Índice

Balances horarios

1   Nueva función de recarga con datos diarios y cálculos horarios

```
def ugw_drainage(whcmax, whcr, whc0, kuz, exp, p, et):
    """
    args
    whxmax: max water holding content mm
    whcr: residual whc
    whc0: initial whc mm
    kuz: satured permeability mm/h
    exp: empirically deduced exponent
    winput: water input mm/h
    et: evapotranspiration mm/h
    output
    whc3: whc at the end
    wd: water drained
    runoff: runoff
    etr: real et
    """
    tiny = 0.00001
    whce = whcmax - whcr
    if whcmax < tiny:
        return 0., 0., p, 0.
    whc1 = whc0 + p
    whc2 = min(whcmax, whc1)
    runoff1 = whc1 - whc2
    x1 = whc2 - whcr
    wd1 = kuz * (x1 / whce)**exp
    if p > 0:
        etr1 = 0.
    else:
        etr1 = min(x1, et * x1 / whce)
    out1 = wd1 + etr1
    out2 = min(x1, out1)
    if out1 > out2:
        wd1 = wd1 * wd1 / out1
        etr1 = etr1 * etr1 / out1
    whc3 = whc2 - wd1 - etr1
    balan = p - wd1 - runoff1 - etr1 + whc0 - whc3
    a = f'p {p:0.1f} - wd1 {wd1:0.1f} - runoff {runoff1:0.1f} -' +\
    f' etr {etr1:0.1f} - whc0 {whc0:0.1f} - whcf {whc3:0.1f} = {balan:0.5f}'
    print(a)
    if abs(balan) > tiny:
        raise ValueError(f'Error de balance {balan:0.5f}')
    return whc3, wd1, runoff1, etr1
```

Balances horarios

2 Sin Lluvia

Los efectos del drenaje diferido y la etr resultan en una disminución del almacenamiento

whc_var = whc[i] – whc[i-1]

2.1 Exponente 2
```
p 0.0 - wd1 1.0 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 11.1 = 0.00000
p 0.0 - wd1 0.7 - runoff 0.0 - etr 0.4 - whc0 11.1 - whcf 9.9 = -0.00000
p 0.0 - wd1 0.6 - runoff 0.0 - etr 0.4 - whc0 9.9 - whcf 9.0 = 0.00000
p 0.0 - wd1 0.5 - runoff 0.0 - etr 0.3 - whc0 9.0 - whcf 8.2 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.3 - whc0 8.2 - whcf 7.5 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.3 - whc0 7.5 - whcf 6.9 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.2 - whc0 6.9 - whcf 6.4 = -0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 6.4 - whcf 6.0 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 6.0 - whcf 5.6 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 5.6 - whcf 5.3 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 5.3 - whcf 4.9 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 4.9 - whcf 4.7 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 4.7 - whcf 4.4 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 4.4 - whcf 4.2 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 4.2 - whcf 4.0 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 4.0 - whcf 3.8 = -0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 3.8 - whcf 3.6 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.1 - whc0 3.6 - whcf 3.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.1 - whc0 3.5 - whcf 3.3 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.1 - whc0 3.3 - whcf 3.2 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.1 - whc0 3.2 - whcf 3.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.1 - whc0 3.1 - whcf 2.9 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.1 - whc0 2.9 - whcf 2.8 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.1 - whc0 2.8 - whcf 2.7 = 0.00000
```



whcmax 25, whc0 12, kuz 100, exp 2.0
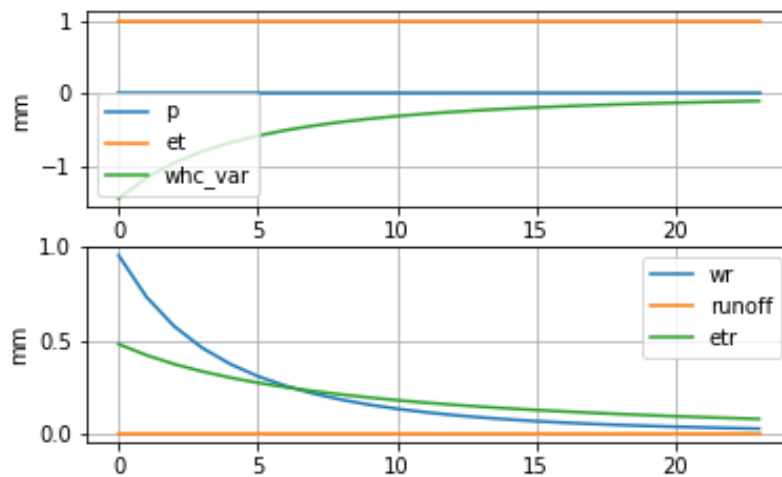
2.2   Exponente 5

```
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 11.9 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 11.9 - whcf 11.4 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.4 - whc0 11.4 - whcf 10.9 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 10.9 - whcf 10.4 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 10.4 - whcf 10.0 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 10.0 - whcf 9.6 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 9.6 - whcf 9.2 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 9.2 - whcf 8.8 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 8.8 - whcf 8.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 8.5 - whcf 8.2 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 8.2 - whcf 7.9 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 7.9 - whcf 7.6 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 7.6 - whcf 7.3 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 7.3 - whcf 7.0 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 7.0 - whcf 6.8 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 6.8 - whcf 6.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 6.5 - whcf 6.3 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 6.3 - whcf 6.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 6.1 - whcf 5.9 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 5.9 - whcf 5.7 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 5.7 - whcf 5.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 5.5 - whcf 5.3 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 5.3 - whcf 5.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 5.1 - whcf 4.9 = 0.00000
```


whcmax 25, whc0 12, kuz 100, exp 5.0
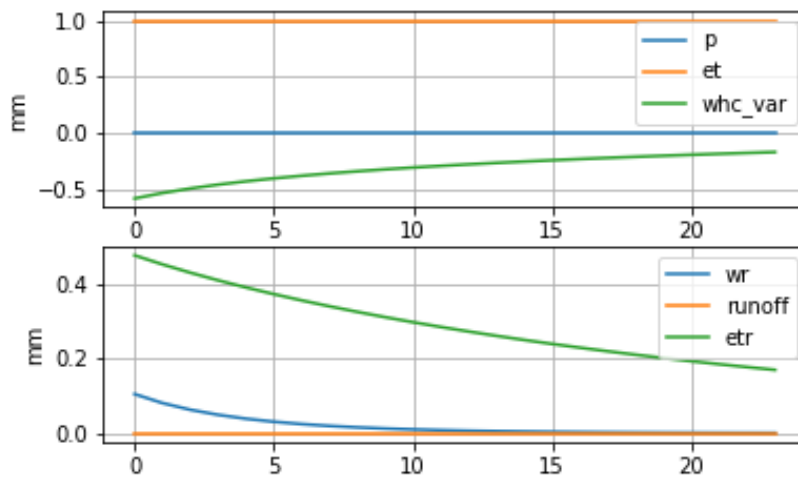
2.3   Exponente 12

```
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 12.0 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.5 - whc0 12.0 - whcf 11.6 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.6 - whcf 11.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.1 - whcf 10.7 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 10.7 - whcf 10.3 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 10.3 - whcf 9.9 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 9.9 - whcf 9.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 9.5 - whcf 9.2 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 9.2 - whcf 8.8 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 8.8 - whcf 8.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 8.5 - whcf 8.2 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 8.2 - whcf 7.9 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 7.9 - whcf 7.6 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 7.6 - whcf 7.3 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 7.3 - whcf 7.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 7.1 - whcf 6.8 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 6.8 - whcf 6.6 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 6.6 - whcf 6.3 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 6.3 - whcf 6.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 6.1 - whcf 5.9 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 5.9 - whcf 5.7 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 5.7 - whcf 5.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 5.5 - whcf 5.3 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.2 - whc0 5.3 - whcf 5.1 = 0.00000
```


whcmax 25, whc0 12, kuz 100, exp 12.0
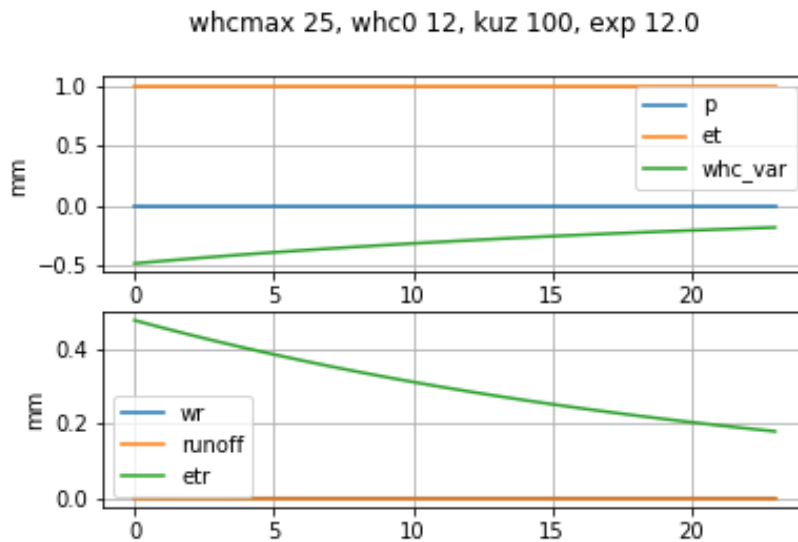
3   Con lluvia

Aumento del drenaje y el almacenamiento del suelo a consecuencia del pulso de lluvia; en algunos casos se puede producir escorrentía superficial.

3.1   15 mm de Lluvia en 3 horas y exponente 2

```
p 0.0 - wd1 1.0 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 11.1 = 0.00000
p 0.0 - wd1 0.7 - runoff 0.0 - etr 0.4 - whc0 11.1 - whcf 9.9 = -0.00000
p 0.0 - wd1 0.6 - runoff 0.0 - etr 0.4 - whc0 9.9 - whcf 9.0 = 0.00000
p 0.0 - wd1 0.5 - runoff 0.0 - etr 0.3 - whc0 9.0 - whcf 8.2 = 0.00000
p 5.0 - wd1 1.1 - runoff 0.0 - etr 0.0 - whc0 8.2 - whcf 12.1 = -0.00000
p 5.0 - wd1 1.9 - runoff 0.0 - etr 0.0 - whc0 12.1 - whcf 15.2 = -0.00000
p 5.0 - wd1 2.7 - runoff 0.0 - etr 0.0 - whc0 15.2 - whcf 17.6 = -0.00000
p 0.0 - wd1 2.0 - runoff 0.0 - etr 0.7 - whc0 17.6 - whcf 14.9 = -0.00000
p 0.0 - wd1 1.4 - runoff 0.0 - etr 0.6 - whc0 14.9 - whcf 12.9 = 0.00000
p 0.0 - wd1 1.0 - runoff 0.0 - etr 0.5 - whc0 12.9 - whcf 11.4 = 0.00000
p 0.0 - wd1 0.8 - runoff 0.0 - etr 0.4 - whc0 11.4 - whcf 10.2 = 0.00000
p 0.0 - wd1 0.6 - runoff 0.0 - etr 0.4 - whc0 10.2 - whcf 9.2 = 0.00000
p 0.0 - wd1 0.5 - runoff 0.0 - etr 0.3 - whc0 9.2 - whcf 8.4 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.3 - whc0 8.4 - whcf 7.7 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.3 - whc0 7.7 - whcf 7.1 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.3 - whc0 7.1 - whcf 6.5 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 6.5 - whcf 6.1 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 6.1 - whcf 5.7 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 5.7 - whcf 5.3 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 5.3 - whcf 5.0 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 5.0 - whcf 4.7 = -0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 4.7 - whcf 4.5 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 4.5 - whcf 4.2 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 4.2 - whcf 4.0 = 0.00000
```



whcmax 25, whc0 12, kuz 100, exp 2.0
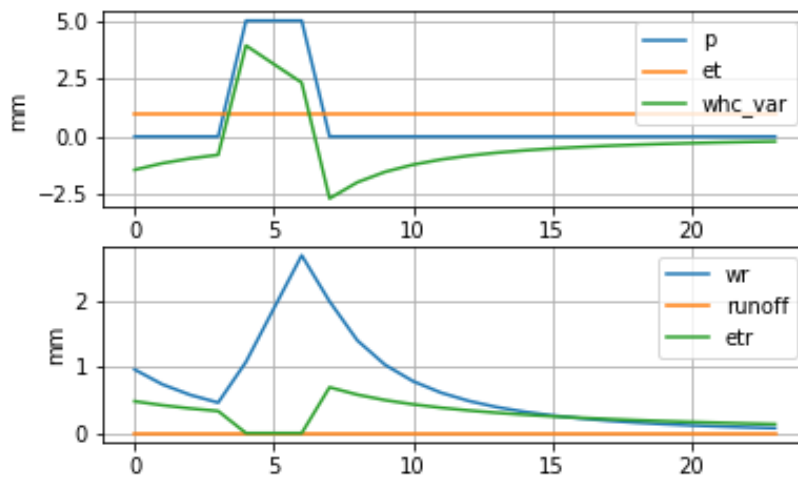
3.2   15 mm de Lluvia en 3 horas y exponente 6

```
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 12.0 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.5 - whc0 12.0 - whcf 11.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.5 - whcf 11.0 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.0 - whcf 10.6 = 0.00000
p 5.0 - wd1 0.2 - runoff 0.0 - etr 0.0 - whc0 10.6 - whcf 15.4 = 0.00000
p 5.0 - wd1 1.1 - runoff 0.0 - etr 0.0 - whc0 15.4 - whcf 19.2 = 0.00000
p 5.0 - wd1 3.4 - runoff 0.0 - etr 0.0 - whc0 19.2 - whcf 20.8 = 0.00000
p 0.0 - wd1 1.3 - runoff 0.0 - etr 0.8 - whc0 20.8 - whcf 18.7 = 0.00000
p 0.0 - wd1 0.7 - runoff 0.0 - etr 0.7 - whc0 18.7 - whcf 17.3 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.7 - whc0 17.3 - whcf 16.2 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.6 - whc0 16.2 - whcf 15.3 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.6 - whc0 15.3 - whcf 14.5 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.6 - whc0 14.5 - whcf 13.8 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 13.8 - whcf 13.2 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 13.2 - whcf 12.6 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 12.6 - whcf 12.1 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.5 - whc0 12.1 - whcf 11.6 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.6 - whcf 11.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.1 - whcf 10.6 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 10.6 - whcf 10.2 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 10.2 - whcf 9.8 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 9.8 - whcf 9.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 9.5 - whcf 9.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 9.1 - whcf 8.7 = 0.00000
```


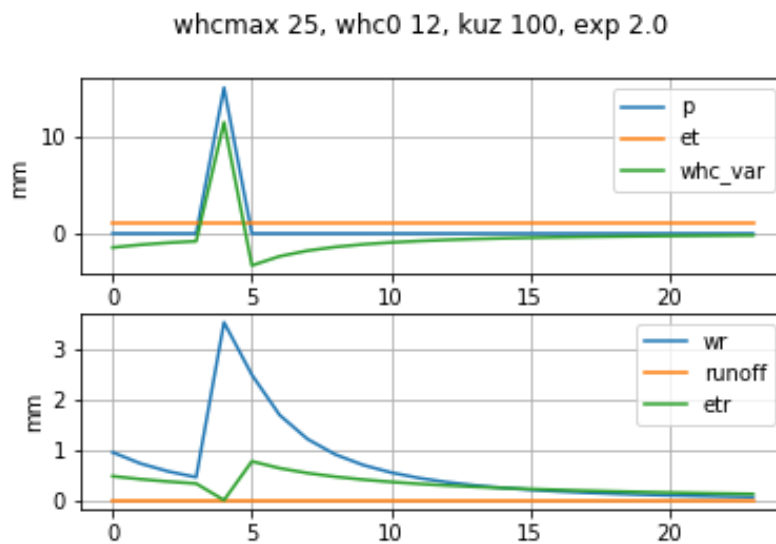
whcmax 25, whc0 12, kuz 100, exp 6.0
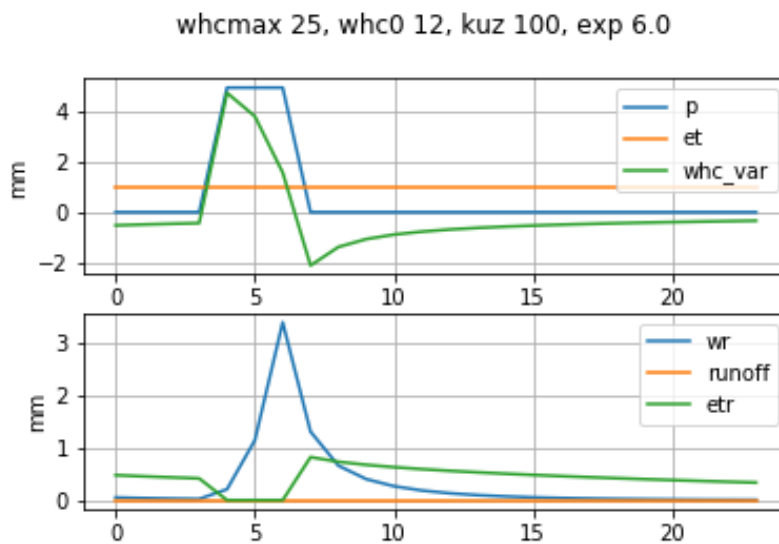
3.3   15 mm de Lluvia en 1 hora y exponente 2

```
p 0.0 - wd1 1.0 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 11.1 = 0.00000
p 0.0 - wd1 0.7 - runoff 0.0 - etr 0.4 - whc0 11.1 - whcf 9.9 = -0.00000
p 0.0 - wd1 0.6 - runoff 0.0 - etr 0.4 - whc0 9.9 - whcf 9.0 = 0.00000
p 0.0 - wd1 0.5 - runoff 0.0 - etr 0.3 - whc0 9.0 - whcf 8.2 = 0.00000
p 15.0 - wd1 3.6 - runoff 0.0 - etr 0.0 - whc0 8.2 - whcf 19.6 = 0.00000
p 0.0 - wd1 2.5 - runoff 0.0 - etr 0.8 - whc0 19.6 - whcf 16.3 = 0.00000
p 0.0 - wd1 1.7 - runoff 0.0 - etr 0.6 - whc0 16.3 - whcf 14.0 = 0.00000
p 0.0 - wd1 1.2 - runoff 0.0 - etr 0.5 - whc0 14.0 - whcf 12.2 = 0.00000
p 0.0 - wd1 0.9 - runoff 0.0 - etr 0.5 - whc0 12.2 - whcf 10.9 = 0.00000
p 0.0 - wd1 0.7 - runoff 0.0 - etr 0.4 - whc0 10.9 - whcf 9.7 = 0.00000
p 0.0 - wd1 0.6 - runoff 0.0 - etr 0.4 - whc0 9.7 - whcf 8.8 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.3 - whc0 8.8 - whcf 8.1 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.3 - whc0 8.1 - whcf 7.4 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.3 - whc0 7.4 - whcf 6.8 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 6.8 - whcf 6.3 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 6.3 - whcf 5.9 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 5.9 - whcf 5.5 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 5.5 - whcf 5.2 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 5.2 - whcf 4.9 = -0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 4.9 - whcf 4.6 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 4.6 - whcf 4.4 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 4.4 - whcf 4.2 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 4.2 - whcf 4.0 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 4.0 - whcf 3.8 = 0.00000
```
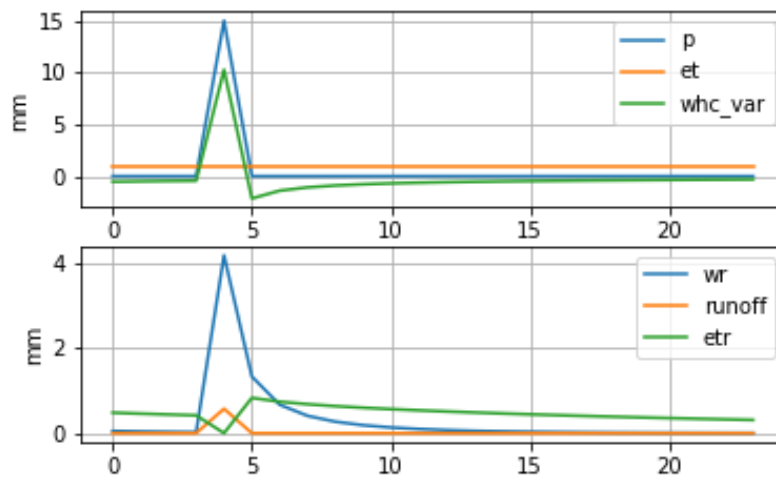

whcmax 25, whc0 12, kuz 100, exp 2.0

3.4   15 mm de Lluvia en 1 hora y exponente 6

```
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 12.0 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.5 - whc0 12.0 - whcf 11.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.5 - whcf 11.0 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.0 - whcf 10.6 = 0.00000
p 15.0 - wd1 4.2 - runoff 0.6 - etr 0.0 - whc0 10.6 - whcf 20.8 = 0.00000
p 0.0 - wd1 1.3 - runoff 0.0 - etr 0.8 - whc0 20.8 - whcf 18.7 = -0.00000
p 0.0 - wd1 0.7 - runoff 0.0 - etr 0.7 - whc0 18.7 - whcf 17.3 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.7 - whc0 17.3 - whcf 16.2 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.6 - whc0 16.2 - whcf 15.3 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.6 - whc0 15.3 - whcf 14.5 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.6 - whc0 14.5 - whcf 13.8 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 13.8 - whcf 13.2 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 13.2 - whcf 12.6 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 12.6 - whcf 12.1 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.5 - whc0 12.1 - whcf 11.6 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.6 - whcf 11.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.1 - whcf 10.7 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 10.7 - whcf 10.2 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 10.2 - whcf 9.8 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 9.8 - whcf 9.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 9.5 - whcf 9.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 9.1 - whcf 8.8 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 8.8 - whcf 8.4 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 8.4 - whcf 8.1 = 0.00000
```


whcmax 25, whc0 12, kuz 100, exp 6.0

3.5   15 mm de Lluvia en 1 hora, exponente 2 y kuz 10

```
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 11.9 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 11.9 - whcf 11.4 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.4 - whc0 11.4 - whcf 10.9 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.4 - whc0 10.9 - whcf 10.4 = 0.00000
p 15.0 - wd1 0.4 - runoff 0.4 - etr 0.0 - whc0 10.4 - whcf 24.6 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 1.0 - whc0 24.6 - whcf 23.2 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.9 - whc0 23.2 - whcf 21.9 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.9 - whc0 21.9 - whcf 20.7 = -0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.8 - whc0 20.7 - whcf 19.6 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.8 - whc0 19.6 - whcf 18.6 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.7 - whc0 18.6 - whcf 17.6 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.7 - whc0 17.6 - whcf 16.7 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.7 - whc0 16.7 - whcf 15.9 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.6 - whc0 15.9 - whcf 15.1 = -0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.6 - whc0 15.1 - whcf 14.4 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.6 - whc0 14.4 - whcf 13.7 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 13.7 - whcf 13.1 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 13.1 - whcf 12.5 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 11.9 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 11.9 - whcf 11.3 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.4 - whc0 11.3 - whcf 10.8 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.4 - whc0 10.8 - whcf 10.4 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.4 - whc0 10.4 - whcf 9.9 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.4 - whc0 9.9 - whcf 9.5 = 0.00000
```


whcmax:25, whc012, kuz10, exp:2.0
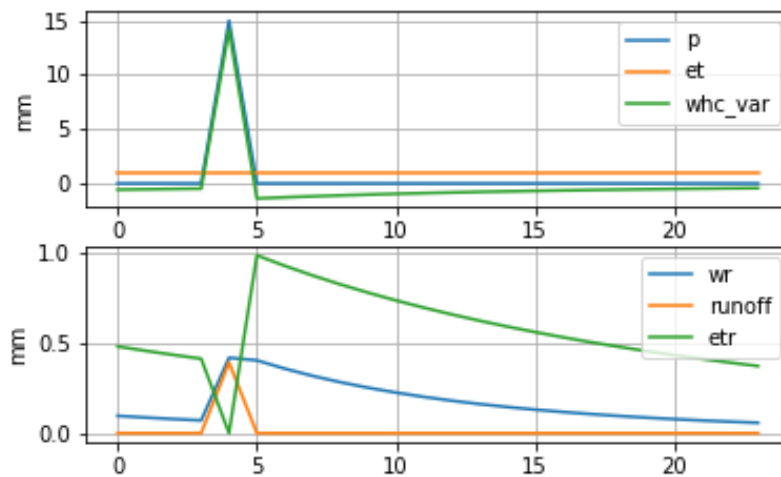
3.6   15 mm de Lluvia en 1 hora, exponente 0.5 y kuz 10

```
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 11.7 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.4 - whc0 11.7 - whcf 11.0 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.4 - whc0 11.0 - whcf 10.3 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.4 - whc0 10.3 - whcf 9.7 = 0.00000
p 15.0 - wd1 0.4 - runoff 0.0 - etr 0.0 - whc0 9.7 - whcf 24.3 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 1.0 - whc0 24.3 - whcf 22.9 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.9 - whc0 22.9 - whcf 21.6 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.9 - whc0 21.6 - whcf 20.3 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.8 - whc0 20.3 - whcf 19.1 = -0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.8 - whc0 19.1 - whcf 18.0 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.7 - whc0 18.0 - whcf 17.0 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.7 - whc0 17.0 - whcf 16.0 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.6 - whc0 16.0 - whcf 15.0 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.6 - whc0 15.0 - whcf 14.1 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.5 - whc0 14.1 - whcf 13.3 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.5 - whc0 13.3 - whcf 12.4 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.5 - whc0 12.4 - whcf 11.7 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.4 - whc0 11.7 - whcf 11.0 = -0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.4 - whc0 11.0 - whcf 10.3 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.4 - whc0 10.3 - whcf 9.6 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.4 - whc0 9.6 - whcf 9.0 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.3 - whc0 9.0 - whcf 8.4 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.3 - whc0 8.4 - whcf 7.9 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.3 - whc0 7.9 - whcf 7.4 = 0.00000
```


whcmax:25, whc012, kuz10, exp:0.5
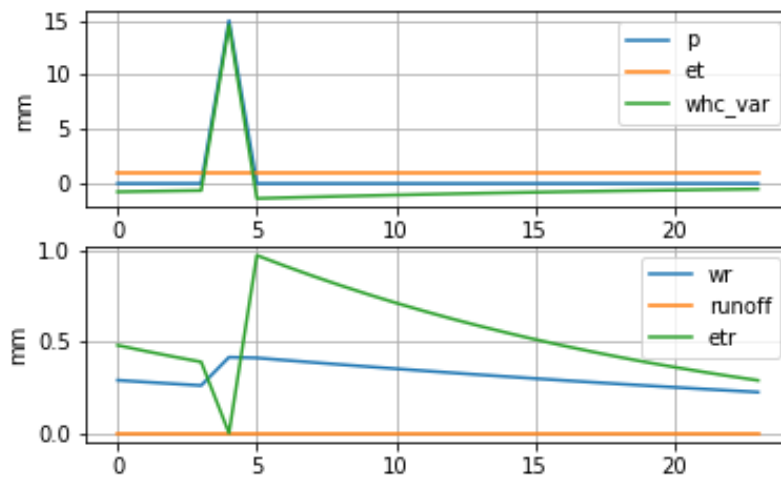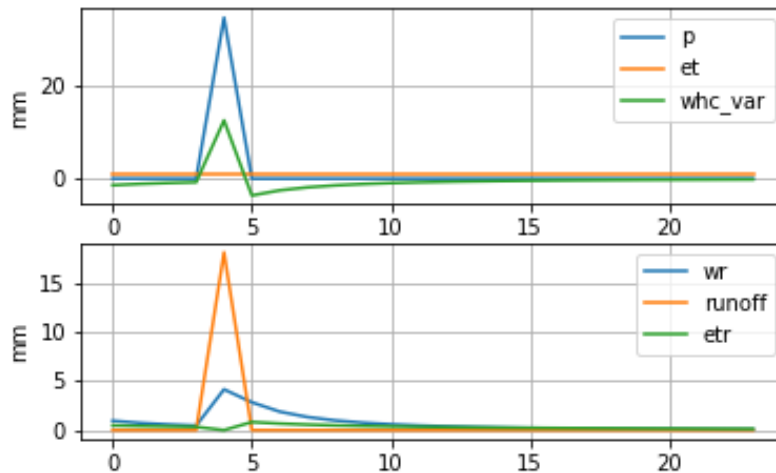
4   Eventos lluviosos con escorrentía

4.1   35 mm de Lluvia en 1 hora, exponente 2

```
p 0.0 - wd1 1.0 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 11.1 = 0.00000
p 0.0 - wd1 0.7 - runoff 0.0 - etr 0.4 - whc0 11.1 - whcf 9.9 = -0.00000
p 0.0 - wd1 0.6 - runoff 0.0 - etr 0.4 - whc0 9.9 - whcf 9.0 = 0.00000
p 0.0 - wd1 0.5 - runoff 0.0 - etr 0.3 - whc0 9.0 - whcf 8.2 = 0.00000
p 35.0 - wd1 4.2 - runoff 18.2 - etr 0.0 - whc0 8.2 - whcf 20.8 = 0.00000
p 0.0 - wd1 2.8 - runoff 0.0 - etr 0.8 - whc0 20.8 - whcf 17.2 = 0.00000
p 0.0 - wd1 1.9 - runoff 0.0 - etr 0.7 - whc0 17.2 - whcf 14.6 = 0.00000
p 0.0 - wd1 1.3 - runoff 0.0 - etr 0.6 - whc0 14.6 - whcf 12.7 = 0.00000
p 0.0 - wd1 1.0 - runoff 0.0 - etr 0.5 - whc0 12.7 - whcf 11.2 = 0.00000
p 0.0 - wd1 0.8 - runoff 0.0 - etr 0.4 - whc0 11.2 - whcf 10.0 = 0.00000
p 0.0 - wd1 0.6 - runoff 0.0 - etr 0.4 - whc0 10.0 - whcf 9.1 = 0.00000
p 0.0 - wd1 0.5 - runoff 0.0 - etr 0.3 - whc0 9.1 - whcf 8.3 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.3 - whc0 8.3 - whcf 7.6 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.3 - whc0 7.6 - whcf 7.0 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.2 - whc0 7.0 - whcf 6.5 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 6.5 - whcf 6.0 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 6.0 - whcf 5.6 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.2 - whc0 5.6 - whcf 5.3 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 5.3 - whcf 5.0 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 5.0 - whcf 4.7 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.2 - whc0 4.7 - whcf 4.4 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 4.4 - whcf 4.2 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 4.2 - whcf 4.0 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.1 - whc0 4.0 - whcf 3.8 = 0.00000
```


whcmax 25, whc0 12, kuz 100, exp 2.0

4.2   35 mm de Lluvia en 1 hora, exponente 6

```
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 12.5 - whcf 12.0 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.5 - whc0 12.0 - whcf 11.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.5 - whcf 11.0 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.0 - whcf 10.6 = 0.00000
p 35.0 - wd1 4.2 - runoff 20.6 - etr 0.0 - whc0 10.6 - whcf 20.8 = -0.00000
p 0.0 - wd1 1.3 - runoff 0.0 - etr 0.8 - whc0 20.8 - whcf 18.7 = -0.00000
p 0.0 - wd1 0.7 - runoff 0.0 - etr 0.7 - whc0 18.7 - whcf 17.3 = 0.00000
p 0.0 - wd1 0.4 - runoff 0.0 - etr 0.7 - whc0 17.3 - whcf 16.2 = 0.00000
p 0.0 - wd1 0.3 - runoff 0.0 - etr 0.6 - whc0 16.2 - whcf 15.3 = 0.00000
p 0.0 - wd1 0.2 - runoff 0.0 - etr 0.6 - whc0 15.3 - whcf 14.5 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.6 - whc0 14.5 - whcf 13.8 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 13.8 - whcf 13.2 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 13.2 - whcf 12.6 = 0.00000
p 0.0 - wd1 0.1 - runoff 0.0 - etr 0.5 - whc0 12.6 - whcf 12.1 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.5 - whc0 12.1 - whcf 11.6 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.6 - whcf 11.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 11.1 - whcf 10.7 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 10.7 - whcf 10.2 = -0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 10.2 - whcf 9.8 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 9.8 - whcf 9.5 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.4 - whc0 9.5 - whcf 9.1 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 9.1 - whcf 8.8 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 8.8 - whcf 8.4 = 0.00000
p 0.0 - wd1 0.0 - runoff 0.0 - etr 0.3 - whc0 8.4 - whcf 8.1 = 0.00000
```


whcmax 25, whc0 12, kuz 100, exp 6.0