



# Statistiques des précipitations extrêmes des communes belges

Baelen (INS 63004)

1. Niveau de retour estimé pour une durée de précipitations de 10 minutes à 30 jours (lignes) et une période de retour de 2 à 200 années (colonnes). Unités : mm.

| Durée  | Période de retour (années) |       |       |       |       |       |       |       |       |       |       |       |
|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|        | 2                          | 5     | 10    | 15    | 20    | 25    | 30    | 40    | 50    | 75    | 100   | 200   |
| 10 min | 8.3                        | 11.9  | 14.6  | 16.2  | 17.4  | 18.4  | 19.2  | 20.5  | 21.5  | 23.5  | 25.0  | 28.8  |
| 20 min | 12.5                       | 18.2  | 22.5  | 25.1  | 27.0  | 28.5  | 29.8  | 31.8  | 33.5  | 36.6  | 38.9  | 44.8  |
| 30 min | 14.7                       | 21.3  | 26.2  | 29.2  | 31.4  | 33.2  | 34.7  | 37.1  | 39.0  | 42.6  | 45.2  | 52.1  |
| 1 h    | 18.2                       | 26.2  | 32.1  | 35.7  | 38.3  | 40.4  | 42.1  | 45.0  | 47.2  | 51.5  | 54.6  | 62.7  |
| 2 h    | 22.2                       | 31.2  | 37.9  | 41.9  | 44.9  | 47.3  | 49.2  | 52.4  | 55.0  | 59.7  | 63.3  | 72.3  |
| 3 h    | 24.7                       | 34.0  | 40.9  | 45.1  | 48.2  | 50.6  | 52.6  | 55.9  | 58.5  | 63.5  | 67.1  | 76.4  |
| 6 h    | 30.0                       | 38.7  | 45.2  | 49.1  | 51.9  | 54.2  | 56.0  | 59.1  | 61.5  | 66.1  | 69.4  | 78.0  |
| 12 h   | 37.4                       | 47.6  | 55.2  | 59.7  | 63.0  | 65.6  | 67.8  | 71.4  | 74.2  | 79.5  | 83.3  | 93.2  |
| 1 j    | 46.7                       | 58.6  | 67.2  | 72.2  | 75.9  | 78.8  | 81.2  | 85.1  | 88.1  | 93.8  | 98.0  | 108.4 |
| 2 j    | 62.0                       | 77.4  | 88.2  | 94.6  | 99.1  | 102.7 | 105.6 | 110.3 | 114.0 | 120.8 | 125.7 | 137.9 |
| 3 j    | 67.9                       | 85.0  | 96.9  | 103.8 | 108.7 | 112.5 | 115.6 | 120.6 | 124.5 | 131.7 | 136.9 | 149.6 |
| 4 j    | 74.8                       | 93.4  | 106.1 | 113.4 | 118.7 | 122.7 | 126.0 | 131.3 | 135.4 | 142.9 | 148.3 | 161.5 |
| 5 j    | 85.2                       | 106.0 | 120.1 | 128.2 | 133.9 | 138.4 | 142.0 | 147.8 | 152.3 | 160.5 | 166.4 | 180.7 |
| 7 j    | 99.7                       | 122.3 | 137.4 | 146.1 | 152.1 | 156.8 | 160.7 | 166.7 | 171.5 | 180.0 | 186.1 | 200.9 |
| 10 j   | 120.4                      | 148.0 | 166.3 | 176.7 | 183.9 | 189.5 | 194.1 | 201.3 | 206.8 | 216.9 | 224.0 | 241.2 |
| 15 j   | 146.5                      | 178.3 | 199.2 | 210.9 | 219.0 | 225.3 | 230.3 | 238.3 | 244.4 | 255.5 | 263.3 | 281.9 |
| 20 j   | 170.8                      | 208.4 | 232.9 | 246.4 | 255.9 | 263.1 | 269.0 | 278.1 | 285.2 | 297.8 | 306.7 | 327.8 |
| 25 j   | 184.7                      | 224.6 | 250.3 | 264.5 | 274.3 | 281.8 | 287.9 | 297.4 | 304.6 | 317.7 | 326.8 | 348.4 |
| 30 j   | 212.7                      | 254.2 | 280.8 | 295.5 | 305.6 | 313.3 | 319.6 | 329.3 | 336.7 | 350.0 | 359.3 | 381.3 |

2. Niveau de retour estimé et écart-type de l'estimation pour une durée de précipitations de 10 minutes à 30 jours (lignes) et une période de retour de 2 à 200 années (colonnes). Unités : mm.

| Durée  | Période de retour (années) |       |       |       |       |       |       |       |       |       |       |       |
|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|        | 2                          | 5     | 10    | 15    | 20    | 25    | 30    | 40    | 50    | 75    | 100   | 200   |
| 10 min | 8.3                        | 11.9  | 14.6  | 16.2  | 17.4  | 18.4  | 19.2  | 20.5  | 21.5  | 23.5  | 25.0  | 28.8  |
|        | 0.4                        | 0.6   | 0.8   | 1.0   | 1.2   | 1.3   | 1.4   | 1.7   | 1.8   | 2.2   | 2.5   | 3.3   |
| 20 min | 12.5                       | 18.2  | 22.5  | 25.1  | 27.0  | 28.5  | 29.8  | 31.8  | 33.5  | 36.6  | 38.9  | 44.8  |
|        | 0.5                        | 0.9   | 1.4   | 1.7   | 2.0   | 2.2   | 2.4   | 2.7   | 3.0   | 3.6   | 4.1   | 5.4   |
| 30 min | 14.7                       | 21.3  | 26.2  | 29.2  | 31.4  | 33.2  | 34.7  | 37.1  | 39.0  | 42.6  | 45.2  | 52.1  |
|        | 0.6                        | 0.9   | 1.2   | 1.4   | 1.6   | 1.7   | 1.9   | 2.1   | 2.2   | 2.6   | 2.9   | 3.6   |
| 1 h    | 18.2                       | 26.2  | 32.1  | 35.7  | 38.3  | 40.4  | 42.1  | 45.0  | 47.2  | 51.5  | 54.6  | 62.7  |
|        | 0.7                        | 1.1   | 1.6   | 1.9   | 2.2   | 2.4   | 2.6   | 2.9   | 3.2   | 3.8   | 4.3   | 5.7   |
| 2 h    | 22.2                       | 31.2  | 37.9  | 41.9  | 44.9  | 47.3  | 49.2  | 52.4  | 55.0  | 59.7  | 63.3  | 72.3  |
|        | 0.8                        | 1.3   | 1.8   | 2.1   | 2.4   | 2.6   | 2.9   | 3.2   | 3.6   | 4.2   | 4.8   | 6.3   |
| 3 h    | 24.7                       | 34.0  | 40.9  | 45.1  | 48.2  | 50.6  | 52.6  | 55.9  | 58.5  | 63.5  | 67.1  | 76.4  |
|        | 0.9                        | 1.4   | 1.8   | 2.2   | 2.4   | 2.6   | 2.8   | 3.2   | 3.4   | 4.0   | 4.4   | 5.7   |
| 6 h    | 30.0                       | 38.7  | 45.2  | 49.1  | 51.9  | 54.2  | 56.0  | 59.1  | 61.5  | 66.1  | 69.4  | 78.0  |
|        | 1.0                        | 1.4   | 1.9   | 2.2   | 2.5   | 2.8   | 3.0   | 3.4   | 3.8   | 4.5   | 5.1   | 6.9   |
| 12 h   | 37.4                       | 47.6  | 55.2  | 59.7  | 63.0  | 65.6  | 67.8  | 71.4  | 74.2  | 79.5  | 83.3  | 93.2  |
|        | 1.3                        | 1.7   | 2.4   | 2.9   | 3.3   | 3.7   | 4.0   | 4.6   | 5.1   | 6.1   | 7.0   | 9.3   |
| 1 j    | 46.7                       | 58.6  | 67.2  | 72.2  | 75.9  | 78.8  | 81.2  | 85.1  | 88.1  | 93.8  | 98.0  | 108.4 |
|        | 1.3                        | 1.5   | 1.8   | 2.0   | 2.1   | 2.3   | 2.4   | 2.6   | 2.8   | 3.3   | 3.6   | 4.6   |
| 2 j    | 62.0                       | 77.4  | 88.2  | 94.6  | 99.1  | 102.7 | 105.6 | 110.3 | 114.0 | 120.8 | 125.7 | 137.9 |
|        | 1.9                        | 2.5   | 3.0   | 3.4   | 3.8   | 4.1   | 4.3   | 4.8   | 5.1   | 5.9   | 6.5   | 8.2   |
| 3 j    | 67.9                       | 85.0  | 96.9  | 103.8 | 108.7 | 112.5 | 115.6 | 120.6 | 124.5 | 131.7 | 136.9 | 149.6 |
|        | 2.4                        | 3.1   | 3.8   | 4.3   | 4.7   | 5.0   | 5.3   | 5.7   | 6.1   | 6.9   | 7.5   | 9.2   |
| 4 j    | 74.8                       | 93.4  | 106.1 | 113.4 | 118.7 | 122.7 | 126.0 | 131.3 | 135.4 | 142.9 | 148.3 | 161.5 |
|        | 2.7                        | 3.5   | 4.2   | 4.7   | 5.0   | 5.3   | 5.6   | 6.0   | 6.3   | 7.0   | 7.6   | 9.0   |
| 5 j    | 85.2                       | 106.0 | 120.1 | 128.2 | 133.9 | 138.4 | 142.0 | 147.8 | 152.3 | 160.5 | 166.4 | 180.7 |
|        | 3.1                        | 4.1   | 5.0   | 5.5   | 5.9   | 6.2   | 6.5   | 7.0   | 7.4   | 8.1   | 8.7   | 10.2  |
| 7 j    | 99.7                       | 122.3 | 137.4 | 146.1 | 152.1 | 156.8 | 160.7 | 166.7 | 171.5 | 180.0 | 186.1 | 200.9 |
|        | 3.7                        | 4.7   | 5.5   | 6.0   | 6.3   | 6.6   | 6.9   | 7.3   | 7.6   | 8.2   | 8.7   | 10.0  |
| 10 j   | 120.4                      | 148.0 | 166.3 | 176.7 | 183.9 | 189.5 | 194.1 | 201.3 | 206.8 | 216.9 | 224.0 | 241.2 |
|        | 4.8                        | 6.1   | 7.1   | 7.8   | 8.2   | 8.6   | 8.9   | 9.4   | 9.8   | 10.6  | 11.3  | 12.8  |
| 15 j   | 146.5                      | 178.3 | 199.2 | 210.9 | 219.0 | 225.3 | 230.3 | 238.3 | 244.4 | 255.5 | 263.3 | 281.9 |
|        | 5.7                        | 7.1   | 8.2   | 8.8   | 9.2   | 9.6   | 9.9   | 10.4  | 10.7  | 11.4  | 11.9  | 13.2  |
| 20 j   | 170.8                      | 208.4 | 232.9 | 246.4 | 255.9 | 263.1 | 269.0 | 278.1 | 285.2 | 297.8 | 306.7 | 327.8 |
|        | 6.8                        | 8.4   | 9.7   | 10.4  | 10.9  | 11.2  | 11.6  | 12.1  | 12.5  | 13.3  | 13.8  | 15.3  |
| 25 j   | 184.7                      | 224.6 | 250.3 | 264.5 | 274.3 | 281.8 | 287.9 | 297.4 | 304.6 | 317.7 | 326.8 | 348.4 |
|        | 7.5                        | 9.6   | 11.2  | 12.2  | 12.9  | 13.5  | 14.0  | 14.8  | 15.4  | 16.6  | 17.5  | 19.9  |
| 30 j   | 212.7                      | 254.2 | 280.8 | 295.5 | 305.6 | 313.3 | 319.6 | 329.3 | 336.7 | 350.0 | 359.3 | 381.3 |
|        | 7.9                        | 10.0  | 11.7  | 12.7  | 13.5  | 14.1  | 14.6  | 15.5  | 16.2  | 17.6  | 18.7  | 21.4  |

3. Intervalle de confiance à 95% de la période de retour estimée pour une durée de précipitations de 10 minutes à 30 jours (lignes) et une période de retour de 2 à 200 années (colonnes). Unités : mm.

| Durée  | Période de retour (années) |       |       |       |       |       |       |       |       |       |       |       |
|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|        | 2                          | 5     | 10    | 15    | 20    | 25    | 30    | 40    | 50    | 75    | 100   | 200   |
| 10 min | 7.6                        | 10.7  | 12.9  | 14.2  | 15.1  | 15.8  | 16.4  | 17.3  | 18.0  | 19.2  | 20.1  | 22.3  |
|        | 9.0                        | 13.0  | 16.2  | 18.2  | 19.7  | 21.0  | 22.0  | 23.7  | 25.1  | 27.8  | 29.9  | 35.3  |
| 20 min | 11.5                       | 16.4  | 19.8  | 21.7  | 23.1  | 24.2  | 25.1  | 26.4  | 27.5  | 29.5  | 30.9  | 34.2  |
|        | 13.6                       | 20.0  | 25.2  | 28.4  | 30.8  | 32.8  | 34.4  | 37.2  | 39.4  | 43.7  | 46.9  | 55.4  |
| 30 min | 13.4                       | 19.4  | 23.8  | 26.4  | 28.3  | 29.8  | 31.0  | 33.0  | 34.6  | 37.5  | 39.6  | 44.9  |
|        | 15.9                       | 23.1  | 28.7  | 32.1  | 34.6  | 36.6  | 38.3  | 41.1  | 43.4  | 47.6  | 50.8  | 59.2  |
| 1 h    | 16.8                       | 24.0  | 29.0  | 32.0  | 34.1  | 35.7  | 37.1  | 39.2  | 40.9  | 44.0  | 46.2  | 51.6  |
|        | 19.7                       | 28.4  | 35.2  | 39.4  | 42.5  | 45.1  | 47.2  | 50.7  | 53.6  | 59.0  | 63.1  | 73.9  |
| 2 h    | 20.6                       | 28.7  | 34.4  | 37.8  | 40.2  | 42.1  | 43.6  | 46.1  | 48.0  | 51.4  | 53.9  | 59.9  |
|        | 23.9                       | 33.7  | 41.3  | 46.1  | 49.6  | 52.5  | 54.9  | 58.8  | 62.0  | 68.1  | 72.7  | 84.7  |
| 3 h    | 22.9                       | 31.3  | 37.3  | 40.9  | 43.4  | 45.4  | 47.1  | 49.7  | 51.8  | 55.6  | 58.4  | 65.2  |
|        | 26.5                       | 36.8  | 44.6  | 49.4  | 52.9  | 55.8  | 58.2  | 62.1  | 65.3  | 71.3  | 75.8  | 87.5  |
| 6 h    | 28.0                       | 35.9  | 41.5  | 44.7  | 47.0  | 48.7  | 50.2  | 52.4  | 54.1  | 57.2  | 59.4  | 64.5  |
|        | 32.0                       | 41.5  | 48.8  | 53.4  | 56.8  | 59.6  | 61.9  | 65.8  | 68.9  | 74.9  | 79.5  | 91.5  |
| 12 h   | 35.0                       | 44.2  | 50.5  | 54.1  | 56.5  | 58.4  | 60.0  | 62.3  | 64.2  | 67.4  | 69.7  | 75.0  |
|        | 39.9                       | 51.1  | 59.8  | 65.3  | 69.5  | 72.8  | 75.7  | 80.4  | 84.2  | 91.5  | 97.0  | 111.5 |
| 1 j    | 44.2                       | 55.6  | 63.7  | 68.4  | 71.7  | 74.3  | 76.5  | 79.9  | 82.5  | 87.4  | 90.9  | 99.4  |
|        | 49.2                       | 61.6  | 70.6  | 76.1  | 80.1  | 83.3  | 86.0  | 90.3  | 93.7  | 100.2 | 105.0 | 117.3 |
| 2 j    | 58.3                       | 72.6  | 82.3  | 87.8  | 91.7  | 94.7  | 97.1  | 101.0 | 103.9 | 109.2 | 112.9 | 121.8 |
|        | 65.7                       | 82.2  | 94.2  | 101.3 | 106.5 | 110.6 | 114.1 | 119.6 | 124.0 | 132.3 | 138.4 | 153.9 |
| 3 j    | 63.2                       | 78.9  | 89.4  | 95.3  | 99.5  | 102.7 | 105.3 | 109.4 | 112.5 | 118.1 | 122.1 | 131.5 |
|        | 72.6                       | 91.2  | 104.4 | 112.2 | 117.8 | 122.3 | 126.0 | 131.9 | 136.6 | 145.3 | 151.7 | 167.7 |
| 4 j    | 69.6                       | 86.5  | 97.9  | 104.3 | 108.8 | 112.3 | 115.1 | 119.6 | 123.0 | 129.1 | 133.5 | 143.8 |
|        | 80.1                       | 100.3 | 114.3 | 122.6 | 128.5 | 133.1 | 136.9 | 143.0 | 147.8 | 156.7 | 163.2 | 179.2 |
| 5 j    | 79.1                       | 97.9  | 110.4 | 117.5 | 122.4 | 126.2 | 129.3 | 134.1 | 137.9 | 144.6 | 149.3 | 160.6 |
|        | 91.3                       | 114.0 | 129.8 | 138.9 | 145.5 | 150.6 | 154.8 | 161.4 | 166.7 | 176.4 | 183.4 | 200.8 |
| 7 j    | 92.4                       | 113.1 | 126.7 | 134.4 | 139.8 | 143.9 | 147.2 | 152.5 | 156.5 | 163.9 | 169.0 | 181.3 |
|        | 107.0                      | 131.4 | 148.1 | 157.7 | 164.5 | 169.8 | 174.1 | 181.0 | 186.4 | 196.2 | 203.2 | 220.6 |
| 10 j   | 111.0                      | 136.0 | 152.3 | 161.5 | 167.8 | 172.7 | 176.6 | 182.8 | 187.5 | 196.0 | 201.9 | 216.0 |
|        | 129.8                      | 160.0 | 180.3 | 191.9 | 200.1 | 206.4 | 211.6 | 219.7 | 226.1 | 237.7 | 246.1 | 266.3 |
| 15 j   | 135.2                      | 164.3 | 183.1 | 193.6 | 200.9 | 206.4 | 211.0 | 218.0 | 223.4 | 233.1 | 239.9 | 256.0 |
|        | 157.7                      | 192.3 | 215.2 | 228.1 | 237.1 | 244.1 | 249.7 | 258.6 | 265.5 | 277.9 | 286.7 | 307.9 |
| 20 j   | 157.5                      | 191.9 | 213.9 | 226.1 | 234.6 | 241.1 | 246.3 | 254.4 | 260.7 | 271.8 | 279.6 | 297.8 |
|        | 184.0                      | 225.0 | 251.8 | 266.7 | 277.2 | 285.2 | 291.7 | 301.8 | 309.7 | 323.8 | 333.8 | 357.8 |
| 25 j   | 170.0                      | 205.8 | 228.3 | 240.6 | 249.0 | 255.4 | 260.5 | 268.4 | 274.4 | 285.1 | 292.4 | 309.4 |
|        | 199.5                      | 243.4 | 272.2 | 288.3 | 299.6 | 308.3 | 315.3 | 326.3 | 334.8 | 350.3 | 361.2 | 387.5 |
| 30 j   | 197.1                      | 234.6 | 258.0 | 270.6 | 279.2 | 285.7 | 290.9 | 298.9 | 304.9 | 315.5 | 322.7 | 339.3 |
|        | 228.2                      | 273.9 | 303.7 | 320.4 | 332.0 | 341.0 | 348.3 | 359.7 | 368.6 | 384.6 | 395.9 | 423.2 |

4. Estimation des coefficients de Montana.

Formule de Montana : intensité[mm/h] =  $a \cdot \text{durée}[\text{min}]^{-b}$  pour une plage de durées

$a_1, b_1$  : durées < 25 min

$a_2, b_2$  : durées entre 25 min et 6000 min (= 100 h)

$a_3, b_3$  : durées > 6000 min (= 100 h)

| Période de retour (années) | $a_1$ | $b_1$  | $a_2$  | $b_2$  | $a_3$ | $b_3$  |
|----------------------------|-------|--------|--------|--------|-------|--------|
| 2                          | 147.7 | 0.4681 | 299.8  | 0.6881 | 49.6  | 0.4813 |
| 5                          | 204.1 | 0.4527 | 480.9  | 0.7189 | 64.5  | 0.4880 |
| 10                         | 245.1 | 0.4435 | 627.3  | 0.7355 | 78.3  | 0.4964 |
| 15                         | 269.5 | 0.4385 | 720.6  | 0.7441 | 87.7  | 0.5020 |
| 20                         | 287.2 | 0.4350 | 790.9  | 0.7498 | 95.1  | 0.5062 |
| 25                         | 301.1 | 0.4324 | 848.1  | 0.7540 | 101.2 | 0.5097 |
| 30                         | 312.7 | 0.4302 | 896.6  | 0.7574 | 106.5 | 0.5125 |
| 40                         | 331.4 | 0.4269 | 976.7  | 0.7626 | 115.5 | 0.5172 |
| 50                         | 346.1 | 0.4243 | 1041.9 | 0.7666 | 123.0 | 0.5210 |
| 75                         | 373.7 | 0.4196 | 1167.8 | 0.7736 | 137.9 | 0.5280 |
| 100                        | 393.9 | 0.4163 | 1263.5 | 0.7784 | 149.6 | 0.5331 |
| 200                        | 444.8 | 0.4083 | 1517.5 | 0.7896 | 182.0 | 0.5458 |

## Références

Van de Vyver, H. (2012). Spatial regression models for extreme precipitation in Belgium, *Water Resour. Res.*, 48, W09549, doi :10.1029/2011WR011707.

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