

Owens Lake Chain Readme

This exercise was my source of inspiration for developing the Computer Methods and Modeling in Geology course at Vassar. It grew out of a modeling project I did as part of my dissertation work (see dissertation chapter included at this site). That project was the first Fortran model I ever created and caused me endless frustration. I had had no formal exposure to computer programming except for a 1-semester course in BASIC programming in high school. When I embarked on the lake project, I had only ever seen one other Fortran code, one that my advisor had written and that I then modified to study marine terraces on uplifting coastlines. I modeled away for months, only to find that I had made a fatal error and that all of my results were garbage. In disgust, I put the model away for 6 months and then picked it up again, only to repeat the same process. This went on for about 3 years before I finally had a fully debugged model. After graduate school, I taught at Franklin and Marshall for a year and a half and was introduced to STELLA by Andy DeWet. Imagine my chagrin when I put together the bulk of my Owens lake chain model in ~ 1 hour and got about the same results as I had with the Fortran! It was at this time that I began to hatch the idea of developing a course that would introduce students to dynamical systems modeling before they went off to graduate school. In the meantime, my programming abilities vastly improved, so that I can now truly say that I enjoy modeling!

The Owens Lake Chain exercise has the following purposes:

- 1) To teach the importance of boundary conditions. Each of the lakes in the chain is limited in the volume, depth, and area it can attain by the presence of a spillway in its drainage basin. Students have to learn how to deal with these boundary conditions by using conditional statements.

- 2) To convey the concept of response time and what it is dependent on.
- 3) To experiment with oscillatory behavior.

Under Teaching Materials, you will find the following:

- 1) An Adobe Acrobat version of the thesis chapter I wrote about the lake chain model.
- 2) Copies of the exercise for students in Adobe Acrobat (.pdf) format.
- 3) Copies of the instructor answer key in Adobe Acrobat format
- 4) Hypsometry data for the Owens chain of lakes - elevation of the water surface, lake depth, cumulative area at each depth, and cumulative volume at each depth.
- 5) A STELLA version of the Owens Lake Chain model
- 6) A Fortran 90 version of the Owens Lake Chain model
- 7) An Adobe Acrobat image of the STELLA Owens Lake Chain model for those who need to create the model in an earlier version of STELLA. This image is in the answer key, but is a little small, so we've put it in a format that will allow you to blow it up and see all the parts.
- 8) An assessment form that can be given to students to determine whether they understood the concepts the exercises are trying to convey