



Statistiques des précipitations extrêmes des communes belges

Ferrières (INS 61019)

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 | 8.0 | 11.5 | 14.1 | 15.7 | 16.9 | 17.8 | 18.6 | 19.9 | 20.9 | 22.8 | 24.2 | 27.9 |
| 20 min | 11.9 | 17.3 | 21.2 | 23.7 | 25.5 | 26.9 | 28.1 | 30.0 | 31.6 | 34.5 | 36.6 | 42.2 |
| 30 min | 14.0 | 20.3 | 25.1 | 27.9 | 30.1 | 31.7 | 33.1 | 35.4 | 37.2 | 40.7 | 43.2 | 49.8 |
| 1 h | 17.4 | 24.8 | 30.2 | 33.6 | 36.0 | 37.9 | 39.6 | 42.2 | 44.3 | 48.2 | 51.2 | 58.6 |
| 2 h | 21.1 | 29.4 | 35.6 | 39.3 | 42.1 | 44.3 | 46.1 | 49.0 | 51.4 | 55.8 | 59.1 | 67.5 |
| 3 h | 23.4 | 32.2 | 38.8 | 42.7 | 45.6 | 47.9 | 49.8 | 52.9 | 55.4 | 60.1 | 63.5 | 72.3 |
| 6 h | 28.4 | 36.9 | 43.2 | 47.1 | 49.9 | 52.1 | 53.9 | 56.9 | 59.3 | 63.8 | 67.1 | 75.5 |
| 12 h | 35.1 | 45.2 | 52.7 | 57.1 | 60.4 | 63.0 | 65.2 | 68.7 | 71.5 | 76.7 | 80.6 | 90.3 |
| 1 j | 43.4 | 55.1 | 63.5 | 68.5 | 72.2 | 75.0 | 77.4 | 81.2 | 84.2 | 89.8 | 93.8 | 104.1 |
| 2 j | 56.7 | 71.4 | 81.7 | 87.8 | 92.1 | 95.5 | 98.3 | 102.8 | 106.3 | 112.7 | 117.4 | 129.1 |
| 3 j | 61.4 | 77.5 | 88.7 | 95.1 | 99.7 | 103.3 | 106.3 | 110.9 | 114.6 | 121.4 | 126.2 | 138.2 |
| 4 j | 67.4 | 84.7 | 96.6 | 103.4 | 108.3 | 112.1 | 115.2 | 120.1 | 123.9 | 130.9 | 136.0 | 148.3 |
| 5 j | 76.6 | 95.8 | 108.8 | 116.3 | 121.6 | 125.7 | 129.0 | 134.4 | 138.5 | 146.1 | 151.5 | 164.7 |
| 7 j | 89.2 | 110.0 | 124.0 | 131.9 | 137.5 | 141.9 | 145.4 | 151.0 | 155.3 | 163.2 | 168.8 | 182.5 |
| 10 j | 107.2 | 131.9 | 148.3 | 157.6 | 164.1 | 169.1 | 173.2 | 179.6 | 184.6 | 193.6 | 200.0 | 215.3 |
| 15 j | 130.2 | 158.8 | 177.6 | 188.1 | 195.4 | 201.0 | 205.6 | 212.7 | 218.2 | 228.2 | 235.2 | 251.9 |
| 20 j | 151.8 | 185.5 | 207.3 | 219.5 | 227.9 | 234.4 | 239.6 | 247.8 | 254.1 | 265.4 | 273.3 | 292.2 |
| 25 j | 163.4 | 199.1 | 222.1 | 234.8 | 243.6 | 250.3 | 255.8 | 264.3 | 270.8 | 282.5 | 290.6 | 310.0 |
| 30 j | 189.1 | 226.7 | 250.7 | 264.0 | 273.1 | 280.1 | 285.8 | 294.5 | 301.3 | 313.3 | 321.7 | 341.6 |

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 | 8.0 | 11.5 | 14.1 | 15.7 | 16.9 | 17.8 | 18.6 | 19.9 | 20.9 | 22.8 | 24.2 | 27.9 |
| | 0.3 | 0.5 | 0.7 | 0.9 | 1.0 | 1.1 | 1.2 | 1.4 | 1.6 | 1.9 | 2.2 | 3.0 |
| 20 min | 11.9 | 17.3 | 21.2 | 23.7 | 25.5 | 26.9 | 28.1 | 30.0 | 31.6 | 34.5 | 36.6 | 42.2 |
| | 0.5 | 0.8 | 1.1 | 1.4 | 1.6 | 1.8 | 2.0 | 2.3 | 2.6 | 3.1 | 3.5 | 4.7 |
| 30 min | 14.0 | 20.3 | 25.1 | 27.9 | 30.1 | 31.7 | 33.1 | 35.4 | 37.2 | 40.7 | 43.2 | 49.8 |
| | 0.5 | 0.8 | 1.0 | 1.2 | 1.3 | 1.5 | 1.6 | 1.8 | 1.9 | 2.3 | 2.5 | 3.3 |
| 1 h | 17.4 | 24.8 | 30.2 | 33.6 | 36.0 | 37.9 | 39.6 | 42.2 | 44.3 | 48.2 | 51.2 | 58.6 |
| | 0.6 | 1.0 | 1.4 | 1.7 | 1.9 | 2.1 | 2.3 | 2.6 | 2.9 | 3.4 | 3.9 | 5.2 |
| 2 h | 21.1 | 29.4 | 35.6 | 39.3 | 42.1 | 44.3 | 46.1 | 49.0 | 51.4 | 55.8 | 59.1 | 67.5 |
| | 0.8 | 1.2 | 1.6 | 1.9 | 2.2 | 2.4 | 2.6 | 2.9 | 3.3 | 3.9 | 4.4 | 5.8 |
| 3 h | 23.4 | 32.2 | 38.8 | 42.7 | 45.6 | 47.9 | 49.8 | 52.9 | 55.4 | 60.1 | 63.5 | 72.3 |
| | 0.9 | 1.2 | 1.6 | 1.9 | 2.1 | 2.3 | 2.5 | 2.8 | 3.0 | 3.5 | 4.0 | 5.2 |
| 6 h | 28.4 | 36.9 | 43.2 | 47.1 | 49.9 | 52.1 | 53.9 | 56.9 | 59.3 | 63.8 | 67.1 | 75.5 |
| | 1.0 | 1.2 | 1.6 | 1.9 | 2.2 | 2.4 | 2.6 | 3.0 | 3.4 | 4.1 | 4.7 | 6.4 |
| 12 h | 35.1 | 45.2 | 52.7 | 57.1 | 60.4 | 63.0 | 65.2 | 68.7 | 71.5 | 76.7 | 80.6 | 90.3 |
| | 1.3 | 1.6 | 2.1 | 2.6 | 2.9 | 3.3 | 3.6 | 4.2 | 4.6 | 5.6 | 6.4 | 8.7 |
| 1 j | 43.4 | 55.1 | 63.5 | 68.5 | 72.2 | 75.0 | 77.4 | 81.2 | 84.2 | 89.8 | 93.8 | 104.1 |
| | 1.5 | 1.7 | 1.9 | 2.1 | 2.3 | 2.4 | 2.5 | 2.8 | 3.0 | 3.4 | 3.7 | 4.7 |
| 2 j | 56.7 | 71.4 | 81.7 | 87.8 | 92.1 | 95.5 | 98.3 | 102.8 | 106.3 | 112.7 | 117.4 | 129.1 |
| | 2.4 | 2.9 | 3.4 | 3.8 | 4.1 | 4.4 | 4.6 | 5.0 | 5.4 | 6.2 | 6.8 | 8.5 |
| 3 j | 61.4 | 77.5 | 88.7 | 95.1 | 99.7 | 103.3 | 106.3 | 110.9 | 114.6 | 121.4 | 126.2 | 138.2 |
| | 3.0 | 3.7 | 4.3 | 4.7 | 5.1 | 5.4 | 5.7 | 6.1 | 6.5 | 7.3 | 7.9 | 9.5 |
| 4 j | 67.4 | 84.7 | 96.6 | 103.4 | 108.3 | 112.1 | 115.2 | 120.1 | 123.9 | 130.9 | 136.0 | 148.3 |
| | 3.4 | 4.2 | 4.8 | 5.2 | 5.5 | 5.8 | 6.0 | 6.4 | 6.7 | 7.4 | 7.9 | 9.3 |
| 5 j | 76.6 | 95.8 | 108.8 | 116.3 | 121.6 | 125.7 | 129.0 | 134.4 | 138.5 | 146.1 | 151.5 | 164.7 |
| | 4.0 | 4.9 | 5.6 | 6.1 | 6.4 | 6.7 | 7.0 | 7.4 | 7.7 | 8.4 | 8.9 | 10.3 |
| 7 j | 89.2 | 110.0 | 124.0 | 131.9 | 137.5 | 141.9 | 145.4 | 151.0 | 155.3 | 163.2 | 168.8 | 182.5 |
| | 4.8 | 5.7 | 6.4 | 6.8 | 7.2 | 7.4 | 7.6 | 8.0 | 8.3 | 8.9 | 9.3 | 10.4 |
| 10 j | 107.2 | 131.9 | 148.3 | 157.6 | 164.1 | 169.1 | 173.2 | 179.6 | 184.6 | 193.6 | 200.0 | 215.3 |
| | 6.1 | 7.5 | 8.5 | 9.1 | 9.6 | 9.9 | 10.2 | 10.7 | 11.1 | 11.8 | 12.4 | 13.8 |
| 15 j | 130.2 | 158.8 | 177.6 | 188.1 | 195.4 | 201.0 | 205.6 | 212.7 | 218.2 | 228.2 | 235.2 | 251.9 |
| | 7.4 | 9.0 | 10.1 | 10.7 | 11.1 | 11.5 | 11.8 | 12.2 | 12.5 | 13.2 | 13.7 | 14.8 |
| 20 j | 151.8 | 185.5 | 207.3 | 219.5 | 227.9 | 234.4 | 239.6 | 247.8 | 254.1 | 265.4 | 273.3 | 292.2 |
| | 8.7 | 10.7 | 12.0 | 12.7 | 13.2 | 13.6 | 13.9 | 14.4 | 14.9 | 15.6 | 16.2 | 17.6 |
| 25 j | 163.4 | 199.1 | 222.1 | 234.8 | 243.6 | 250.3 | 255.8 | 264.3 | 270.8 | 282.5 | 290.6 | 310.0 |
| | 9.8 | 12.0 | 13.5 | 14.5 | 15.1 | 15.7 | 16.1 | 16.8 | 17.4 | 18.5 | 19.3 | 21.5 |
| 30 j | 189.1 | 226.7 | 250.7 | 264.0 | 273.1 | 280.1 | 285.8 | 294.5 | 301.3 | 313.3 | 321.7 | 341.6 |
| | 10.7 | 12.9 | 14.5 | 15.5 | 16.2 | 16.8 | 17.3 | 18.1 | 18.8 | 20.1 | 21.0 | 23.5 |

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 | 7.5 | 10.6 | 12.8 | 14.0 | 14.9 | 15.6 | 16.2 | 17.1 | 17.8 | 19.0 | 19.9 | 22.0 |
| | 8.6 | 12.4 | 15.5 | 17.4 | 18.8 | 20.0 | 21.0 | 22.7 | 24.0 | 26.6 | 28.6 | 33.8 |
| 20 min | 11.0 | 15.7 | 19.0 | 20.9 | 22.3 | 23.3 | 24.1 | 25.5 | 26.5 | 28.4 | 29.8 | 33.1 |
| | 12.8 | 18.8 | 23.5 | 26.5 | 28.7 | 30.5 | 32.0 | 34.5 | 36.6 | 40.5 | 43.5 | 51.3 |
| 30 min | 12.9 | 18.8 | 23.0 | 25.6 | 27.4 | 28.9 | 30.0 | 32.0 | 33.5 | 36.3 | 38.3 | 43.3 |
| | 15.1 | 21.9 | 27.1 | 30.3 | 32.7 | 34.6 | 36.2 | 38.9 | 41.0 | 45.1 | 48.2 | 56.2 |
| 1 h | 16.2 | 22.8 | 27.6 | 30.3 | 32.3 | 33.8 | 35.1 | 37.1 | 38.7 | 41.5 | 43.6 | 48.5 |
| | 18.7 | 26.7 | 32.9 | 36.8 | 39.7 | 42.1 | 44.0 | 47.3 | 49.9 | 55.0 | 58.8 | 68.8 |
| 2 h | 19.6 | 27.1 | 32.5 | 35.6 | 37.8 | 39.6 | 41.0 | 43.3 | 45.0 | 48.2 | 50.5 | 56.0 |
| | 22.6 | 31.7 | 38.7 | 43.1 | 46.3 | 49.0 | 51.2 | 54.8 | 57.8 | 63.4 | 67.7 | 78.9 |
| 3 h | 21.7 | 29.8 | 35.6 | 39.0 | 41.5 | 43.4 | 45.0 | 47.5 | 49.5 | 53.1 | 55.7 | 62.2 |
| | 25.1 | 34.7 | 41.9 | 46.4 | 49.7 | 52.4 | 54.7 | 58.4 | 61.4 | 67.0 | 71.3 | 82.4 |
| 6 h | 26.4 | 34.5 | 40.1 | 43.4 | 45.6 | 47.4 | 48.8 | 51.0 | 52.7 | 55.7 | 57.8 | 62.9 |
| | 30.3 | 39.4 | 46.4 | 50.8 | 54.1 | 56.8 | 59.1 | 62.8 | 65.9 | 71.8 | 76.3 | 88.0 |
| 12 h | 32.5 | 42.0 | 48.5 | 52.1 | 54.6 | 56.6 | 58.1 | 60.5 | 62.4 | 65.7 | 68.0 | 73.3 |
| | 37.7 | 48.4 | 56.8 | 62.2 | 66.2 | 69.5 | 72.3 | 76.8 | 80.6 | 87.7 | 93.1 | 107.4 |
| 1 j | 40.4 | 51.7 | 59.7 | 64.4 | 67.7 | 70.3 | 72.4 | 75.7 | 78.3 | 83.1 | 86.5 | 94.9 |
| | 46.4 | 58.5 | 67.3 | 72.7 | 76.6 | 79.7 | 82.4 | 86.6 | 90.0 | 96.4 | 101.2 | 113.3 |
| 2 j | 52.0 | 65.8 | 75.1 | 80.4 | 84.1 | 86.9 | 89.3 | 92.9 | 95.6 | 100.6 | 104.1 | 112.5 |
| | 61.3 | 77.0 | 88.3 | 95.1 | 100.1 | 104.0 | 107.3 | 112.6 | 116.9 | 124.8 | 130.7 | 145.7 |
| 3 j | 55.6 | 70.3 | 80.2 | 85.8 | 89.7 | 92.7 | 95.2 | 99.0 | 101.9 | 107.1 | 110.8 | 119.6 |
| | 67.3 | 84.7 | 97.1 | 104.4 | 109.7 | 113.9 | 117.4 | 122.9 | 127.4 | 135.6 | 141.6 | 156.8 |
| 4 j | 60.7 | 76.5 | 87.2 | 93.3 | 97.5 | 100.8 | 103.4 | 107.5 | 110.7 | 116.5 | 120.6 | 130.2 |
| | 74.1 | 92.9 | 106.0 | 113.6 | 119.1 | 123.4 | 126.9 | 132.6 | 137.1 | 145.4 | 151.4 | 166.5 |
| 5 j | 68.9 | 86.2 | 97.8 | 104.4 | 109.0 | 112.5 | 115.4 | 119.9 | 123.4 | 129.6 | 134.0 | 144.4 |
| | 84.4 | 105.4 | 119.8 | 128.2 | 134.2 | 138.8 | 142.7 | 148.8 | 153.6 | 162.5 | 168.9 | 184.9 |
| 7 j | 79.8 | 98.7 | 111.4 | 118.5 | 123.5 | 127.3 | 130.4 | 135.3 | 139.1 | 145.9 | 150.6 | 162.0 |
| | 98.6 | 121.2 | 136.5 | 145.3 | 151.6 | 156.4 | 160.4 | 166.7 | 171.6 | 180.6 | 187.0 | 202.9 |
| 10 j | 95.3 | 117.2 | 131.6 | 139.7 | 145.3 | 149.6 | 153.2 | 158.6 | 162.8 | 170.4 | 175.7 | 188.2 |
| | 119.1 | 146.6 | 165.0 | 175.5 | 182.9 | 188.6 | 193.2 | 200.6 | 206.3 | 216.7 | 224.2 | 242.4 |
| 15 j | 115.6 | 141.2 | 157.8 | 167.1 | 173.6 | 178.5 | 182.5 | 188.8 | 193.7 | 202.3 | 208.4 | 222.9 |
| | 144.8 | 176.5 | 197.4 | 209.1 | 217.2 | 223.5 | 228.6 | 236.6 | 242.8 | 254.0 | 261.9 | 281.0 |
| 20 j | 134.6 | 164.5 | 183.9 | 194.6 | 202.0 | 207.7 | 212.3 | 219.5 | 225.0 | 234.8 | 241.6 | 257.8 |
| | 168.9 | 206.4 | 230.7 | 244.3 | 253.8 | 261.0 | 266.9 | 276.1 | 283.2 | 296.0 | 305.0 | 326.6 |
| 25 j | 144.2 | 175.6 | 195.6 | 206.5 | 214.0 | 219.6 | 224.2 | 231.3 | 236.7 | 246.2 | 252.7 | 267.9 |
| | 182.6 | 222.6 | 248.6 | 263.1 | 273.3 | 281.0 | 287.4 | 297.3 | 304.9 | 318.8 | 328.6 | 352.1 |
| 30 j | 168.1 | 201.5 | 222.3 | 233.7 | 241.4 | 247.2 | 251.9 | 259.0 | 264.4 | 274.0 | 280.5 | 295.4 |
| | 210.0 | 251.9 | 279.1 | 294.3 | 304.9 | 313.0 | 319.7 | 330.1 | 338.1 | 352.6 | 362.9 | 387.7 |

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 | 142.7 | 0.4688 | 299.9 | 0.6995 | 50.1 | 0.4938 |
| 5 | 199.7 | 0.4586 | 475.1 | 0.7278 | 68.5 | 0.5053 |
| 10 | 241.0 | 0.4516 | 616.4 | 0.7433 | 85.3 | 0.5159 |
| 15 | 265.7 | 0.4476 | 706.3 | 0.7513 | 96.6 | 0.5226 |
| 20 | 283.6 | 0.4447 | 774.0 | 0.7567 | 105.5 | 0.5276 |
| 25 | 297.7 | 0.4425 | 829.0 | 0.7607 | 112.9 | 0.5315 |
| 30 | 309.4 | 0.4407 | 875.7 | 0.7639 | 119.3 | 0.5348 |
| 40 | 328.2 | 0.4378 | 952.7 | 0.7689 | 130.1 | 0.5400 |
| 50 | 343.1 | 0.4355 | 1015.4 | 0.7726 | 139.2 | 0.5442 |
| 75 | 370.9 | 0.4314 | 1136.5 | 0.7792 | 157.2 | 0.5519 |
| 100 | 391.2 | 0.4284 | 1228.4 | 0.7838 | 171.4 | 0.5574 |
| 200 | 442.6 | 0.4212 | 1472.2 | 0.7946 | 210.8 | 0.5712 |

Références

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