1. Plot the heads (or WTD) of the initial steady state condition. The gradient is not uniform for the initial steady state conditions - discuss the influences of recharge and the unconfined condition on this nonlinearity.

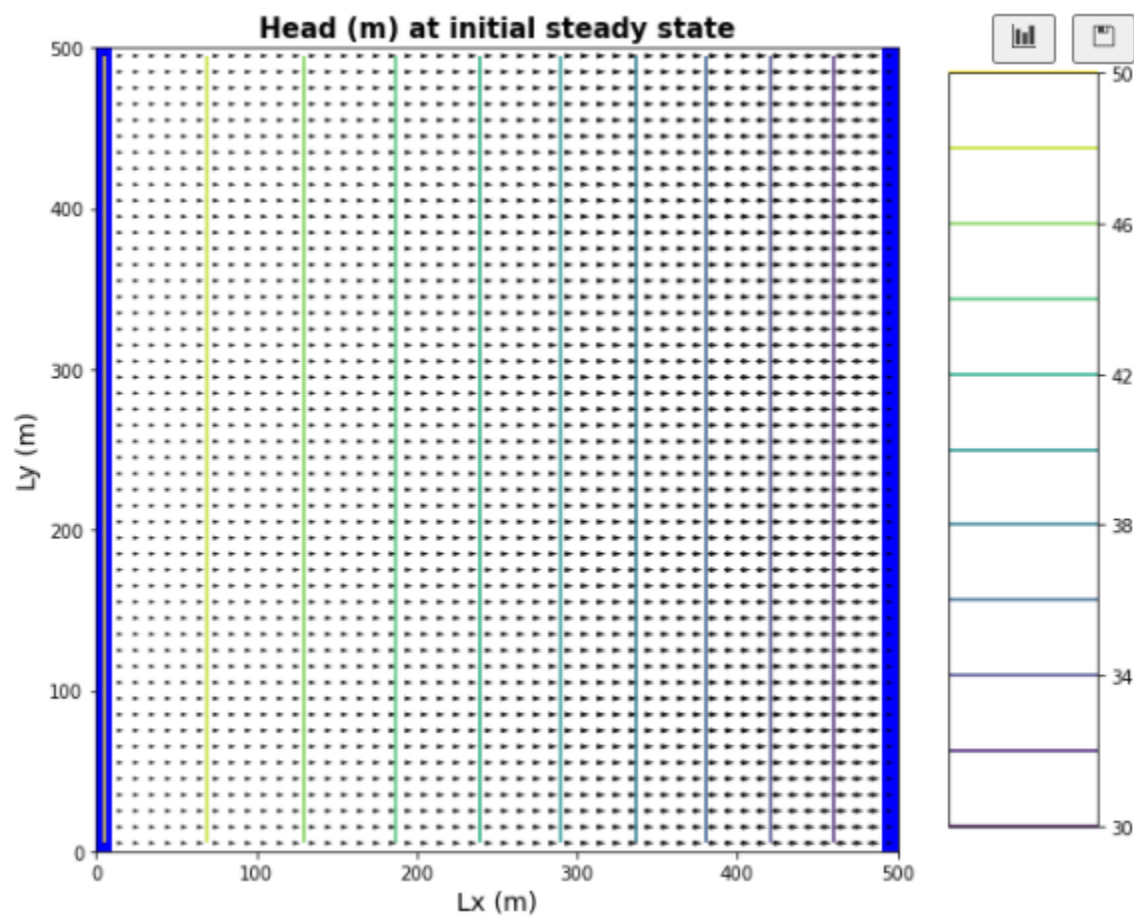- Head at steady state conditions (sim_years = 10, time_select = 0)

Figure 1. (Head at steady state conditions (sim_years = 10, time_select = 0))

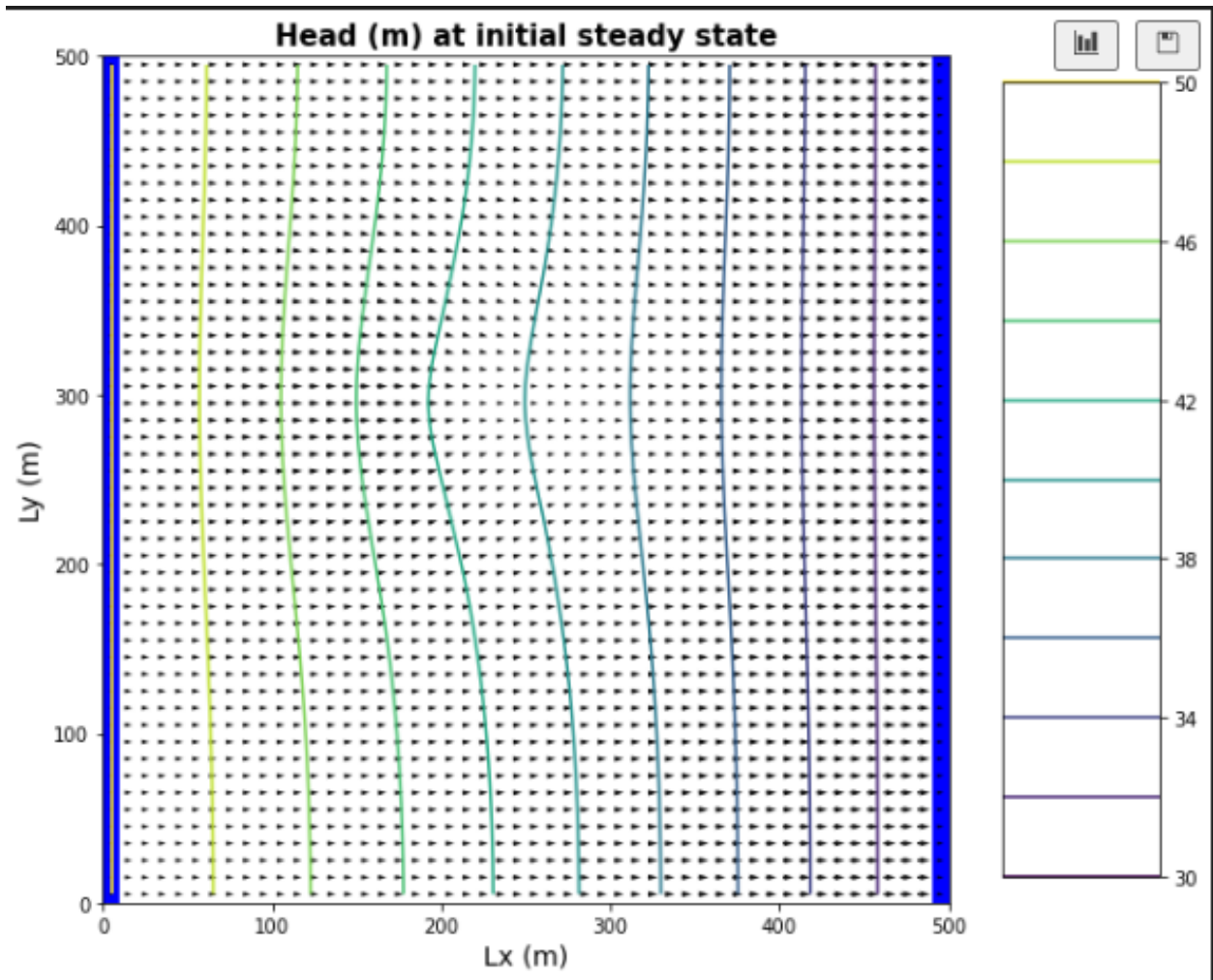- Head Contours at the last pumping period (sim_years = 10, time_select = -9)

Figure 2. (Head Contours at the last pumping period (sim_years = 10, time_select = -9))

2. Determine if the system has reached steady state after 10 years - consider a point at the well and another at the center of the domain.
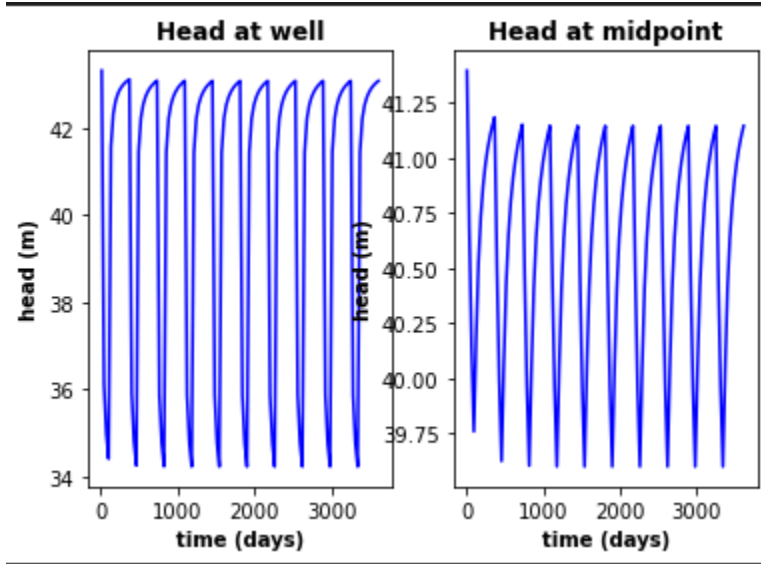
Head at well and midpoint sim_years = 10

Figure 3.(Head at well and midpoint sim_years = 10)

Print head values at Center of the domain

```
[41.39671  40.688213 40.14179  39.75882  40.188747 40.52536  40.73605
 40.874153 40.971493 41.04431  41.10122  41.14707  41.184795 40.506905
 39.985634 39.624172 40.073215 40.42677  40.65191  40.80228  40.91004
 40.991745 41.056236 41.10857  41.151833 40.478546 39.961124 39.602993
 40.05502  40.41123  40.63864  40.79094  40.900345 40.98345  41.049137
 41.102493 41.146633 40.47407  39.957256 39.59965  40.052147 40.408775
 40.636547 40.78915  40.898815 40.982143 41.04802  41.101536 41.145813
 40.473366 39.956646 39.599125 40.051693 40.40839  40.636215 40.788868
 40.898575 40.981934 41.04784  41.101383 41.145683 40.47325  39.956547
 39.59904  40.051624 40.40833  40.636166 40.788822 40.898537 40.981903
 41.047813 41.10136  41.14566  40.473236 39.956535 39.59903  40.051613
 40.408318 40.636158 40.78882  40.89853  40.9819   41.04781  41.101357
 41.14566  40.473232 39.95653  39.599026 40.05161  40.408318 40.636154
 40.788815 40.89853  40.981895 41.04781  41.101357 41.145657 40.473232
 39.95653  39.599026 40.05161  40.408318 40.636154 40.788815 40.89853
 40.981895 41.04781  41.101357 41.145657 40.473232 39.95653  39.599026
 40.05161  40.408318 40.636154 40.788815 40.89853  40.981895 41.04781
 41.101357 41.145657]
```

Table 1. Printed head values at center of the domain for 10 years

Print Head values at the Well

```
[43.312252 36.106586 34.976887 34.409485 41.564915 42.31929  42.61524
 42.781494 42.890488 42.968563 43.027752 43.074345 43.111965 35.907684
 34.802197 34.258118 41.455444 42.227753 42.53767  42.715496 42.83422
 42.920536 42.98673  43.039284 43.08199  35.87756  34.77552  34.234863
 41.43856  42.213585 42.525627 42.705227 42.825447 42.913036 42.980312
 43.033794 43.077293 35.872833 34.77133  34.231213 41.435905 42.211357
 42.523735 42.70361  42.824066 42.911854 42.9793   43.03293  43.076553
 35.87209  34.77067  34.230637 41.435486 42.211002 42.523434 42.703354
 42.82385  42.911667 42.97914  43.03279  43.076435 35.87197  34.77057
 34.230545 41.43542  42.21095  42.523388 42.703316 42.823814 42.91164
 42.979115 43.032772 43.076416 35.871952 34.770554 34.23053  41.43541
 42.21094  42.52338  42.70331  42.823807 42.911633 42.97911  43.03277
 43.076412 35.87195  34.77055  34.23053  41.43541  42.210938 42.52338
 42.70331  42.823807 42.911633 42.97911  43.032764 43.076412 35.87195
 34.77055  34.230526 41.43541  42.210938 42.52338  42.70331  42.823807
 42.911633 42.97911  43.032764 43.076412 35.87195  34.77055  34.230526
 41.43541  42.210938 42.52338  42.70331  42.823807 42.911633 42.97911
 43.032764 43.076412]
```

Table 2. Printed head values at well of the domain for 10 years

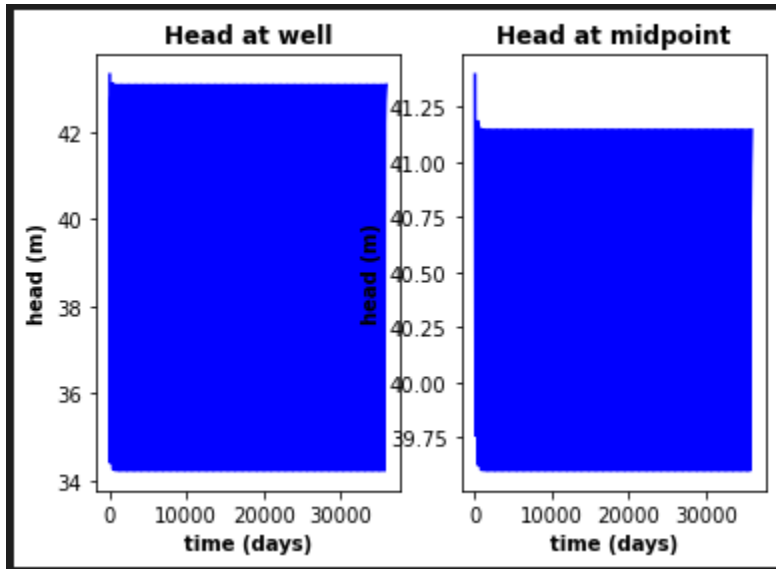3. Repeat your run this time for 100 years and reconsider question 2 again.

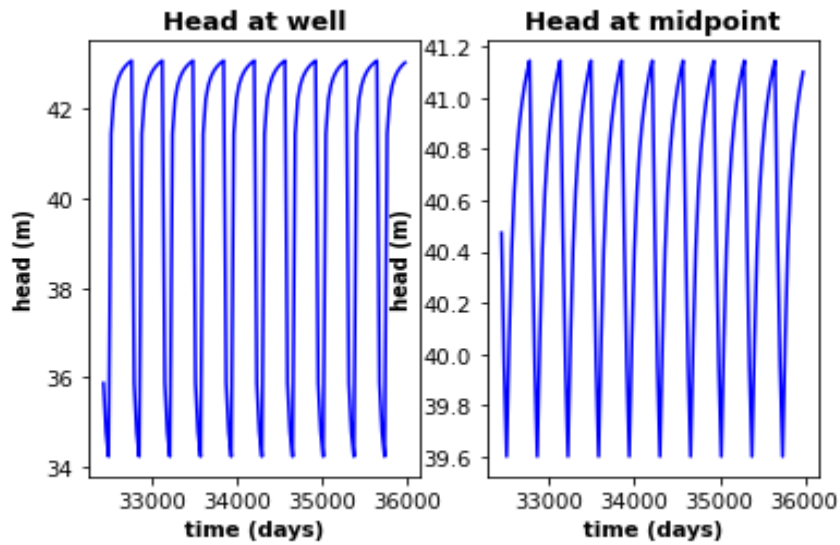Figure 4. Head for 100 year simulation

Figure 5. (Oscillation of head for the last ten years of pumping)

Print Head Values of the Well (sim_years = 100)

```
[35.87195  34.77055  34.230526 41.43541  42.210938 42.52338  42.70331
 42.823807 42.911633 42.97911  43.032764 43.076412 35.87195  34.77055
 34.230526 41.43541  42.210938 42.52338  42.70331  42.823807 42.911633
 42.97911  43.032764 43.076412 35.87195  34.77055  34.230526 41.43541
 42.210938 42.52338  42.70331  42.823807 42.911633 42.97911  43.032764
 43.076412 35.87195  34.77055  34.230526 41.43541  42.210938 42.52338
 42.70331  42.823807 42.911633 42.97911  43.032764 43.076412 35.87195
 34.77055  34.230526 41.43541  42.210938 42.52338  42.70331  42.823807
 42.911633 42.97911  43.032764 43.076412 35.87195  34.77055  34.230526
 41.43541  42.210938 42.52338  42.70331  42.823807 42.911633 42.97911
 43.032764 43.076412 35.87195  34.77055  34.230526 41.43541  42.210938
 42.52338  42.70331  42.823807 42.911633 42.97911  43.032764 43.076412
 35.87195  34.77055  34.230526 41.43541  42.210938 42.52338  42.70331
 42.823807 42.911633 42.97911  43.032764 43.076412 35.87195  34.77055
 34.230526 41.43541  42.210938 42.52338  42.70331  42.823807 42.911633
 42.97911  43.032764 43.076412 35.87195  34.77055  34.230526 41.43541
 42.210938 42.52338  42.70331  42.823807 42.911633 42.97911  43.032764]
```

Table 3. Head values of the well for 100 year simulation

Print Head Values of the Center of the Domain (sim_years = 100)

```
[40.473232 39.95653  39.599026 40.05161  40.408318 40.636154 40.788815
 40.89853  40.981895 41.04781  41.101357 41.145657 40.473232 39.95653
 39.599026 40.05161  40.408318 40.636154 40.788815 40.89853  40.981895
 41.04781  41.101357 41.145657 40.473232 39.95653  39.599026 40.05161
 40.408318 40.636154 40.788815 40.89853  40.981895 41.04781  41.101357
 41.145657 40.473232 39.95653  39.599026 40.05161  40.408318 40.636154
 40.788815 40.89853  40.981895 41.04781  41.101357 41.145657 40.473232
 39.95653  39.599026 40.05161  40.408318 40.636154 40.788815 40.89853
 40.981895 41.04781  41.101357 41.145657 40.473232 39.95653  39.599026
 40.05161  40.408318 40.636154 40.788815 40.89853  40.981895 41.04781
 41.101357 41.145657 40.473232 39.95653  39.599026 40.05161  40.408318
 40.636154 40.788815 40.89853  40.981895 41.04781  41.101357 41.145657
 40.473232 39.95653  39.599026 40.05161  40.408318 40.636154 40.788815
 40.89853  40.981895 41.04781  41.101357 41.145657 40.473232 39.95653
 39.599026 40.05161  40.408318 40.636154 40.788815 40.89853  40.981895
 41.04781  41.101357 41.145657 40.473232 39.95653  39.599026 40.05161
 40.408318 40.636154 40.788815 40.89853  40.981895 41.04781  41.101357]
```

Table 4. Head values of the center for 100 simulation

4. Find the zone of influence of the well defined in two ways:

Based on the drawdown from the initial steady state to the end of simulation time (end of final no-pumping stress period). (Time_select1 = 0, Time_select2 = -1)
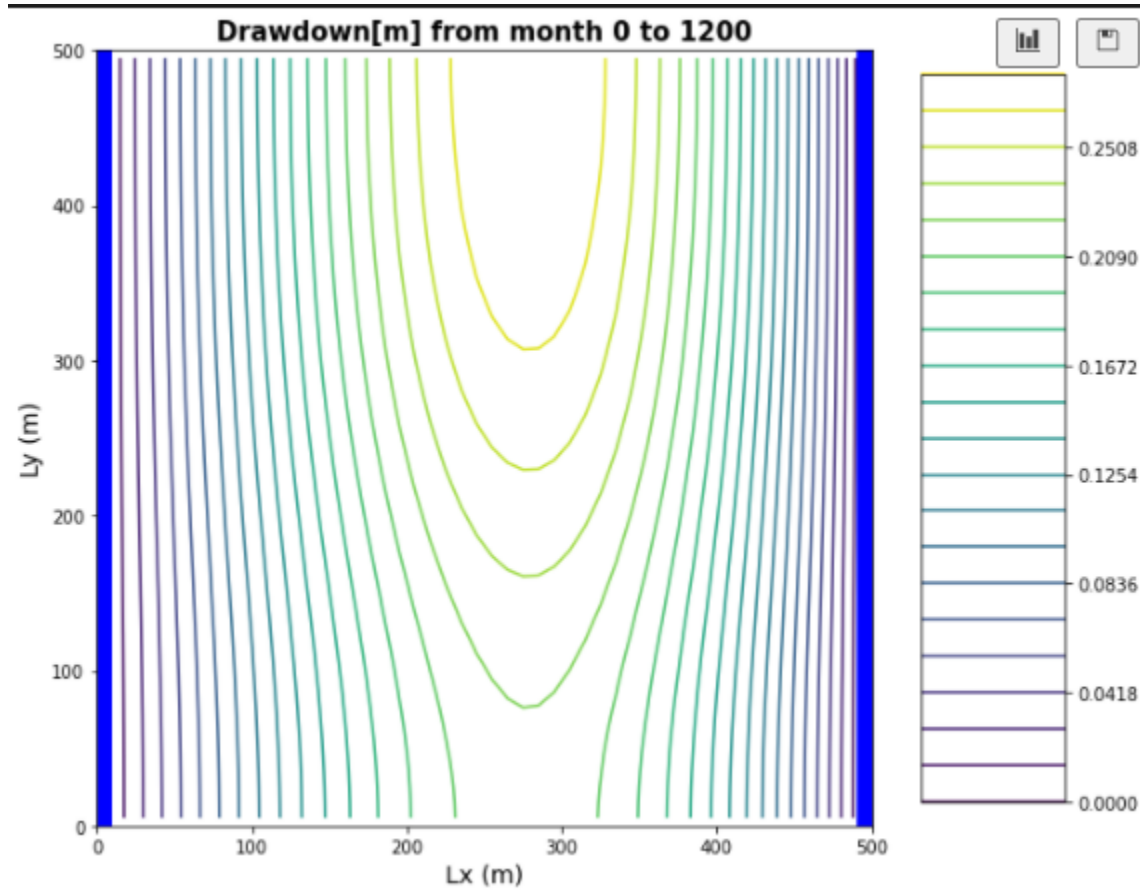

Figure 6. (Drawdown for Time_select1 = 0, Time_select2 = -1)

Based on the drawdown from the end of the last pump-on stress period to the end of simulation time. (Time_select1 = -9, Time_select2 = -1)
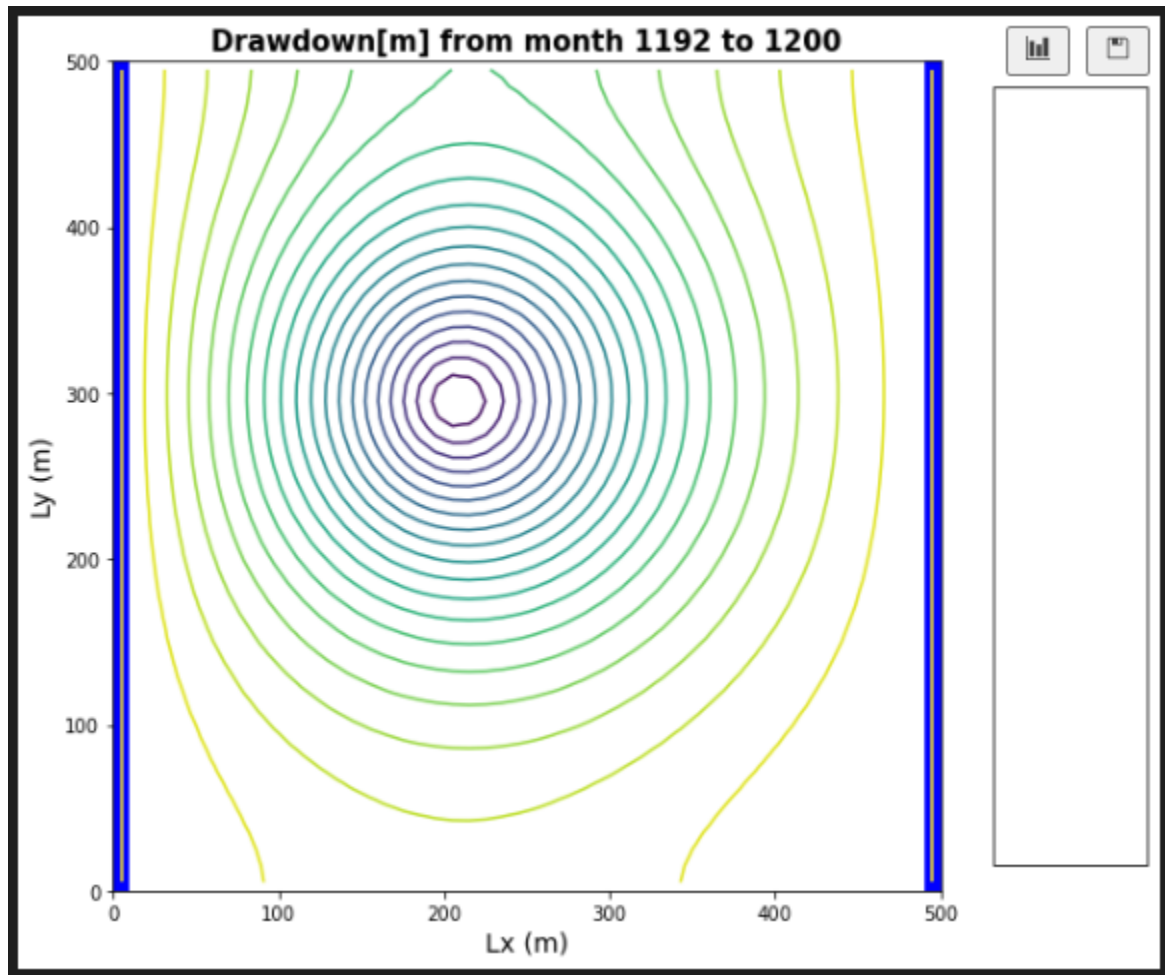

Figure 7. (Drawdown for Time_select1 = -9, Time_select2 = -1)