



# Statistiques des précipitations extrêmes des communes belges

## Frasnes-lez-Anvaing (INS 51065)

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 | 7.6                        | 10.9  | 13.4  | 14.9  | 16.0  | 16.9  | 17.6  | 18.8  | 19.8  | 21.6  | 23.0  | 26.5  |
| 20 min | 10.9                       | 15.7  | 19.3  | 21.4  | 23.0  | 24.3  | 25.4  | 27.1  | 28.5  | 31.1  | 33.0  | 37.9  |
| 30 min | 12.9                       | 18.8  | 23.2  | 25.8  | 27.8  | 29.3  | 30.6  | 32.7  | 34.4  | 37.6  | 40.0  | 46.0  |
| 1 h    | 16.0                       | 22.4  | 27.2  | 30.1  | 32.2  | 33.9  | 35.3  | 37.6  | 39.5  | 42.9  | 45.4  | 52.0  |
| 2 h    | 19.2                       | 26.4  | 31.8  | 35.1  | 37.5  | 39.3  | 40.9  | 43.5  | 45.5  | 49.4  | 52.2  | 59.5  |
| 3 h    | 21.3                       | 29.3  | 35.2  | 38.8  | 41.4  | 43.5  | 45.3  | 48.1  | 50.3  | 54.6  | 57.7  | 65.6  |
| 6 h    | 25.7                       | 34.0  | 40.1  | 43.8  | 46.5  | 48.6  | 50.4  | 53.3  | 55.6  | 60.0  | 63.1  | 71.3  |
| 12 h   | 31.3                       | 41.2  | 48.5  | 53.0  | 56.2  | 58.7  | 60.9  | 64.3  | 67.0  | 72.2  | 76.0  | 85.6  |
| 1 j    | 38.3                       | 49.7  | 57.9  | 62.8  | 66.3  | 69.1  | 71.4  | 75.1  | 78.1  | 83.5  | 87.5  | 97.5  |
| 2 j    | 48.4                       | 62.1  | 71.6  | 77.3  | 81.3  | 84.4  | 87.0  | 91.1  | 94.4  | 100.4 | 104.7 | 115.5 |
| 3 j    | 51.5                       | 66.0  | 76.0  | 81.8  | 85.9  | 89.2  | 91.8  | 96.0  | 99.3  | 105.4 | 109.8 | 120.5 |
| 4 j    | 55.9                       | 71.3  | 81.9  | 88.0  | 92.3  | 95.7  | 98.4  | 102.8 | 106.2 | 112.5 | 117.0 | 127.9 |
| 5 j    | 63.4                       | 80.1  | 91.4  | 97.9  | 102.5 | 106.1 | 109.0 | 113.6 | 117.2 | 123.8 | 128.5 | 140.0 |
| 7 j    | 73.0                       | 91.0  | 103.2 | 110.1 | 115.0 | 118.7 | 121.8 | 126.6 | 130.4 | 137.3 | 142.1 | 154.0 |
| 10 j   | 86.8                       | 107.1 | 120.5 | 128.1 | 133.4 | 137.6 | 140.9 | 146.2 | 150.2 | 157.6 | 162.8 | 175.4 |
| 15 j   | 105.1                      | 128.8 | 144.3 | 152.9 | 159.0 | 163.6 | 167.4 | 173.3 | 177.8 | 186.0 | 191.8 | 205.6 |
| 20 j   | 122.5                      | 150.0 | 167.8 | 177.8 | 184.7 | 190.0 | 194.2 | 200.9 | 206.1 | 215.3 | 221.8 | 237.2 |
| 25 j   | 130.4                      | 159.7 | 178.6 | 189.0 | 196.2 | 201.8 | 206.2 | 213.2 | 218.5 | 228.1 | 234.8 | 250.7 |
| 30 j   | 152.6                      | 184.1 | 204.2 | 215.3 | 223.0 | 228.8 | 233.6 | 240.9 | 246.5 | 256.6 | 263.6 | 280.3 |

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 | 7.6                        | 10.9  | 13.4  | 14.9  | 16.0  | 16.9  | 17.6  | 18.8  | 19.8  | 21.6  | 23.0  | 26.5  |
|        | 0.2                        | 0.4   | 0.5   | 0.7   | 0.8   | 0.9   | 1.0   | 1.2   | 1.4   | 1.7   | 2.0   | 2.7   |
| 20 min | 10.9                       | 15.7  | 19.3  | 21.4  | 23.0  | 24.3  | 25.4  | 27.1  | 28.5  | 31.1  | 33.0  | 37.9  |
|        | 0.4                        | 0.6   | 0.9   | 1.1   | 1.2   | 1.4   | 1.5   | 1.8   | 2.0   | 2.4   | 2.7   | 3.7   |
| 30 min | 12.9                       | 18.8  | 23.2  | 25.8  | 27.8  | 29.3  | 30.6  | 32.7  | 34.4  | 37.6  | 40.0  | 46.0  |
|        | 0.5                        | 0.7   | 0.9   | 1.1   | 1.3   | 1.4   | 1.5   | 1.7   | 1.9   | 2.3   | 2.5   | 3.3   |
| 1 h    | 16.0                       | 22.4  | 27.2  | 30.1  | 32.2  | 33.9  | 35.3  | 37.6  | 39.5  | 42.9  | 45.4  | 52.0  |
|        | 0.5                        | 0.9   | 1.2   | 1.5   | 1.7   | 1.9   | 2.1   | 2.4   | 2.6   | 3.2   | 3.6   | 4.8   |
| 2 h    | 19.2                       | 26.4  | 31.8  | 35.1  | 37.5  | 39.3  | 40.9  | 43.5  | 45.5  | 49.4  | 52.2  | 59.5  |
|        | 0.7                        | 1.1   | 1.5   | 1.8   | 2.0   | 2.2   | 2.4   | 2.7   | 3.0   | 3.6   | 4.1   | 5.4   |
| 3 h    | 21.3                       | 29.3  | 35.2  | 38.8  | 41.4  | 43.5  | 45.3  | 48.1  | 50.3  | 54.6  | 57.7  | 65.6  |
|        | 0.8                        | 1.1   | 1.5   | 1.8   | 2.0   | 2.2   | 2.3   | 2.6   | 2.9   | 3.4   | 3.8   | 5.0   |
| 6 h    | 25.7                       | 34.0  | 40.1  | 43.8  | 46.5  | 48.6  | 50.4  | 53.3  | 55.6  | 60.0  | 63.1  | 71.3  |
|        | 1.0                        | 1.2   | 1.5   | 1.8   | 2.1   | 2.4   | 2.6   | 3.0   | 3.3   | 4.1   | 4.7   | 6.4   |
| 12 h   | 31.3                       | 41.2  | 48.5  | 53.0  | 56.2  | 58.7  | 60.9  | 64.3  | 67.0  | 72.2  | 76.0  | 85.6  |
|        | 1.3                        | 1.6   | 2.1   | 2.5   | 2.8   | 3.1   | 3.4   | 4.0   | 4.4   | 5.4   | 6.1   | 8.3   |
| 1 j    | 38.3                       | 49.7  | 57.9  | 62.8  | 66.3  | 69.1  | 71.4  | 75.1  | 78.1  | 83.5  | 87.5  | 97.5  |
|        | 1.6                        | 1.8   | 2.1   | 2.3   | 2.5   | 2.7   | 2.8   | 3.1   | 3.3   | 3.8   | 4.2   | 5.2   |
| 2 j    | 48.4                       | 62.1  | 71.6  | 77.3  | 81.3  | 84.4  | 87.0  | 91.1  | 94.4  | 100.4 | 104.7 | 115.5 |
|        | 2.4                        | 3.0   | 3.6   | 4.1   | 4.5   | 4.8   | 5.1   | 5.6   | 6.0   | 6.8   | 7.5   | 9.3   |
| 3 j    | 51.5                       | 66.0  | 76.0  | 81.8  | 85.9  | 89.2  | 91.8  | 96.0  | 99.3  | 105.4 | 109.8 | 120.5 |
|        | 3.0                        | 3.8   | 4.5   | 5.0   | 5.3   | 5.7   | 6.0   | 6.4   | 6.8   | 7.7   | 8.3   | 10.0  |
| 4 j    | 55.9                       | 71.3  | 81.9  | 88.0  | 92.3  | 95.7  | 98.4  | 102.8 | 106.2 | 112.5 | 117.0 | 127.9 |
|        | 3.5                        | 4.2   | 4.9   | 5.3   | 5.6   | 5.9   | 6.1   | 6.5   | 6.8   | 7.5   | 8.0   | 9.4   |
| 5 j    | 63.4                       | 80.1  | 91.4  | 97.9  | 102.5 | 106.1 | 109.0 | 113.6 | 117.2 | 123.8 | 128.5 | 140.0 |
|        | 4.0                        | 4.9   | 5.6   | 6.0   | 6.3   | 6.6   | 6.8   | 7.2   | 7.5   | 8.2   | 8.7   | 10.0  |
| 7 j    | 73.0                       | 91.0  | 103.2 | 110.1 | 115.0 | 118.7 | 121.8 | 126.6 | 130.4 | 137.3 | 142.1 | 154.0 |
|        | 4.9                        | 5.8   | 6.5   | 6.9   | 7.2   | 7.4   | 7.6   | 8.0   | 8.3   | 8.8   | 9.3   | 10.4  |
| 10 j   | 86.8                       | 107.1 | 120.5 | 128.1 | 133.4 | 137.6 | 140.9 | 146.2 | 150.2 | 157.6 | 162.8 | 175.4 |
|        | 6.1                        | 7.5   | 8.5   | 9.1   | 9.5   | 9.8   | 10.1  | 10.6  | 10.9  | 11.6  | 12.1  | 13.5  |
| 15 j   | 105.1                      | 128.8 | 144.3 | 152.9 | 159.0 | 163.6 | 167.4 | 173.3 | 177.8 | 186.0 | 191.8 | 205.6 |
|        | 7.5                        | 9.1   | 10.1  | 10.7  | 11.1  | 11.4  | 11.7  | 12.1  | 12.4  | 13.0  | 13.4  | 14.5  |
| 20 j   | 122.5                      | 150.0 | 167.8 | 177.8 | 184.7 | 190.0 | 194.2 | 200.9 | 206.1 | 215.3 | 221.8 | 237.2 |
|        | 8.9                        | 10.8  | 12.0  | 12.8  | 13.3  | 13.6  | 14.0  | 14.5  | 14.9  | 15.6  | 16.1  | 17.5  |
| 25 j   | 130.4                      | 159.7 | 178.6 | 189.0 | 196.2 | 201.8 | 206.2 | 213.2 | 218.5 | 228.1 | 234.8 | 250.7 |
|        | 9.9                        | 12.0  | 13.5  | 14.4  | 15.0  | 15.5  | 15.9  | 16.5  | 17.1  | 18.1  | 18.8  | 20.7  |
| 30 j   | 152.6                      | 184.1 | 204.2 | 215.3 | 223.0 | 228.8 | 233.6 | 240.9 | 246.5 | 256.6 | 263.6 | 280.3 |
|        | 11.0                       | 13.1  | 14.7  | 15.7  | 16.4  | 16.9  | 17.4  | 18.2  | 18.9  | 20.1  | 21.0  | 23.4  |

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 | 7.2                        | 10.2  | 12.3  | 13.5  | 14.4  | 15.0  | 15.6  | 16.4  | 17.1  | 18.3  | 19.2  | 21.2  |
|        | 8.0                        | 11.6  | 14.5  | 16.3  | 17.6  | 18.7  | 19.7  | 21.2  | 22.5  | 24.9  | 26.8  | 31.7  |
| 20 min | 10.2                       | 14.5  | 17.5  | 19.3  | 20.6  | 21.6  | 22.4  | 23.6  | 24.6  | 26.4  | 27.7  | 30.7  |
|        | 11.7                       | 16.9  | 21.0  | 23.5  | 25.5  | 27.0  | 28.4  | 30.5  | 32.3  | 35.7  | 38.3  | 45.2  |
| 30 min | 12.0                       | 17.4  | 21.3  | 23.6  | 25.3  | 26.6  | 27.6  | 29.4  | 30.7  | 33.2  | 35.0  | 39.5  |
|        | 13.8                       | 20.1  | 25.0  | 28.0  | 30.3  | 32.1  | 33.6  | 36.1  | 38.2  | 42.0  | 45.0  | 52.6  |
| 1 h    | 15.0                       | 20.7  | 24.8  | 27.2  | 28.9  | 30.2  | 31.3  | 33.0  | 34.3  | 36.7  | 38.4  | 42.6  |
|        | 17.1                       | 24.2  | 29.6  | 33.1  | 35.6  | 37.7  | 39.4  | 42.3  | 44.6  | 49.1  | 52.5  | 61.3  |
| 2 h    | 17.9                       | 24.3  | 28.9  | 31.6  | 33.5  | 35.0  | 36.2  | 38.1  | 39.6  | 42.3  | 44.2  | 48.9  |
|        | 20.5                       | 28.5  | 34.7  | 38.5  | 41.4  | 43.7  | 45.7  | 48.9  | 51.5  | 56.5  | 60.2  | 70.1  |
| 3 h    | 19.7                       | 27.1  | 32.3  | 35.4  | 37.6  | 39.3  | 40.7  | 42.9  | 44.6  | 47.9  | 50.2  | 55.8  |
|        | 22.8                       | 31.5  | 38.1  | 42.2  | 45.3  | 47.8  | 49.8  | 53.2  | 56.0  | 61.2  | 65.2  | 75.5  |
| 6 h    | 23.8                       | 31.6  | 37.1  | 40.2  | 42.3  | 44.0  | 45.4  | 47.5  | 49.1  | 52.0  | 54.0  | 58.8  |
|        | 27.6                       | 36.3  | 43.1  | 47.4  | 50.6  | 53.3  | 55.5  | 59.2  | 62.2  | 67.9  | 72.3  | 83.7  |
| 12 h   | 28.7                       | 38.0  | 44.5  | 48.1  | 50.6  | 52.6  | 54.1  | 56.5  | 58.4  | 61.7  | 64.0  | 69.3  |
|        | 33.9                       | 44.4  | 52.6  | 57.8  | 61.7  | 64.9  | 67.6  | 72.1  | 75.7  | 82.7  | 87.9  | 101.9 |
| 1 j    | 35.2                       | 46.1  | 53.8  | 58.3  | 61.4  | 63.9  | 65.9  | 69.1  | 71.5  | 76.1  | 79.3  | 87.2  |
|        | 41.4                       | 53.3  | 62.0  | 67.4  | 71.3  | 74.4  | 77.0  | 81.2  | 84.6  | 91.0  | 95.7  | 107.8 |
| 2 j    | 43.7                       | 56.2  | 64.5  | 69.2  | 72.5  | 75.0  | 77.1  | 80.2  | 82.7  | 87.1  | 90.1  | 97.4  |
|        | 53.2                       | 68.0  | 78.8  | 85.3  | 90.0  | 93.8  | 96.9  | 102.0 | 106.1 | 113.7 | 119.3 | 133.6 |
| 3 j    | 45.5                       | 58.6  | 67.2  | 72.1  | 75.5  | 78.0  | 80.1  | 83.4  | 85.9  | 90.4  | 93.6  | 101.0 |
|        | 57.5                       | 73.3  | 84.7  | 91.5  | 96.4  | 100.3 | 103.5 | 108.7 | 112.8 | 120.4 | 126.0 | 140.1 |
| 4 j    | 49.0                       | 63.0  | 72.4  | 77.6  | 81.3  | 84.2  | 86.5  | 90.0  | 92.8  | 97.8  | 101.2 | 109.5 |
|        | 62.8                       | 79.6  | 91.4  | 98.3  | 103.3 | 107.2 | 110.4 | 115.6 | 119.6 | 127.2 | 132.7 | 146.4 |
| 5 j    | 55.5                       | 70.5  | 80.5  | 86.1  | 90.1  | 93.1  | 95.6  | 99.4  | 102.4 | 107.8 | 111.5 | 120.4 |
|        | 71.3                       | 89.7  | 102.3 | 109.7 | 114.9 | 119.0 | 122.4 | 127.8 | 132.0 | 139.8 | 145.5 | 159.5 |
| 7 j    | 63.4                       | 79.7  | 90.5  | 96.6  | 100.9 | 104.2 | 106.8 | 111.0 | 114.2 | 119.9 | 124.0 | 133.6 |
|        | 82.6                       | 102.4 | 115.8 | 123.6 | 129.0 | 133.3 | 136.8 | 142.3 | 146.7 | 154.6 | 160.3 | 174.4 |
| 10 j   | 74.8                       | 92.3  | 103.9 | 110.3 | 114.8 | 118.3 | 121.1 | 125.5 | 128.8 | 134.8 | 139.1 | 149.0 |
|        | 98.8                       | 121.8 | 137.2 | 145.9 | 152.0 | 156.8 | 160.7 | 166.8 | 171.6 | 180.4 | 186.6 | 201.8 |
| 15 j   | 90.4                       | 110.9 | 124.4 | 132.0 | 137.2 | 141.2 | 144.5 | 149.6 | 153.5 | 160.6 | 165.5 | 177.3 |
|        | 119.9                      | 146.6 | 164.1 | 173.9 | 180.7 | 186.0 | 190.2 | 196.9 | 202.1 | 211.5 | 218.1 | 234.0 |
| 20 j   | 105.1                      | 128.9 | 144.2 | 152.8 | 158.7 | 163.2 | 166.9 | 172.6 | 176.9 | 184.7 | 190.2 | 203.0 |
|        | 139.8                      | 171.1 | 191.5 | 202.8 | 210.7 | 216.7 | 221.6 | 229.3 | 235.2 | 245.9 | 253.4 | 271.5 |
| 25 j   | 111.0                      | 136.1 | 152.1 | 160.9 | 166.9 | 171.4 | 175.1 | 180.8 | 185.1 | 192.7 | 197.9 | 210.1 |
|        | 149.9                      | 183.3 | 205.0 | 217.1 | 225.6 | 232.1 | 237.3 | 245.6 | 252.0 | 263.5 | 271.7 | 291.3 |
| 30 j   | 131.1                      | 158.4 | 175.4 | 184.6 | 190.9 | 195.6 | 199.4 | 205.2 | 209.6 | 217.2 | 222.5 | 234.4 |
|        | 174.1                      | 209.8 | 233.0 | 246.0 | 255.1 | 262.0 | 267.7 | 276.6 | 283.5 | 296.0 | 304.8 | 326.1 |

#### 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                          | 134.7 | 0.4709 | 300.4  | 0.7199 | 52.7  | 0.5198 |
| 5                          | 193.3 | 0.4708 | 464.7  | 0.7434 | 79.4  | 0.5403 |
| 10                         | 235.7 | 0.4682 | 596.4  | 0.7566 | 103.5 | 0.5553 |
| 15                         | 261.0 | 0.4661 | 680.0  | 0.7636 | 119.8 | 0.5640 |
| 20                         | 279.4 | 0.4645 | 742.9  | 0.7683 | 132.6 | 0.5702 |
| 25                         | 293.9 | 0.4631 | 794.0  | 0.7719 | 143.4 | 0.5751 |
| 30                         | 305.9 | 0.4619 | 837.2  | 0.7747 | 152.7 | 0.5791 |
| 40                         | 325.3 | 0.4600 | 908.6  | 0.7791 | 168.4 | 0.5854 |
| 50                         | 340.6 | 0.4584 | 966.7  | 0.7825 | 181.6 | 0.5903 |
| 75                         | 369.2 | 0.4554 | 1078.7 | 0.7885 | 207.9 | 0.5992 |
| 100                        | 390.2 | 0.4532 | 1163.7 | 0.7927 | 228.6 | 0.6056 |
| 200                        | 443.0 | 0.4475 | 1389.0 | 0.8025 | 286.6 | 0.6211 |

## 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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