

a short course in

Welcome to ~~stockassessment~~ via TMB

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$$M2_i = \frac{\sum_j \frac{dR}{dt} N_j \frac{\varphi_{ji}}{\varphi_j}}{N_i \omega_i} \int_a^b \epsilon \Theta^{\sqrt{17}} + \Omega \int \delta e^{i\pi} = \{2.7182818284\} \chi^2 \Sigma !$$

Preliminary agenda

Day 1:

- Introduction and installation (hopefully done)
- Getting data in and results out
- Dealing with parameters (bounds, phases, transformations, mapping)
- Random effects in TMB
-

Day 2:

- Spatial modelling with SPDE and linking to R-INLA
- Project

Time and place

Time:

Monday 12 Feb. 2018: 10.15 —12.00 + seminar 14.15

Tuesday 13 Feb. 2018: 10.15 —12.00

Place:

NTNU, Trondheims

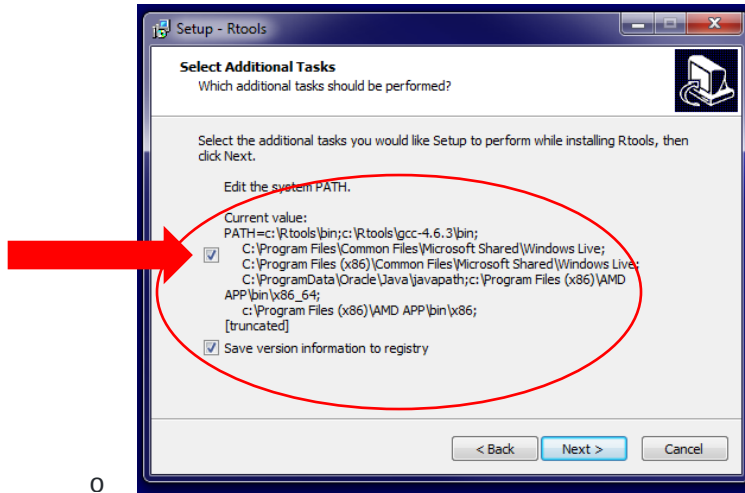
Prepare for course by:

- Windows (next slide)
- Linux
- Mac

- Installing TMB on your computer via the instructions on: <https://github.com/kaskr/adcomp/wiki/Download>
- Try replicating the linear regression example on the next slides
- Watch the TMB tutorial video:
<https://www.youtube.com/watch?v=A5CLrhzNzVU&t=>
- Report any problems to skaug@math.uib.no

Details on installation on Windows:

1. Install a 3.3.3 version of R (<https://cran.r-project.org/>)
2. If using a Windows machine, install a matching version of Rtools
 - o Available at <https://cran.r-project.org/bin/windows/Rtools/>
 - o For example, R v3.3.3 requires Rtools34
 - o During installation, please check box to ensure that Rtools is added to your PATH



- o It is not necessary to install Rtools if using an apple or Linux operating system
 - o On a government machine, this will require admin privileges, and will probably require working with your IT department (I have spoken with IT and they give us okay to install)
3. Install TMB from CRAN using `install.packages("TMB")` in the R terminal
 4. Confirm that TMB is working by running a simple TMB example as follows

Example: Linear regression in TMB - 1

- 10 observations are assumed to follow a linear regression model:
- Copy the following lines to a plain text file named `linreg.dat`

x	y
-1	1.4
0	4.7
1	5.1
2	8.3
3	9.0
4	14.5
5	14.0
6	13.4
7	19.2
8	18

Example: Linear regression in TMB - 2

- Copy the following lines to a plain text file named `linreg.cpp`

```
#include <TMB.hpp>

template<class Type>
Type objective_function<Type>::operator() ()
{
  DATA_VECTOR(x);
  DATA_VECTOR(y);

  PARAMETER(alpha);
  PARAMETER(beta);
  PARAMETER(logSigma);
  vector<Type> pred=alpha+beta*x;
  Type ans=-sum(dnorm(y,pred,exp(logSigma),true));
  ADREPORT(pred);

  return ans;
}
```