

Lake Tikitapu modelling

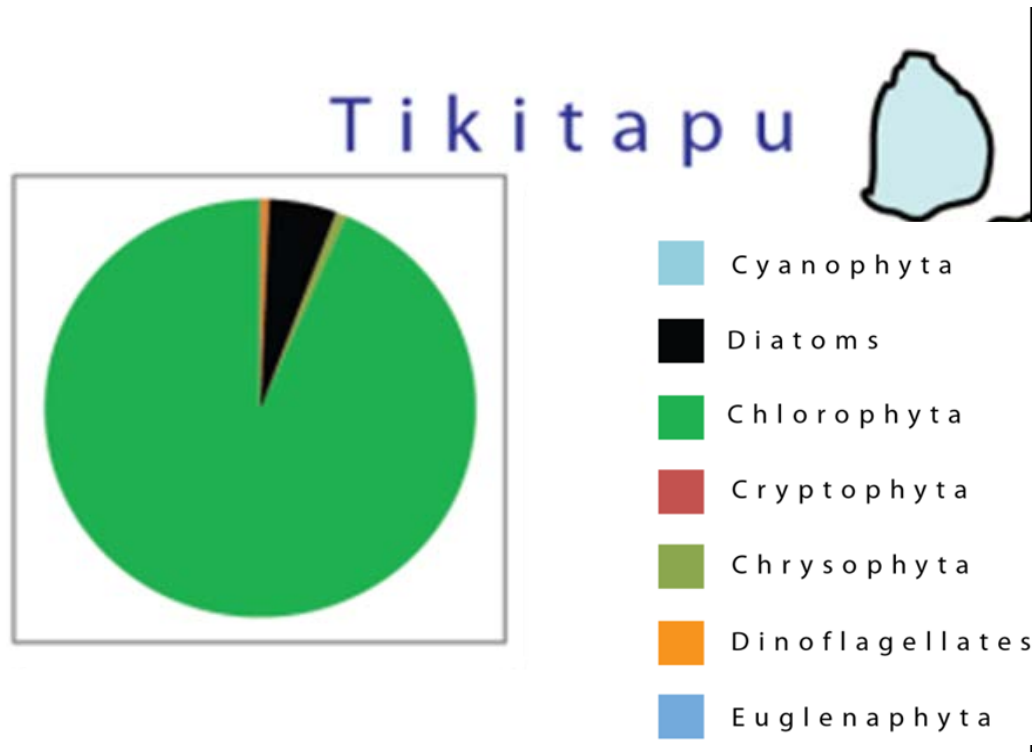
Key points

- Tikitapu is an ideal system for 1-D modelling (relatively small, round, bowl shaped)
- Model being used: DYRESM-CAEDYM
- Tikitapu is unique in that it has much lower Silica than other Rotorua lakes
 - This means that diatom production in Tikitapu may be limited by the availability of Silica, rather than N or P.
- The lake bed likely underwent disturbance sometime after 2006, resulting in redistribution of organic sediments in the lake. This has consequences for Silica diffusion and possibly, therefore, diatom abundance.

Project milestones

- Construct catchment and lake water balance and model inputs (COMPLETE)
- Initial model testing and calibration (COMPLETE)
- Incorporation of geochemistry module and Si diffusion from sediments (TO DO)
- Scenario establishment (TO DO)
- Scenario testing (TO DO)

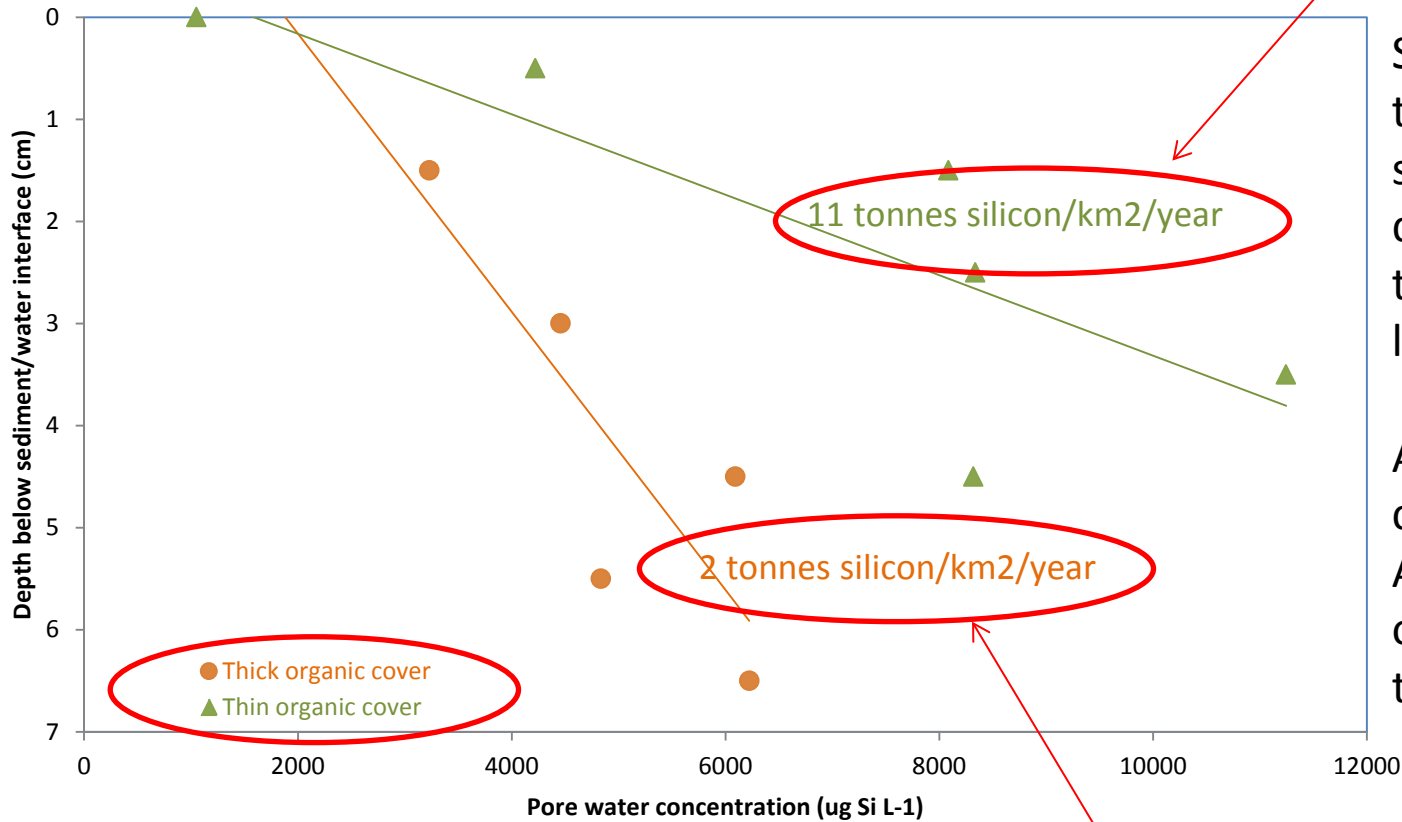
Phytoplankton species assemblage (mean of all samples; Paul, W.)



Tikitapu sediments

Potential diffusion from exposed sediments with thin organic cover

Diffusion of silicon to Lake Tikitapu



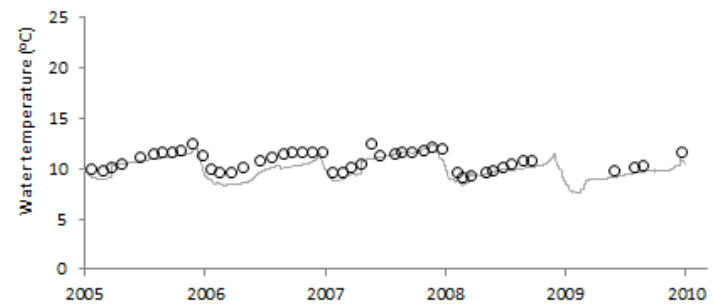
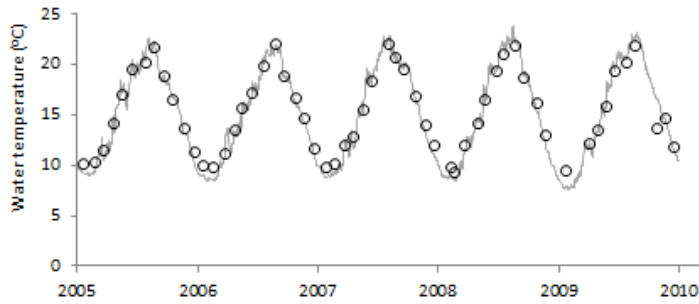
Sediments with thick organic cover show slower diffusion of silicon to the overlying lake water.

Anticipated consequence :- Accelerated growth of diatoms, lake turns green

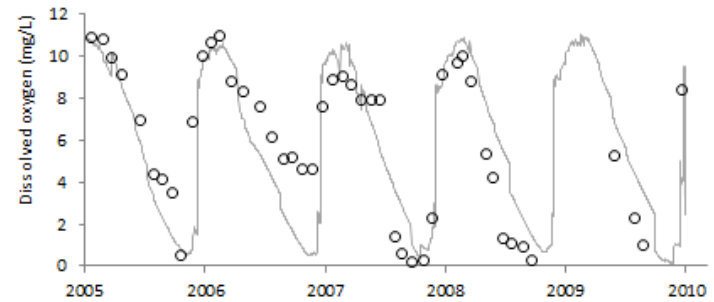
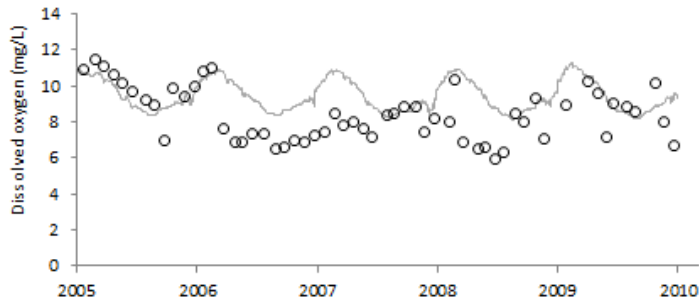
Current diffusion: 1.7 Si km⁻² y⁻¹ (Hendy, pers. Comm. April 2013)

Model calibration

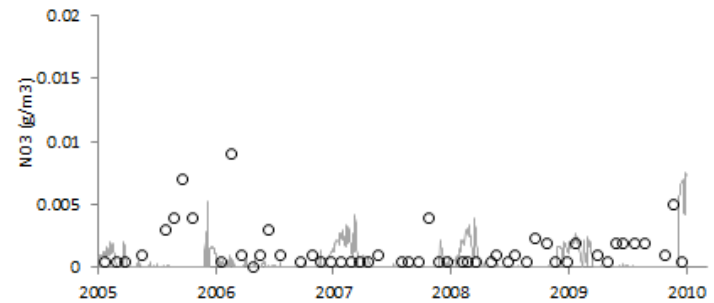
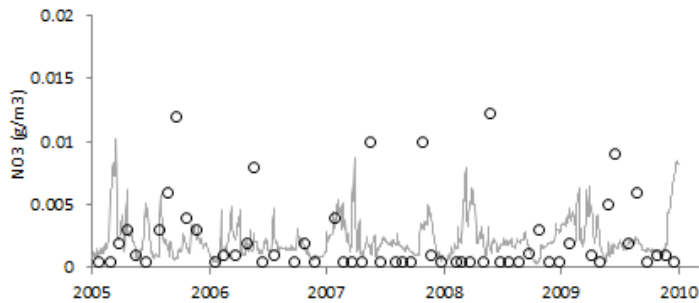
T(°C)



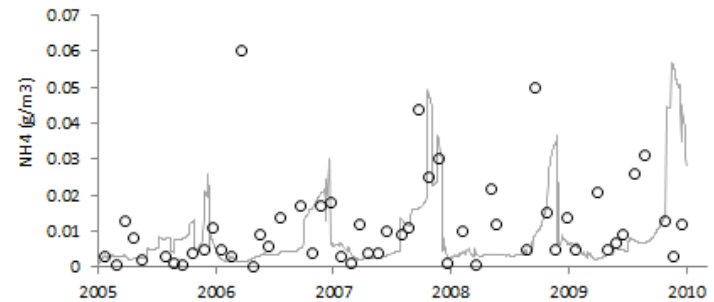
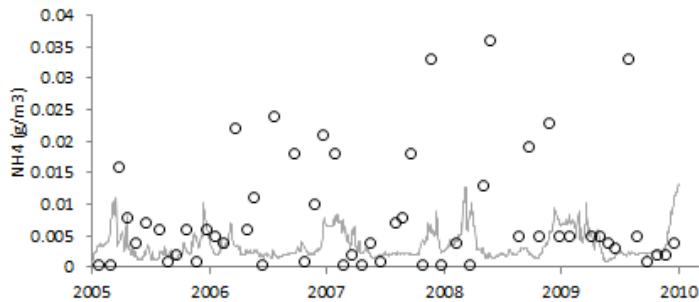
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NO₃

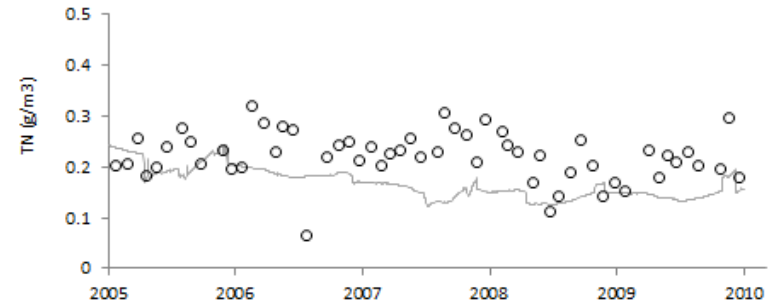
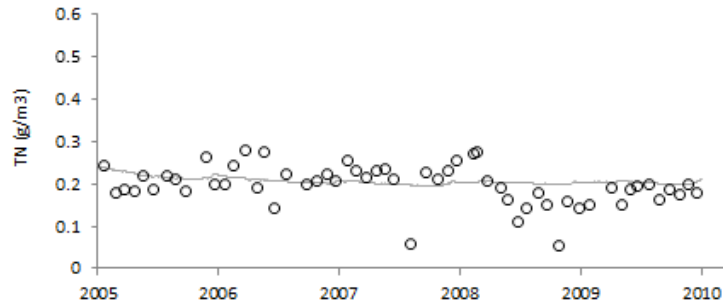


NH₄

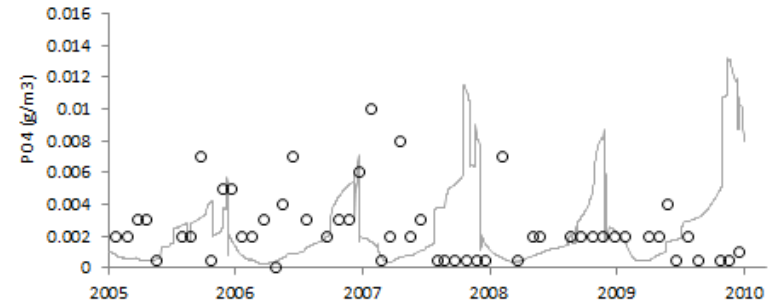
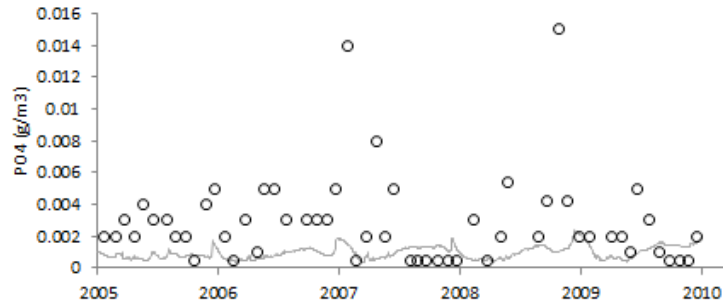


Model calibration

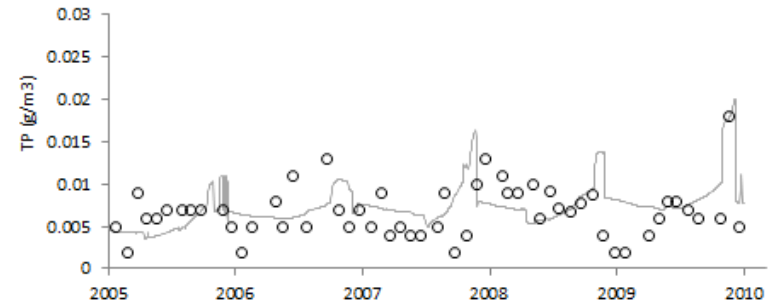
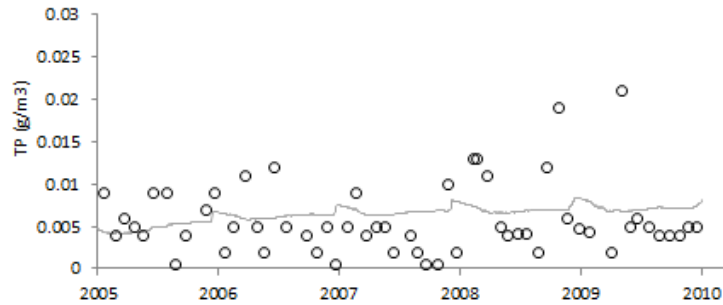
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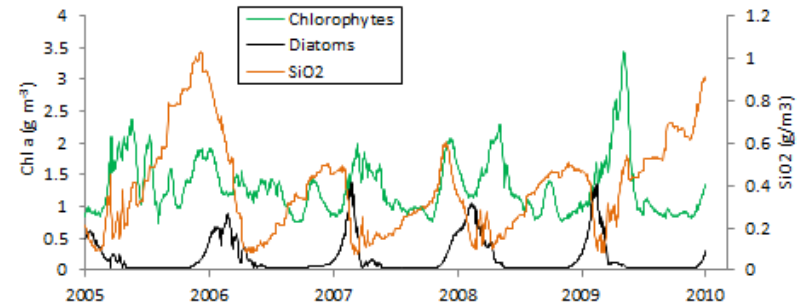
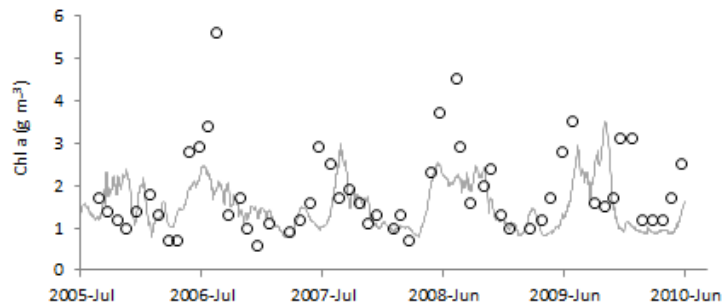
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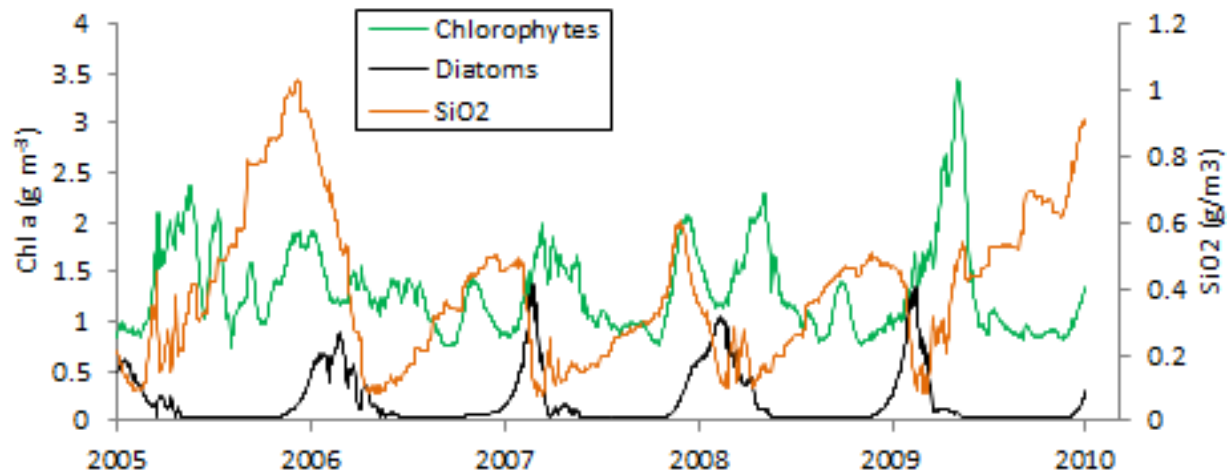
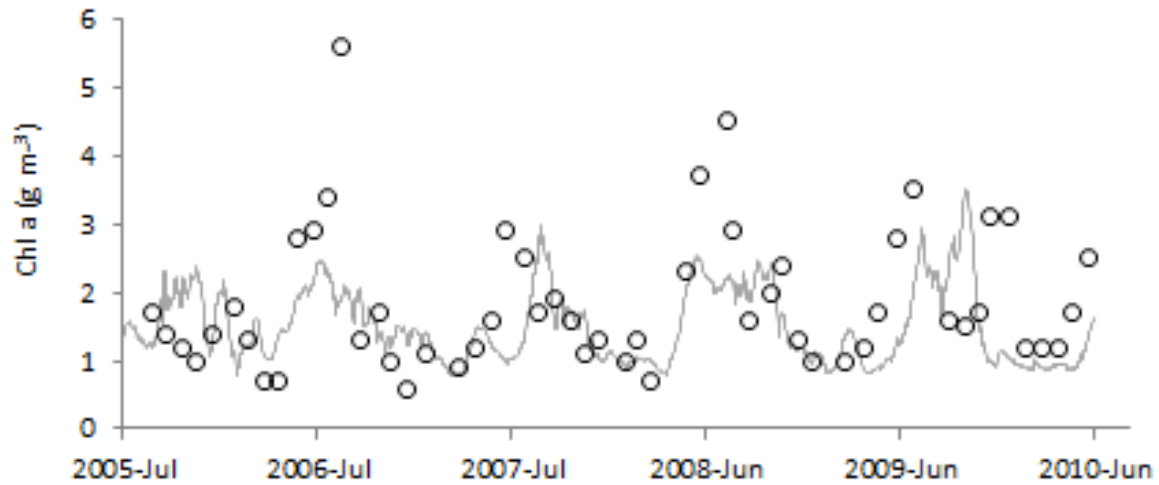
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Chl *a*



Model calibration



Scenarios

Potential questions??

- To what extent does Silica limit production in Tikitapu?
- Would increased Si diffusion as a result of sediment redistribution (Hendy) result in increased production, and/or altered species assemblage?
- What effect would removal of septic tanks have
- To what extent to recreational users affect water quality?
- To what extent could particulate nutrient loads from forestry impact water quality?