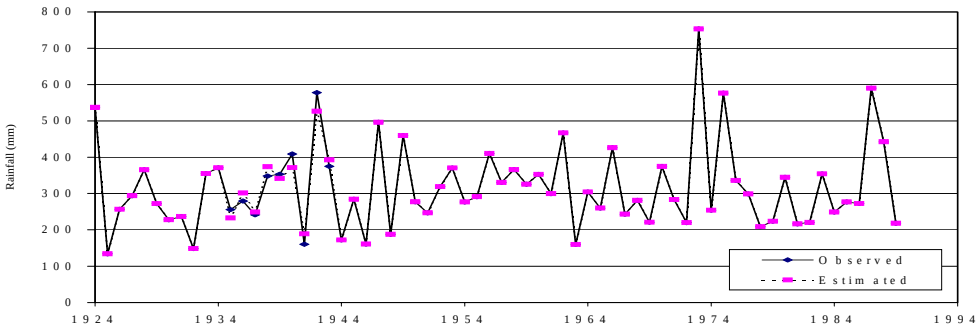



Figure C.6g Annual total rainfall at 0228495 (13.6 % missing from 1935) using MEM1-2 with base gauge 0228170

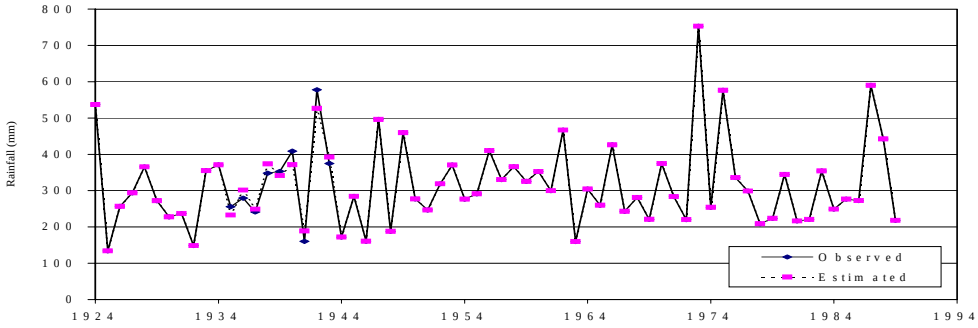



Figure C.6h Annual total rainfall at 0228495 (13.6 % missing from 1935) using MEM3 with base gauge 0228170

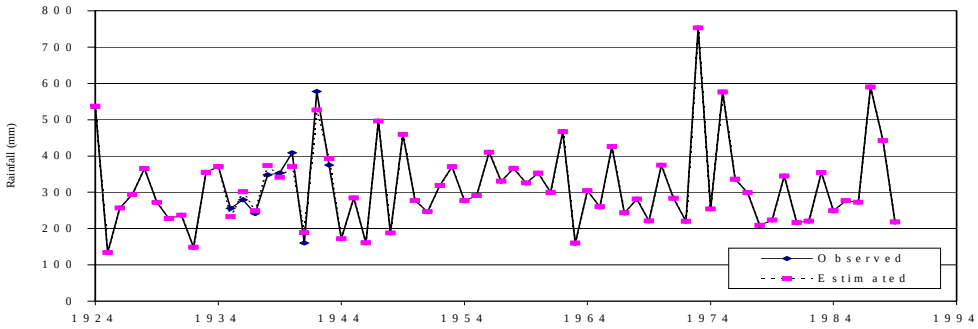



Figure C.6i Annual total rainfall at 0228495 (13.6 % missing from 1935) using ECM1-2 with base gauge 0228170

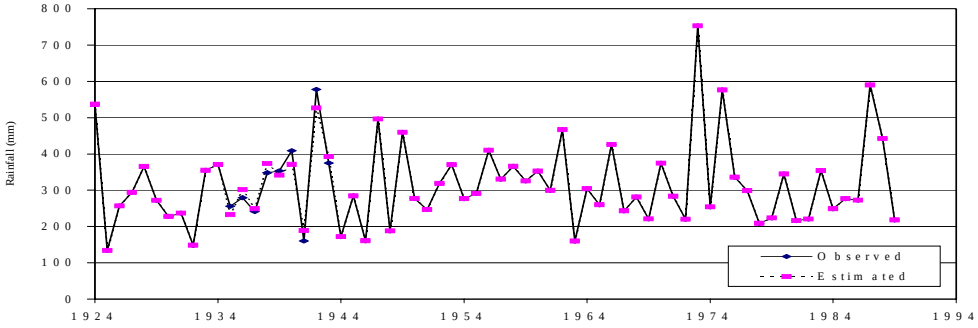



Figure C.6j Annual rainfall at 0228495 (13.6 % missing from 1935) using ECME1-2-3 with base gauge 0228170

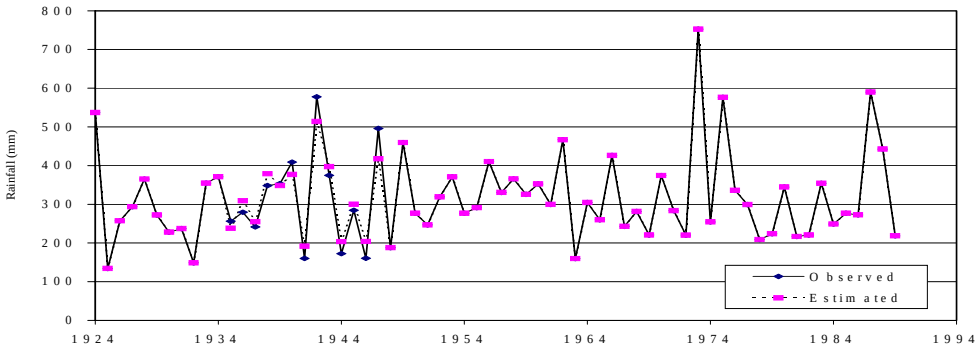



Figure C.7a Annual total rainfall at 0228495 (19.7 % missing from 1935) using standard BP with base gauge 0228170

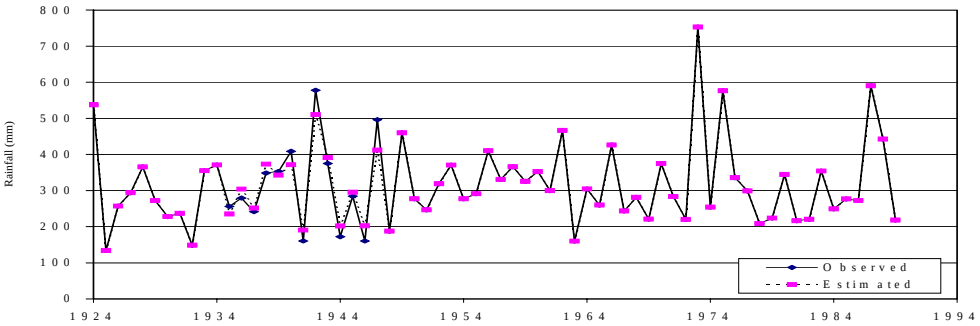



Figure C.7b Annual total rainfall at 0228495 (19.7 % missing from 1935) using McL1BP with base gauge 0228495

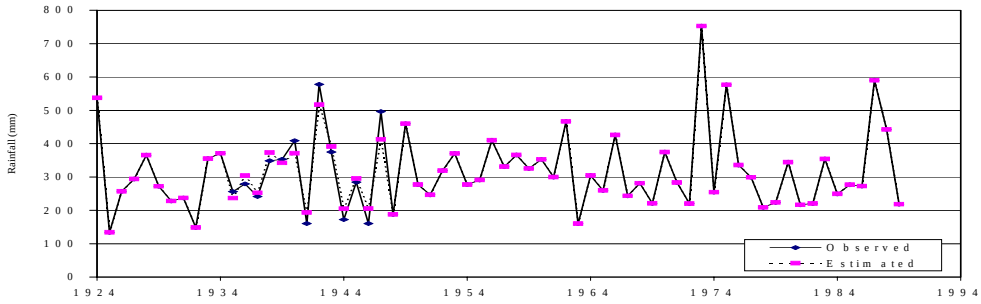



Figure C.7c Annual total rainfall at 0228495 (19.7 % missing from 1935) using GenerBP (s = 5) with base gauge 0228170

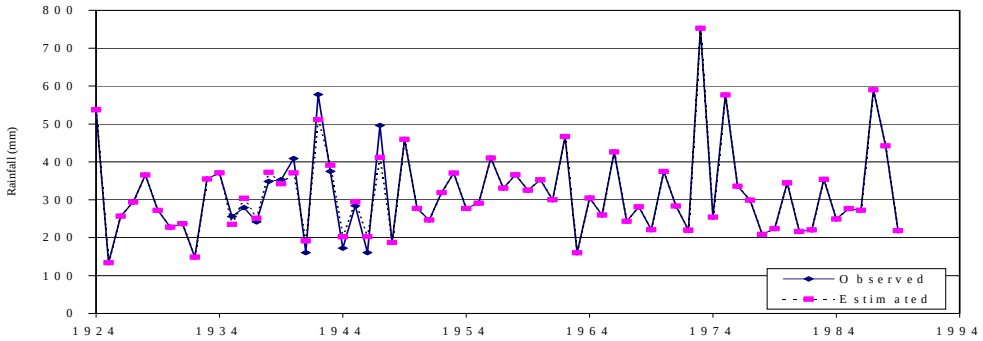



Figure C.7d Annual total rainfall at 0228495 (19.7 % missing from 1935) using GoldSBP with base gauge 0228170

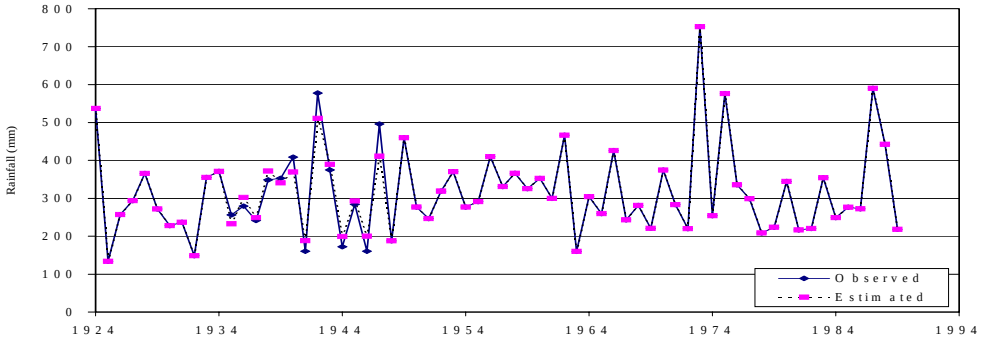



Figure C.7e Annual total rainfall at 0228495 (19.7 % missing from 1935) using VLRBP with base gauge 0228170

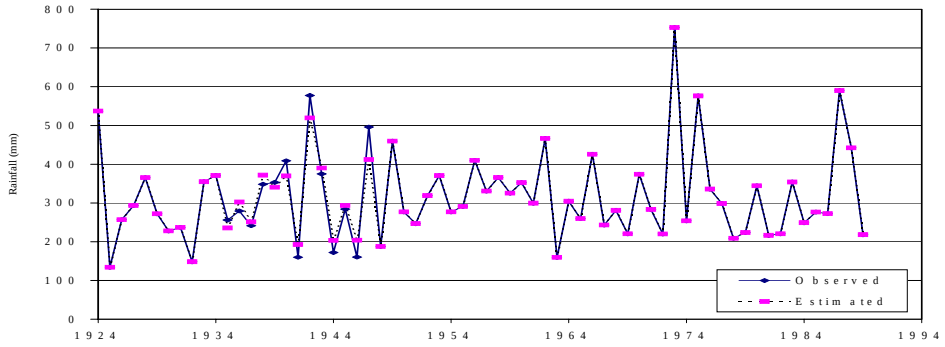



Figure C.7f Annual total rainfall at 0228495 (19.7 % missing from 1935) using standard EM with base gauge 0228170

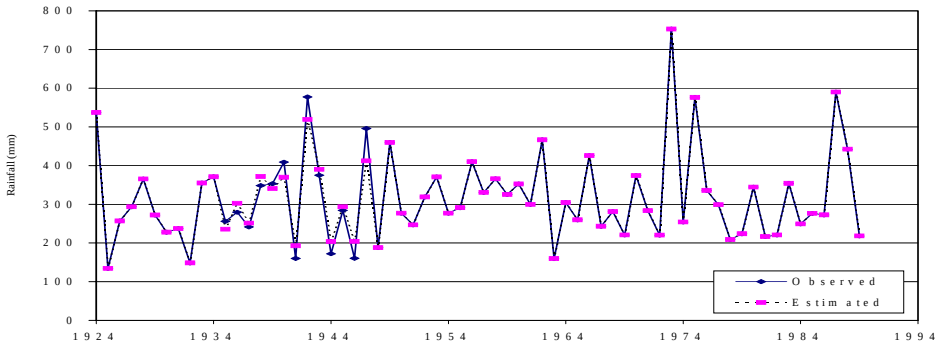



Figure C.7g Annual total rainfall at 0228495 (19.7 % missing from 1935) using ECM1-2 with base gauge 0228170

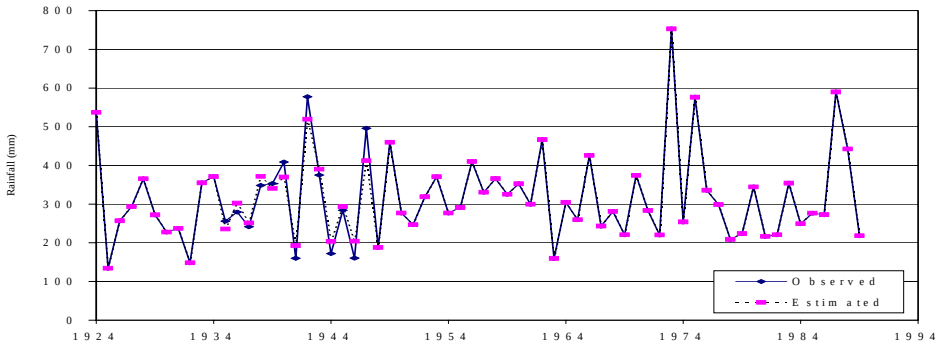



Figure C.7h Annual total rainfall at 0228495 (19.7 % missing from 1935) using MEM2 with base gauge 0228170

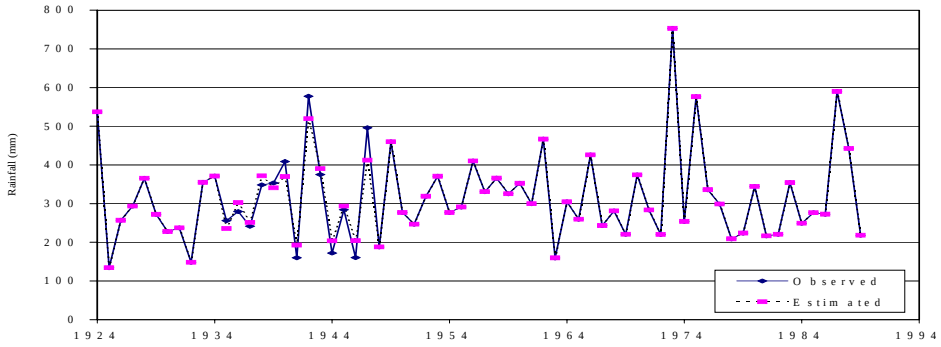



Figure C.7i Annual total rainfall at 0228495 (19.7 % missing from 1935) using MEM1-3 with base gauge 0228170

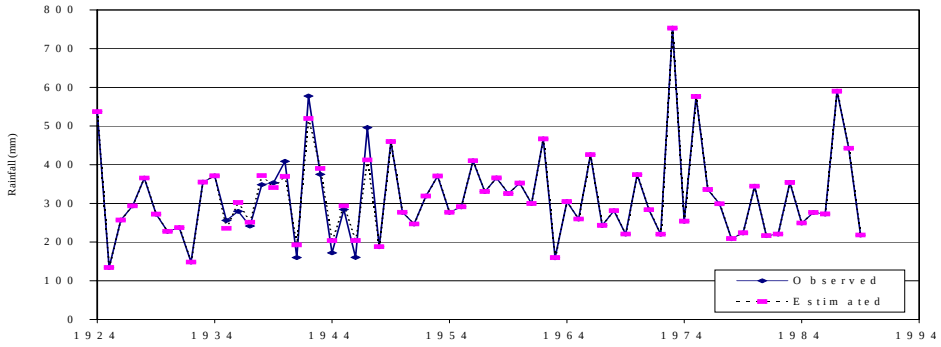



Figure C.7j Annual total rainfall at 0228495 (19.7 % missing from 1935) using ECME1-2-3 with base gauge 0228170

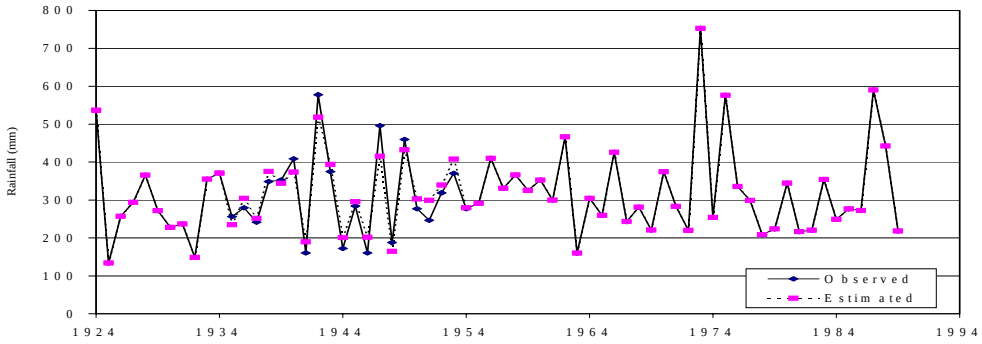



Figure C.8a Annual total rainfall at 0228495 (30.3 % missing from 1935) using VLR with base gauge 0228170

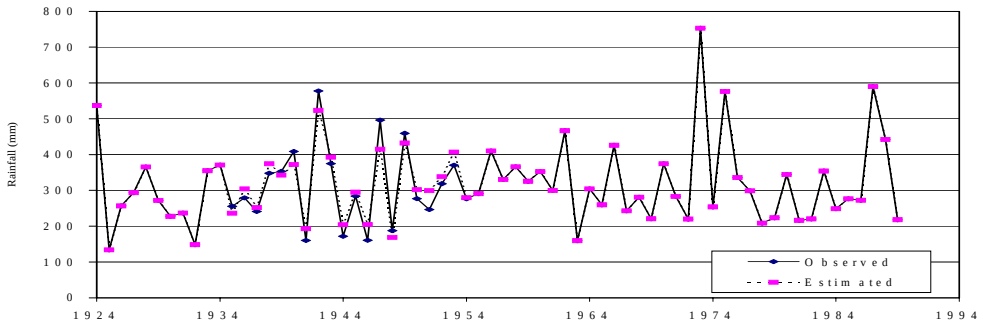



Figure C.8b Annual total rainfall at 0228495 (30.3 % missing from 1935) using standard EM with base gauge 0228170

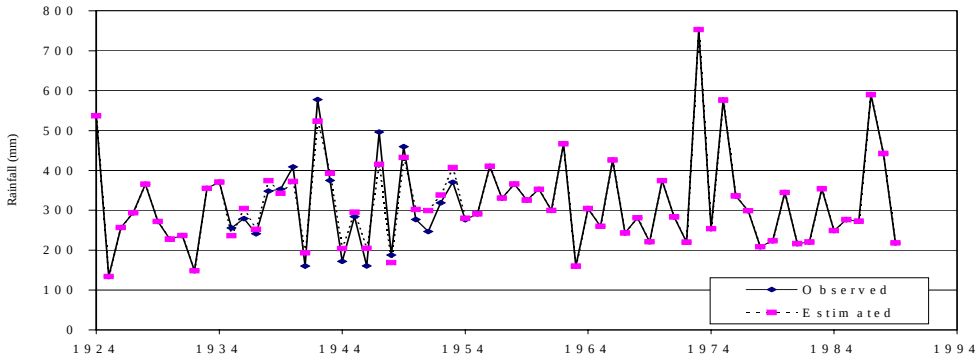



Figure C.8c Annual total rainfall at 0228495 (30.3 % missing from 1935) using ECM1-2 with based gauge 0228170

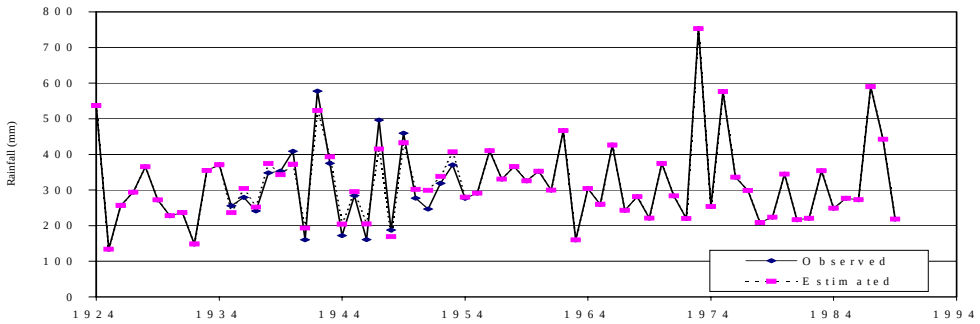



Figure C.8d Annual total rainfall at 0228495 (30.3 % missing from 1935) using ECME1-2-3 with based gauge 0228170

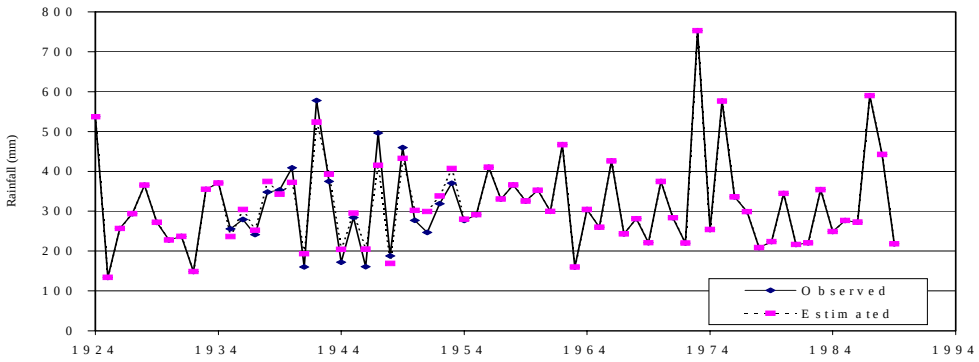
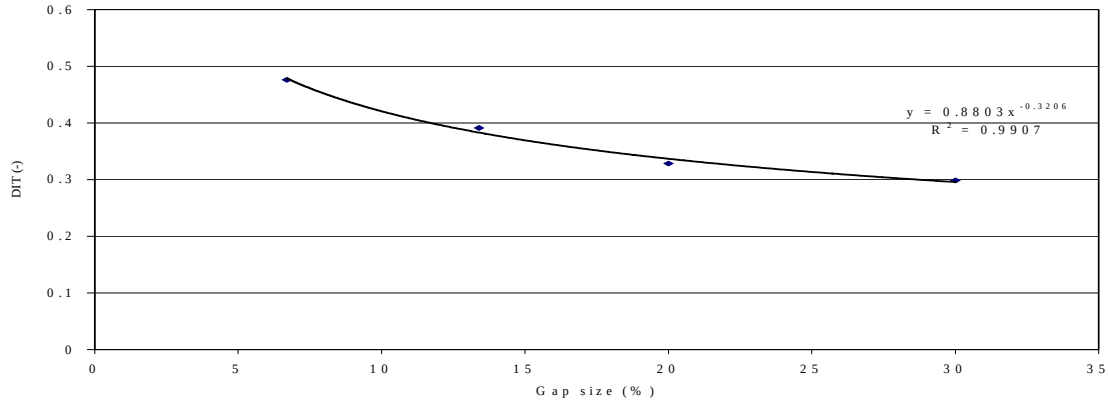
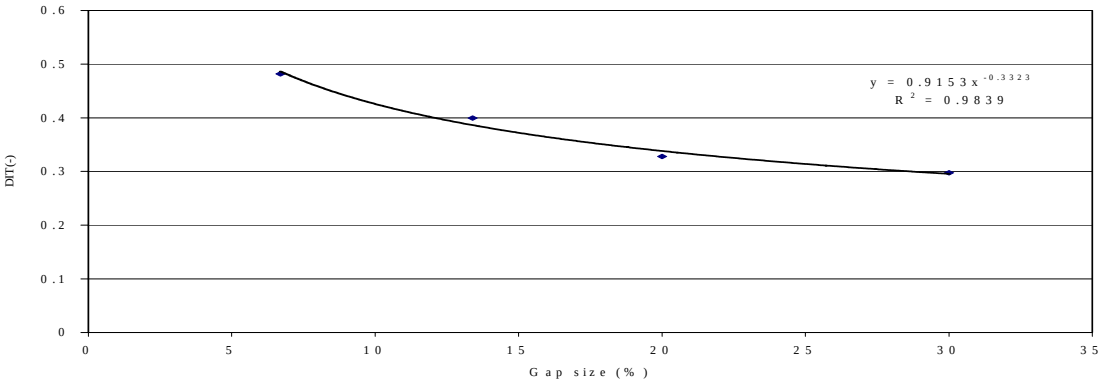


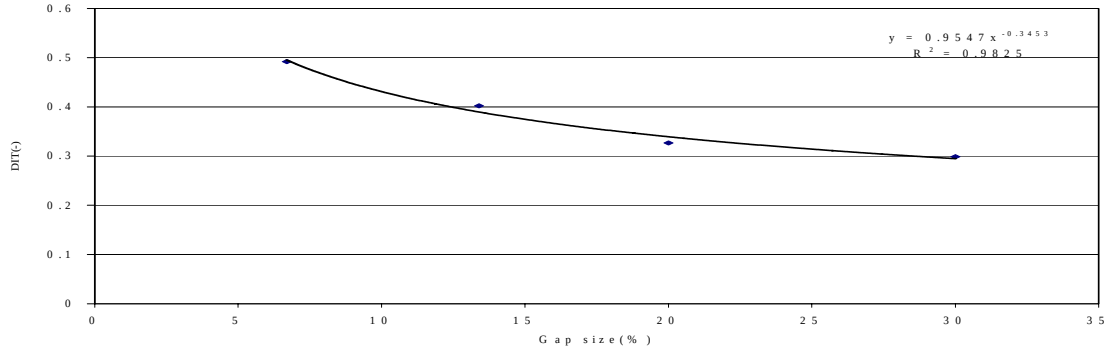

Figure C.8e Annual total rainfall at 0228495 (30.3 % missing from 1935) using MEM1 with based gauge 0228170




(a)

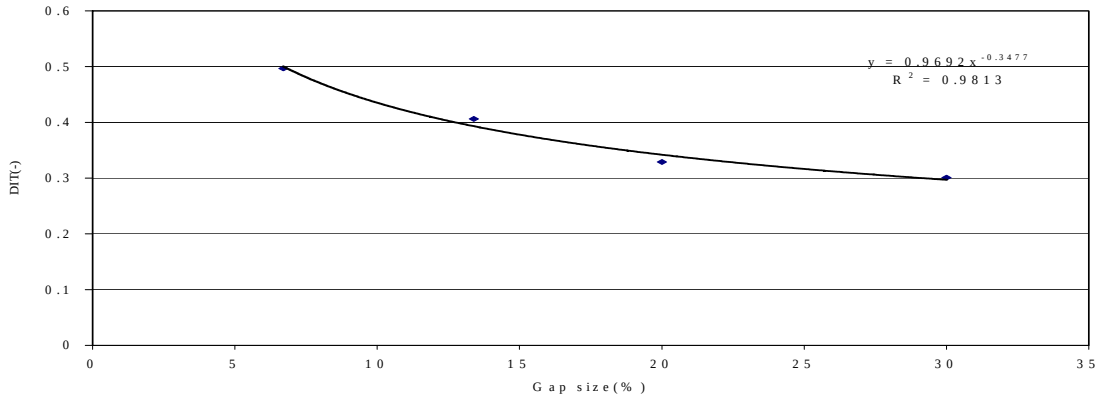



(b)



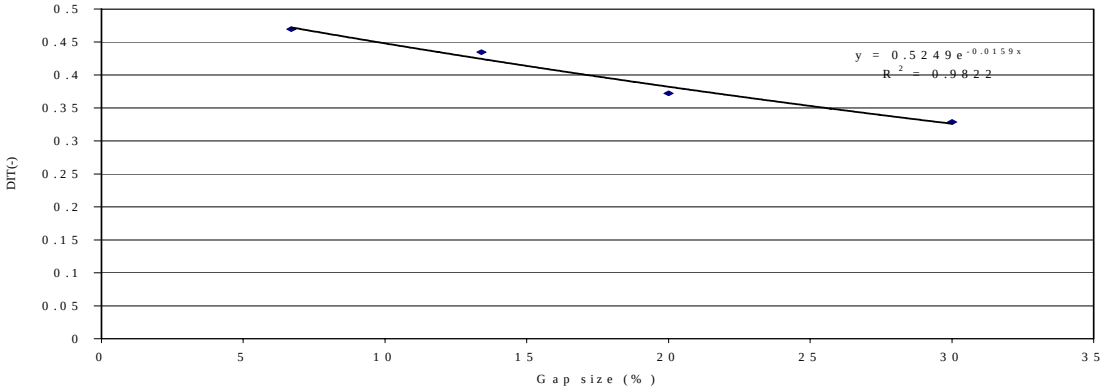

(c)

Figures C.9 (a-c) DIT versus gap size for annual total rainfall at 0228495 (base station 0228170): (a ) BP, (b) GoldSBP, (c) GenerBP

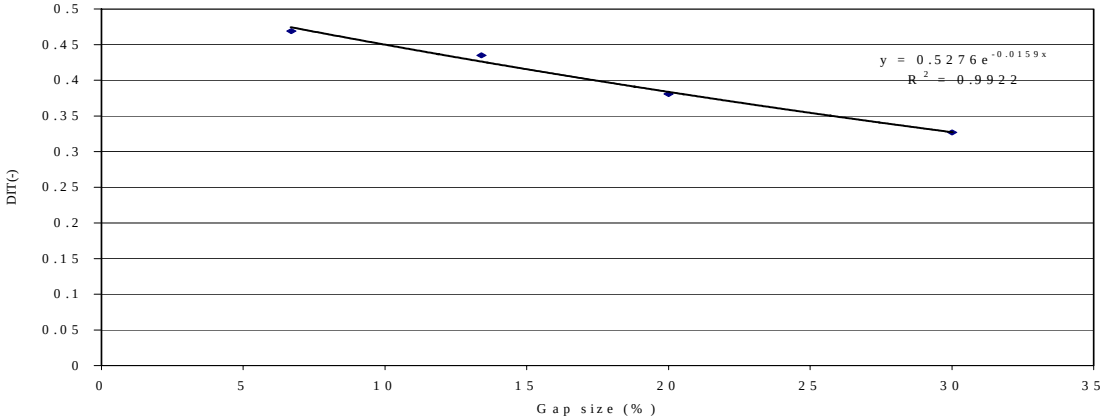



(d)

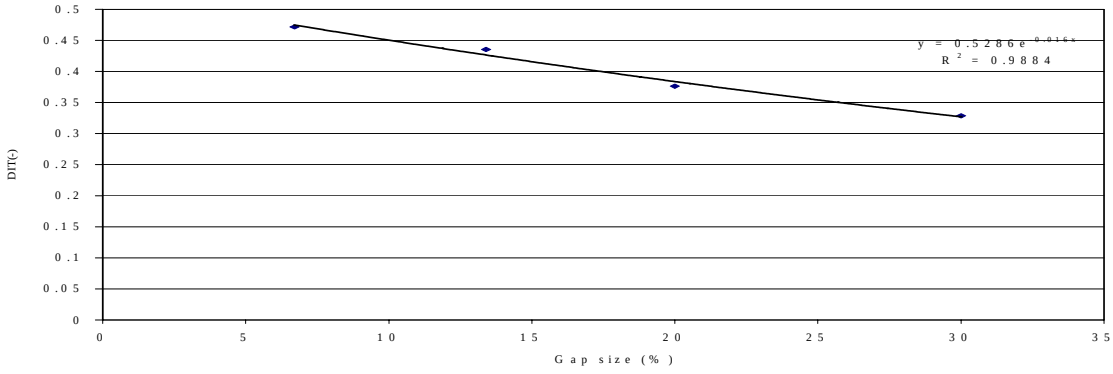
Figure C.9d DIT versus gap size for annual total rainfall at 0228495 (base station 0228170): (b ) Standard EM




(a)




(b)




(c)

Figures C.10 (a-c) DIT versus gap size for annual total rainfall at 0228170 (base station 0228495): (a ) BP, (b) GoldSBP, (c) GenerBP

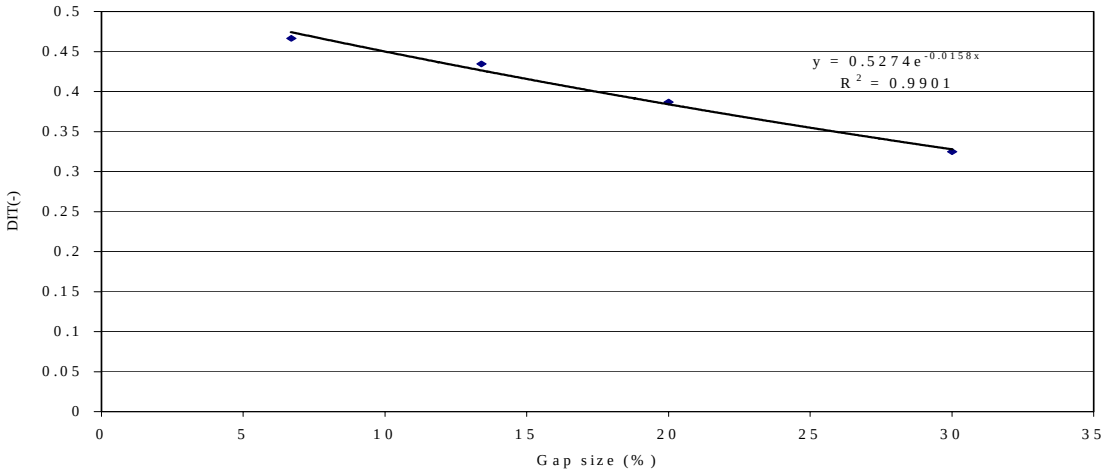



Figure C.10d DIT versus gap size for annual total rainfall at 0228170 (base station 0228495): (d ) standard EM