



# Statistiques des précipitations extrêmes des communes belges

Bekkevoort (INS 24008)

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 | 7.5                        | 10.7  | 13.1  | 14.6  | 15.7  | 16.6  | 17.3  | 18.5  | 19.5  | 21.2  | 22.6  | 26.0  |
| 20 min | 10.6                       | 15.2  | 18.6  | 20.7  | 22.2  | 23.4  | 24.5  | 26.1  | 27.4  | 29.9  | 31.8  | 36.6  |
| 30 min | 12.6                       | 18.3  | 22.5  | 25.1  | 27.0  | 28.6  | 29.8  | 31.9  | 33.5  | 36.6  | 38.9  | 44.8  |
| 1 h    | 15.6                       | 21.7  | 26.2  | 29.0  | 31.0  | 32.6  | 34.0  | 36.1  | 37.9  | 41.2  | 43.6  | 49.8  |
| 2 h    | 18.6                       | 25.5  | 30.6  | 33.7  | 35.9  | 37.7  | 39.3  | 41.7  | 43.6  | 47.3  | 50.0  | 56.9  |
| 3 h    | 20.6                       | 28.3  | 34.1  | 37.5  | 40.1  | 42.1  | 43.8  | 46.5  | 48.7  | 52.8  | 55.8  | 63.5  |
| 6 h    | 24.8                       | 33.0  | 39.1  | 42.7  | 45.4  | 47.5  | 49.3  | 52.2  | 54.4  | 58.7  | 61.9  | 69.9  |
| 12 h   | 30.0                       | 39.9  | 47.2  | 51.6  | 54.8  | 57.3  | 59.4  | 62.9  | 65.6  | 70.7  | 74.5  | 84.0  |
| 1 j    | 36.7                       | 48.0  | 56.1  | 61.0  | 64.5  | 67.2  | 69.5  | 73.2  | 76.1  | 81.5  | 85.5  | 95.4  |
| 2 j    | 45.8                       | 59.1  | 68.4  | 73.9  | 77.8  | 80.9  | 83.4  | 87.4  | 90.6  | 96.4  | 100.7 | 111.1 |
| 3 j    | 48.3                       | 62.3  | 71.9  | 77.5  | 81.5  | 84.6  | 87.2  | 91.3  | 94.4  | 100.3 | 104.5 | 114.9 |
| 4 j    | 52.2                       | 67.0  | 77.2  | 83.0  | 87.2  | 90.4  | 93.1  | 97.3  | 100.6 | 106.6 | 110.9 | 121.4 |
| 5 j    | 59.2                       | 75.1  | 85.8  | 92.0  | 96.4  | 99.8  | 102.6 | 107.0 | 110.4 | 116.7 | 121.1 | 132.1 |
| 7 j    | 67.8                       | 85.0  | 96.5  | 103.1 | 107.7 | 111.3 | 114.3 | 118.9 | 122.4 | 129.0 | 133.6 | 144.9 |
| 10 j   | 80.3                       | 99.1  | 111.6 | 118.7 | 123.6 | 127.5 | 130.6 | 135.5 | 139.2 | 146.1 | 151.0 | 162.7 |
| 15 j   | 97.1                       | 119.2 | 133.6 | 141.7 | 147.3 | 151.6 | 155.2 | 160.7 | 164.9 | 172.5 | 177.9 | 190.8 |
| 20 j   | 113.1                      | 138.7 | 155.2 | 164.5 | 170.9 | 175.8 | 179.7 | 186.0 | 190.7 | 199.3 | 205.3 | 219.7 |
| 25 j   | 119.9                      | 147.2 | 164.7 | 174.4 | 181.1 | 186.2 | 190.4 | 196.9 | 201.8 | 210.7 | 217.0 | 231.7 |
| 30 j   | 141.0                      | 170.5 | 189.4 | 199.8 | 207.0 | 212.4 | 216.9 | 223.8 | 229.0 | 238.5 | 245.1 | 260.7 |

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 | 7.5                        | 10.7  | 13.1  | 14.6  | 15.7  | 16.6  | 17.3  | 18.5  | 19.5  | 21.2  | 22.6  | 26.0  |
|        | 0.2                        | 0.3   | 0.5   | 0.7   | 0.8   | 0.9   | 1.0   | 1.2   | 1.3   | 1.7   | 1.9   | 2.6   |
| 20 min | 10.6                       | 15.2  | 18.6  | 20.7  | 22.2  | 23.4  | 24.5  | 26.1  | 27.4  | 29.9  | 31.8  | 36.6  |
|        | 0.3                        | 0.5   | 0.8   | 0.9   | 1.1   | 1.2   | 1.4   | 1.6   | 1.8   | 2.2   | 2.5   | 3.4   |
| 30 min | 12.6                       | 18.3  | 22.5  | 25.1  | 27.0  | 28.6  | 29.8  | 31.9  | 33.5  | 36.6  | 38.9  | 44.8  |
|        | 0.4                        | 0.7   | 0.9   | 1.1   | 1.3   | 1.4   | 1.6   | 1.8   | 2.0   | 2.3   | 2.6   | 3.5   |
| 1 h    | 15.6                       | 21.7  | 26.2  | 29.0  | 31.0  | 32.6  | 34.0  | 36.1  | 37.9  | 41.2  | 43.6  | 49.8  |
|        | 0.5                        | 0.8   | 1.1   | 1.4   | 1.6   | 1.8   | 2.0   | 2.3   | 2.5   | 3.1   | 3.5   | 4.6   |
| 2 h    | 18.6                       | 25.5  | 30.6  | 33.7  | 35.9  | 37.7  | 39.3  | 41.7  | 43.6  | 47.3  | 50.0  | 56.9  |
|        | 0.6                        | 0.9   | 1.3   | 1.6   | 1.9   | 2.1   | 2.3   | 2.6   | 2.9   | 3.4   | 3.9   | 5.2   |
| 3 h    | 20.6                       | 28.3  | 34.1  | 37.5  | 40.1  | 42.1  | 43.8  | 46.5  | 48.7  | 52.8  | 55.8  | 63.5  |
|        | 0.7                        | 1.0   | 1.4   | 1.7   | 1.9   | 2.1   | 2.3   | 2.6   | 2.9   | 3.4   | 3.8   | 5.0   |
| 6 h    | 24.8                       | 33.0  | 39.1  | 42.7  | 45.4  | 47.5  | 49.3  | 52.2  | 54.4  | 58.7  | 61.9  | 69.9  |
|        | 0.8                        | 1.1   | 1.5   | 1.9   | 2.2   | 2.4   | 2.7   | 3.1   | 3.4   | 4.2   | 4.8   | 6.5   |
| 12 h   | 30.0                       | 39.9  | 47.2  | 51.6  | 54.8  | 57.3  | 59.4  | 62.9  | 65.6  | 70.7  | 74.5  | 84.0  |
|        | 1.1                        | 1.5   | 2.0   | 2.5   | 2.8   | 3.2   | 3.5   | 4.0   | 4.4   | 5.4   | 6.1   | 8.3   |
| 1 j    | 36.7                       | 48.0  | 56.1  | 61.0  | 64.5  | 67.2  | 69.5  | 73.2  | 76.1  | 81.5  | 85.5  | 95.4  |
|        | 1.3                        | 1.6   | 1.9   | 2.2   | 2.4   | 2.6   | 2.8   | 3.1   | 3.3   | 3.8   | 4.2   | 5.4   |
| 2 j    | 45.8                       | 59.1  | 68.4  | 73.9  | 77.8  | 80.9  | 83.4  | 87.4  | 90.6  | 96.4  | 100.7 | 111.1 |
|        | 1.9                        | 2.6   | 3.3   | 3.8   | 4.2   | 4.6   | 4.9   | 5.4   | 5.8   | 6.7   | 7.4   | 9.3   |
| 3 j    | 48.3                       | 62.3  | 71.9  | 77.5  | 81.5  | 84.6  | 87.2  | 91.3  | 94.4  | 100.3 | 104.5 | 114.9 |
|        | 2.3                        | 3.1   | 3.8   | 4.4   | 4.8   | 5.1   | 5.4   | 6.0   | 6.4   | 7.2   | 7.9   | 9.7   |
| 4 j    | 52.2                       | 67.0  | 77.2  | 83.0  | 87.2  | 90.4  | 93.1  | 97.3  | 100.6 | 106.6 | 110.9 | 121.4 |
|        | 2.7                        | 3.4   | 4.0   | 4.4   | 4.8   | 5.0   | 5.3   | 5.7   | 6.1   | 6.8   | 7.3   | 8.7   |
| 5 j    | 59.2                       | 75.1  | 85.8  | 92.0  | 96.4  | 99.8  | 102.6 | 107.0 | 110.4 | 116.7 | 121.1 | 132.1 |
|        | 3.1                        | 3.8   | 4.4   | 4.8   | 5.1   | 5.4   | 5.6   | 6.0   | 6.3   | 7.0   | 7.5   | 8.8   |
| 7 j    | 67.8                       | 85.0  | 96.5  | 103.1 | 107.7 | 111.3 | 114.3 | 118.9 | 122.4 | 129.0 | 133.6 | 144.9 |
|        | 3.7                        | 4.4   | 5.0   | 5.4   | 5.7   | 6.0   | 6.2   | 6.6   | 6.8   | 7.4   | 7.9   | 9.0   |
| 10 j   | 80.3                       | 99.1  | 111.6 | 118.7 | 123.6 | 127.5 | 130.6 | 135.5 | 139.2 | 146.1 | 151.0 | 162.7 |
|        | 4.6                        | 5.7   | 6.5   | 7.0   | 7.3   | 7.6   | 7.9   | 8.3   | 8.6   | 9.2   | 9.7   | 11.0  |
| 15 j   | 97.1                       | 119.2 | 133.6 | 141.7 | 147.3 | 151.6 | 155.2 | 160.7 | 164.9 | 172.5 | 177.9 | 190.8 |
|        | 5.6                        | 6.8   | 7.6   | 8.1   | 8.4   | 8.7   | 8.9   | 9.2   | 9.5   | 9.9   | 10.3  | 11.2  |
| 20 j   | 113.1                      | 138.7 | 155.2 | 164.5 | 170.9 | 175.8 | 179.7 | 186.0 | 190.7 | 199.3 | 205.3 | 219.7 |
|        | 6.6                        | 8.1   | 9.2   | 9.7   | 10.1  | 10.5  | 10.7  | 11.2  | 11.5  | 12.1  | 12.6  | 13.8  |
| 25 j   | 119.9                      | 147.2 | 164.7 | 174.4 | 181.1 | 186.2 | 190.4 | 196.9 | 201.8 | 210.7 | 217.0 | 231.7 |
|        | 7.4                        | 9.1   | 10.3  | 11.1  | 11.6  | 12.1  | 12.4  | 13.0  | 13.5  | 14.4  | 15.1  | 16.9  |
| 30 j   | 141.0                      | 170.5 | 189.4 | 199.8 | 207.0 | 212.4 | 216.9 | 223.8 | 229.0 | 238.5 | 245.1 | 260.7 |
|        | 8.2                        | 10.0  | 11.4  | 12.3  | 13.0  | 13.6  | 14.0  | 14.8  | 15.5  | 16.7  | 17.6  | 20.0  |

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 | 7.1                        | 10.0  | 12.1  | 13.3  | 14.1  | 14.8  | 15.3  | 16.2  | 16.8  | 18.0  | 18.8  | 20.8  |
|        | 7.9                        | 11.4  | 14.2  | 16.0  | 17.3  | 18.4  | 19.3  | 20.8  | 22.1  | 24.5  | 26.3  | 31.2  |
| 20 min | 9.9                        | 14.1  | 17.1  | 18.8  | 20.1  | 21.0  | 21.8  | 23.0  | 24.0  | 25.7  | 27.0  | 29.9  |
|        | 11.3                       | 16.2  | 20.1  | 22.6  | 24.4  | 25.9  | 27.1  | 29.2  | 30.9  | 34.2  | 36.7  | 43.2  |
| 30 min | 11.7                       | 17.0  | 20.7  | 22.9  | 24.5  | 25.7  | 26.7  | 28.4  | 29.7  | 32.0  | 33.7  | 38.0  |
|        | 13.4                       | 19.6  | 24.4  | 27.3  | 29.6  | 31.4  | 32.9  | 35.4  | 37.4  | 41.2  | 44.1  | 51.6  |
| 1 h    | 14.7                       | 20.1  | 24.0  | 26.2  | 27.8  | 29.0  | 30.1  | 31.6  | 32.9  | 35.2  | 36.8  | 40.7  |
|        | 16.5                       | 23.3  | 28.5  | 31.8  | 34.2  | 36.2  | 37.9  | 40.6  | 42.9  | 47.2  | 50.4  | 58.9  |
| 2 h    | 17.4                       | 23.6  | 28.0  | 30.5  | 32.3  | 33.7  | 34.8  | 36.6  | 38.0  | 40.5  | 42.3  | 46.7  |
|        | 19.7                       | 27.3  | 33.2  | 36.9  | 39.6  | 41.8  | 43.7  | 46.8  | 49.3  | 54.0  | 57.7  | 67.1  |
| 3 h    | 19.2                       | 26.3  | 31.3  | 34.2  | 36.3  | 37.9  | 39.3  | 41.4  | 43.0  | 46.1  | 48.3  | 53.6  |
|        | 22.0                       | 30.4  | 36.8  | 40.8  | 43.8  | 46.2  | 48.3  | 51.6  | 54.3  | 59.4  | 63.3  | 73.3  |
| 6 h    | 23.2                       | 30.8  | 36.0  | 39.0  | 41.1  | 42.8  | 44.1  | 46.1  | 47.7  | 50.5  | 52.5  | 57.2  |
|        | 26.5                       | 35.3  | 42.1  | 46.4  | 49.7  | 52.3  | 54.5  | 58.2  | 61.2  | 66.9  | 71.2  | 82.6  |
| 12 h   | 27.8                       | 36.9  | 43.2  | 46.8  | 49.3  | 51.1  | 52.7  | 55.1  | 56.9  | 60.2  | 62.5  | 67.8  |
|        | 32.3                       | 42.9  | 51.2  | 56.4  | 60.3  | 63.5  | 66.2  | 70.7  | 74.3  | 81.2  | 86.5  | 100.3 |
| 1 j    | 34.2                       | 44.9  | 52.4  | 56.7  | 59.8  | 62.2  | 64.1  | 67.2  | 69.6  | 74.0  | 77.2  | 84.9  |
|        | 39.2                       | 51.1  | 59.9  | 65.3  | 69.2  | 72.3  | 75.0  | 79.2  | 82.6  | 89.0  | 93.8  | 105.9 |
| 2 j    | 42.1                       | 54.1  | 62.0  | 66.5  | 69.6  | 71.9  | 73.9  | 76.8  | 79.1  | 83.2  | 86.1  | 92.9  |
|        | 49.6                       | 64.1  | 74.8  | 81.3  | 86.0  | 89.8  | 92.9  | 98.0  | 102.0 | 109.6 | 115.2 | 129.4 |
| 3 j    | 43.7                       | 56.2  | 64.4  | 69.0  | 72.1  | 74.6  | 76.5  | 79.6  | 81.9  | 86.1  | 89.0  | 95.9  |
|        | 52.9                       | 68.3  | 79.4  | 86.1  | 90.9  | 94.7  | 97.9  | 103.0 | 107.0 | 114.5 | 120.0 | 133.9 |
| 4 j    | 47.0                       | 60.5  | 69.4  | 74.4  | 77.9  | 80.5  | 82.7  | 86.1  | 88.7  | 93.3  | 96.6  | 104.3 |
|        | 57.5                       | 73.6  | 85.0  | 91.7  | 96.5  | 100.3 | 103.4 | 108.5 | 112.4 | 119.8 | 125.2 | 138.6 |
| 5 j    | 53.2                       | 67.6  | 77.2  | 82.6  | 86.3  | 89.2  | 91.5  | 95.2  | 98.0  | 103.0 | 106.5 | 114.8 |
|        | 65.2                       | 82.5  | 94.5  | 101.5 | 106.5 | 110.4 | 113.6 | 118.8 | 122.8 | 130.3 | 135.8 | 149.3 |
| 7 j    | 60.6                       | 76.3  | 86.7  | 92.5  | 96.5  | 99.6  | 102.1 | 106.0 | 109.0 | 114.4 | 118.2 | 127.2 |
|        | 75.0                       | 93.7  | 106.4 | 113.8 | 119.0 | 123.1 | 126.4 | 131.7 | 135.9 | 143.5 | 149.0 | 162.6 |
| 10 j   | 71.3                       | 88.0  | 99.0  | 105.1 | 109.3 | 112.5 | 115.2 | 119.3 | 122.4 | 128.0 | 131.9 | 141.1 |
|        | 89.3                       | 110.2 | 124.3 | 132.3 | 138.0 | 142.4 | 146.0 | 151.7 | 156.1 | 164.2 | 170.0 | 184.2 |
| 15 j   | 86.1                       | 105.8 | 118.6 | 125.8 | 130.8 | 134.7 | 137.8 | 142.6 | 146.4 | 153.1 | 157.8 | 168.9 |
|        | 108.2                      | 132.6 | 148.6 | 157.5 | 163.8 | 168.6 | 172.5 | 178.7 | 183.4 | 192.0 | 198.1 | 212.8 |
| 20 j   | 100.1                      | 122.7 | 137.3 | 145.4 | 151.0 | 155.3 | 158.7 | 164.1 | 168.2 | 175.6 | 180.7 | 192.7 |
|        | 126.1                      | 154.6 | 173.2 | 183.5 | 190.7 | 196.3 | 200.8 | 207.8 | 213.2 | 223.1 | 230.0 | 246.7 |
| 25 j   | 105.4                      | 129.3 | 144.4 | 152.7 | 158.3 | 162.6 | 166.0 | 171.3 | 175.3 | 182.4 | 187.3 | 198.5 |
|        | 134.4                      | 165.0 | 184.9 | 196.1 | 203.9 | 209.9 | 214.7 | 222.4 | 228.3 | 239.0 | 246.6 | 265.0 |
| 30 j   | 124.9                      | 150.9 | 167.0 | 175.6 | 181.5 | 185.8 | 189.3 | 194.7 | 198.7 | 205.8 | 210.6 | 221.5 |
|        | 157.1                      | 190.1 | 211.8 | 223.9 | 232.5 | 239.0 | 244.4 | 252.8 | 259.3 | 271.2 | 279.6 | 299.9 |

#### 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                          | 131.9 | 0.4709 | 301.5  | 0.7276 | 54.3  | 0.5307 |
| 5                          | 191.0 | 0.4747 | 462.1  | 0.7492 | 85.0  | 0.5546 |
| 10                         | 233.9 | 0.4738 | 590.6  | 0.7616 | 112.7 | 0.5712 |
| 15                         | 259.5 | 0.4725 | 672.0  | 0.7681 | 131.5 | 0.5806 |
| 20                         | 278.1 | 0.4714 | 733.3  | 0.7726 | 146.4 | 0.5873 |
| 25                         | 292.8 | 0.4703 | 783.0  | 0.7760 | 158.7 | 0.5925 |
| 30                         | 304.9 | 0.4694 | 825.2  | 0.7787 | 169.5 | 0.5968 |
| 40                         | 324.5 | 0.4679 | 894.6  | 0.7829 | 187.8 | 0.6034 |
| 50                         | 340.0 | 0.4666 | 951.2  | 0.7861 | 203.1 | 0.6086 |
| 75                         | 369.0 | 0.4640 | 1060.2 | 0.7919 | 233.7 | 0.6180 |
| 100                        | 390.2 | 0.4621 | 1142.8 | 0.7959 | 257.8 | 0.6247 |
| 200                        | 443.7 | 0.4570 | 1361.9 | 0.8054 | 325.4 | 0.6409 |

## 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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