Presentation 12

Evaluating Output from SEAWAT Version 4

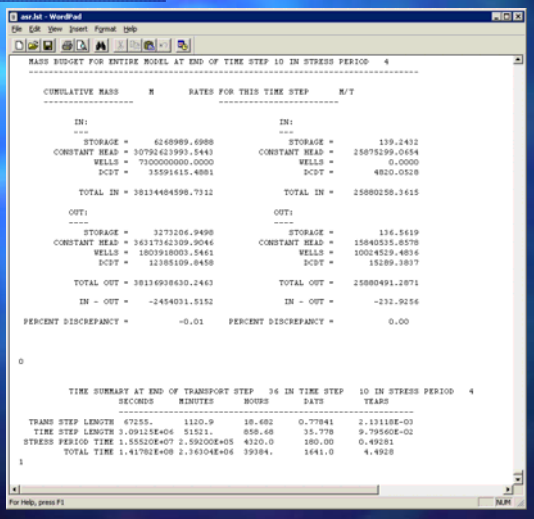
Model Results of Interest

- Listing Files
  - Flow budget
  - Solute mass budget
- Heads
- Flows
- Concentrations
  - Unformatted concentration file
  - Concentration observations
- Solute mass budget

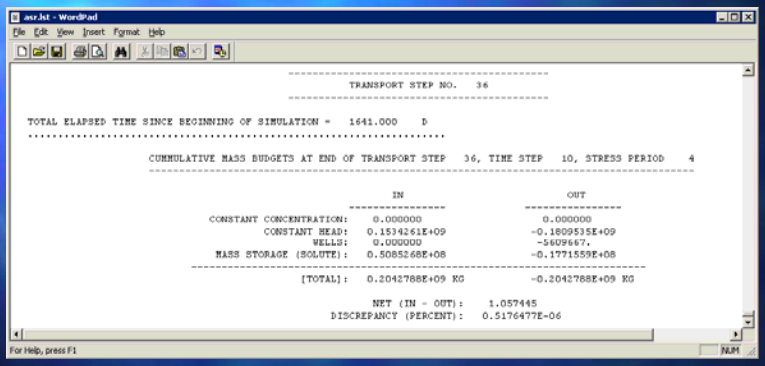
Listing Files

- Output from both MODFLOW and MT3D are written to either:
  - Global Listing File (of FTYPE GLOBAL)
  - Forward run listing file (of FTYPE LIST)
- Output file contains
  - Runtime information
  - Flow budgets
  - Solute budgets

Flow Budget



Solute Budget



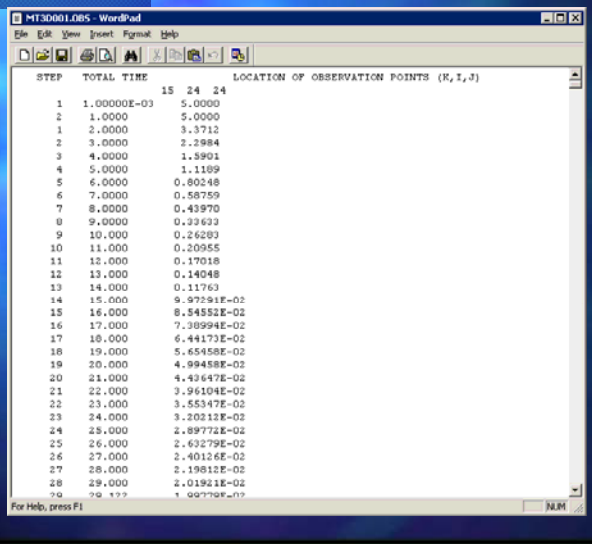
Heads

- Binary head file is “true binary”
- Heads (not equivalent freshwater heads)
- Used to make water-table and potentiometric surface maps

Concentrations

- Unformatted concentration file (mt3d001.ucn; true binary)
  - Perhaps most important output from SEAWAT
  - Animate with Modelviewer
- MT3DMS Observations (mt3d001.obs)
  - Import into Excel and prepare plots of concentration versus time for one or many cells
  - Saving interval is specified as a multiple of transport timesteps

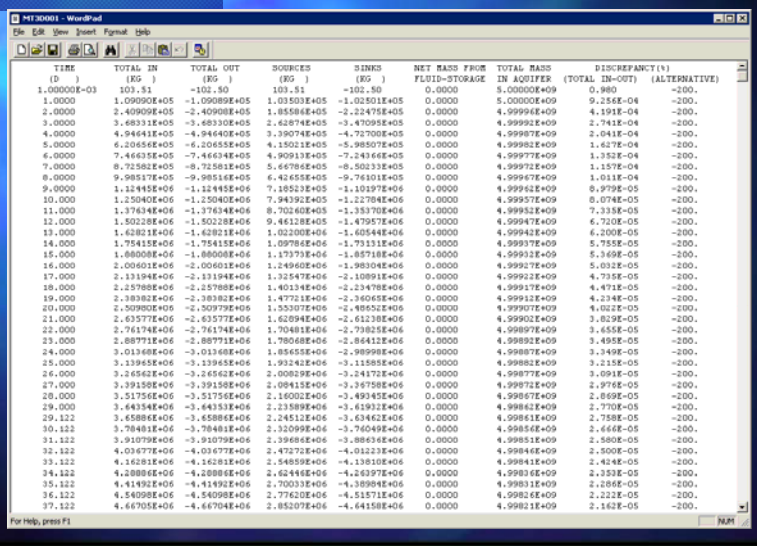
Observation File



Solute Mass Budget

- Mass budget information written to:
  - Listing file
  - Mt3d001.mas
    - Written as cumulative mass
    - Useful to plot cumulative mass in model domain as a function of time—indicates when steady state is achieved

Mt3d001.mas



TIME (D)	TOTAL IN (KG)	TOTAL OUT (KG)	SOURCES (KG)	SINKS (KG)	NET MASS FROM FLUID-STORAGE	TOTAL MASS IN AQUIFER	DISCREPANCY(%) (TOTAL IN-OUT)	(ALTERNATIVE)
1.00000E-03	103.51	-102.50	103.51	-102.50	0.0000	5.00000E+09	0.980	-200.
1.0000	1.09090E+05	-1.09089E+05	1.03503E+05	-1.02501E+05	0.0000	5.00000E+09	9.256E-04	-200.
2.0000	2.40909E+05	-2.40908E+05	1.85586E+05	-2.22475E+05	0.0000	4.99996E+09	4.191E-04	-200.
3.0000	3.68331E+05	-3.68330E+05	2.62874E+05	-3.47095E+05	0.0000	4.99992E+09	2.741E-04	-200.
4.0000	4.94641E+05	-4.94640E+05	3.39074E+05	-4.72700E+05	0.0000	4.99987E+09	2.041E-04	-200.
5.0000	6.20656E+05	-6.20655E+05	4.15021E+05	-5.98507E+05	0.0000	4.99982E+09	1.617E-04	-200.
6.0000	7.46635E+05	-7.46634E+05	4.90913E+05	-7.24366E+05	0.0000	4.99977E+09	1.352E-04	-200.
7.0000	8.72582E+05	-8.72581E+05	5.66786E+05	-8.50233E+05	0.0000	4.99972E+09	1.157E-04	-200.
8.0000	9.98517E+05	-9.98516E+05	6.42655E+05	-9.76101E+05	0.0000	4.99967E+09	1.011E-04	-200.
9.0000	1.12445E+06	-1.12445E+06	7.18523E+05	-1.10197E+06	0.0000	4.99962E+09	8.979E-05	-200.
10.000	1.25040E+06	-1.25040E+06	7.94392E+05	-1.22784E+06	0.0000	4.99957E+09	8.074E-05	-200.
11.000	1.37634E+06	-1.37634E+06	8.70260E+05	-1.35370E+06	0.0000	4.99952E+09	7.335E-05	-200.
12.000	1.50228E+06	-1.50228E+06	9.46128E+05	-1.47957E+06	0.0000	4.99947E+09	6.720E-05	-200.
13.000	1.62821E+06	-1.62821E+06	1.02200E+06	-1.60544E+06	0.0000	4.99942E+09	6.200E-05	-200.
14.000	1.75415E+06	-1.75415E+06	1.09786E+06	-1.73131E+06	0.0000	4.99937E+09	5.755E-05	-200.
15.000	1.88008E+06	-1.88008E+06	1.17373E+06	-1.85718E+06	0.0000	4.99932E+09	5.369E-05	-200.
16.000	2.00601E+06	-2.00601E+06	1.24960E+06	-1.98304E+06	0.0000	4.99927E+09	5.032E-05	-200.
17.000	2.13194E+06	-2.13194E+06	1.32547E+06	-2.10891E+06	0.0000	4.99922E+09	4.735E-05	-200.
18.000	2.25788E+06	-2.25788E+06	1.40134E+06	-2.23478E+06	0.0000	4.99917E+09	4.471E-05	-200.
19.000	2.38382E+06	-2.38382E+06	1.47721E+06	-2.36065E+06	0.0000	4.99912E+09	4.234E-05	-200.
20.000	2.50980E+06	-2.50979E+06	1.55307E+06	-2.48652E+06	0.0000	4.99907E+09	4.022E-05	-200.
21.000	2.63577E+06	-2.63577E+06	1.62894E+06	-2.61238E+06	0.0000	4.99902E+09	3.829E-05	-200.
22.000	2.76174E+06	-2.76174E+06	1.70481E+06	-2.73825E+06	0.0000	4.99897E+09	3.655E-05	-200.
23.000	2.88771E+06	-2.88771E+06	1.78068E+06	-2.86412E+06	0.0000	4.99892E+09	3.495E-05	-200.
24.000	3.01368E+06	-3.01368E+06	1.85655E+06	-2.98998E+06	0.0000	4.99887E+09	3.349E-05	-200.
25.000	3.13965E+06	-3.13965E+06	1.93242E+06	-3.11585E+06	0.0000	4.99882E+09	3.215E-05	-200.
26.000	3.26562E+06	-3.26562E+06	2.00829E+06	-3.24172E+06	0.0000	4.99877E+09	3.091E-05	-200.
27.000	3.39158E+06	-3.39158E+06	2.08415E+06	-3.36758E+06	0.0000	4.99872E+09	2.976E-05	-200.
28.000	3.51756E+06	-3.51756E+06	2.16002E+06	-3.49345E+06	0.0000	4.99867E+09	2.869E-05	-200.
29.000	3.64354E+06	-3.64353E+06	2.23589E+06	-3.61932E+06	0.0000	4.99862E+09	2.770E-05	-200.
29.122	3.65886E+06	-3.65886E+06	2.24512E+06	-3.63462E+06	0.0000	4.99861E+09	2.758E-05	-200.
30.122	3.78481E+06	-3.78481E+06	2.32099E+06	-3.76049E+06	0.0000	4.99856E+09	2.666E-05	-200.
31.122	3.91079E+06	-3.91079E+06	2.39686E+06	-3.88636E+06	0.0000	4.99851E+09	2.580E-05	-200.
32.122	4.03677E+06	-4.03677E+06	2.47272E+06	-4.01223E+06	0.0000	4.99846E+09	2.500E-05	-200.
33.122	4.16281E+06	-4.16281E+06	2.54859E+06	-4.13810E+06	0.0000	4.99841E+09	2.424E-05	-200.
34.122	4.28886E+06	-4.28886E+06	2.62446E+06	-4.26397E+06	0.0000	4.99836E+09	2.353E-05	-200.
35.122	4.41492E+06	-4.41492E+06	2.70033E+06	-4.38984E+06	0.0000	4.99831E+09	2.286E-05	-200.
36.122	4.54098E+06	-4.54098E+06	2.77620E+06	-4.51571E+06	0.0000	4.99826E+09	2.222E-05	-200.
37.122	4.66705E+06	-4.66704E+06	2.85207E+06	-4.64158E+06	0.0000	4.99821E+09	2.162E-05	-200.

Mass Budget Errors

- Mass balance error computation
  - Source – Sink = Δ(Storage)
  - Source – Sink = Δ(C+) – Δ(C-)
  - Source + Δ(C-) = Sink + Δ(C+)
  - Total in = Source + Δ(C-)
  - Total out = Sink + Δ(C+)

$$error(\%) = \frac{TotalIN - TotalOUT}{0.5(TotalIN + TotalOUT)} \times 100$$

Mass Budget Errors (cont.)

- Alternative error computation
  - Source + M^0 = Sink + M^t
  - M^0: initial mass in aquifer
  - M^t: current mass in aquifer
  - Total in = Source + M^0
  - Total out = Sink + M^t

$$error2(\%) = \frac{TotalIN - TotalOUT}{0.5(TotalIN + TotalOUT)} \times 100$$