Report on ICES Training Course: Methods for setting proxy MSY reference points for stocks in categories 3 and 4

25-26 January 2017, ICES Headquarters, Denmark

14-15 February 2017, Webex

ICES
CIEM

International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer

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Recommended format for purposes of citation:

Contents

Summary

The training course on MSY proxy reference points for category 3-4 stocks was taught in two parts to two separate but related audiences: 25–26 January 2017 for ICES Expert Group Chairs (taught in person at the ICES Secretariat in Copenhagen, Denmark) and 14–15 February 2017 for stock assessors and the general public (taught online via web conference). The number of participants in part 1 was 18, coming from 8 countries and part 2 42, coming from 15 countries. The objective of the course was to provide participants with a foundation in the methods, how to apply the methods and understand the output so that they will be prepared to propose MSY proxy reference points in the ICES advisory process and to use the values to provide advice through the 2017 ICES advice rules. Emphasis was placed on online tools that are easily accessible and useable by the entire ICES community. These tools also provide transparency in the process and standardized input and output files to aid in accessibility. From the conception of the course through deliverance, all course materials were developed and delivered using non-proprietary software via the BlueBRIDGE e-infrastructure. In that spirit, all the material was also made available as open source. To facilitate distribution of the most recent version of course material, GitHub repositories were used (https://github.com/ices-tools-dev/ICES_MSY, https://goo.gl/gPpzpA)

that contains all source documents (in the form of .R, .Rmd and/or .Rnw) and data, with associated output documents (.html and/or .pdf format). Also, two web applications were used to simplify the presentation of the course materials and to ensure a consistent output for reporting (Length-based indicator app and Length-based spawning potential ratio app):

1   Background

ICES uses two major categories of methods for setting proxy MSY reference points: (1) length-based methods, and (2) catch and survey-based methods. The Secretariat instructors are setting up a virtual research environment for use with all length-based methods. This will provide an environment with the method code, data format, example output files, as well as a pre-set environment for running the code. Access to the VRE platform will be given prior to the course dates.

The ICES Technical Guidance on Proxy Reference Point Methodologies will provide in-depth information on the methods and how to interpret the results. This will be published prior to the course and be available to all participants.

The DTU instructors developed www.stockassessment.org, which houses SAM and SPiCT

Participants will be given access to this web interface for running SPiCT and accessing examples. The SPiCT source code is open source and distributed as an R package, so it is also possible to run SPiCT with or without using the web interface.

2 Context

ICES provides advice on fishing opportunities for more than 200 stocks and strives to base this advice on stock status relative to Maximum Sustainable Yield (MSY) objectives. More than 30% of stocks ICES gives advice on have insufficient data and knowledge to conduct a full analytical assessment of their state and exploitation (ICES category 3 and 4 stocks). Methods to provide reference points for such stocks are nascent and are new to most in the scientific community. ICES began to develop methods in 2015 (WKLIFE V) and applied these methods to a small group of stocks via a workshop (WKProxy) to classify the status of category 3 and 4 stocks relative to MSY reference points for 2016. In 2017, ICES will apply these methods for all category 3 and 4 stocks with assessments that should be updated in 2017 (see ACOM ToRs for 2017). This work will be done in the ICES stock assessment Expert Groups and as such, training is needed. To accomplish this ICES objective in an effective and efficient manner, ICES stock assessment Expert Group chairs, stock assessors and staff will need training in the methods and how to apply them, which this course will provide.

2.1 Objectives

To allow stock assessors and users of the ICES advice to understand the underlying principles of each method, the required data and format, as well as how to run the code and interpret the results for use in the ICES advice.

- Part 1: To introduce the course material and methods, the instructors will provide a half day presentation with Q&A at the conclusion of WGChairs_2017. The following full day will be an overview of the methods, assumptions, data needs, methods application, and how to incorporate information into the ICES Advice. The course will begin at 900am and end at 5pm on the second day.
- Part 2: To provide in depth methods training for proxy reference points to stock assessors working with ICES category 3 and 4 stocks. In this two day online course (14-15 February) students and instructors will participate via web-conference in an effort to reduce costs for participants. The course will begin at 900am and end at 6pm.

2.2 Level

Ability to create a length–frequency distribution for a stock from InterCatch download and some very basic familiarity with R for using the length-based methods. A virtual research environment will be available for ICES methods using R; which should resolve many technical issues for all levels of R users and allow an effective learning environment for students.

3   Course Programme, Product, Deliverance and Instructors

3.1   Programme

This course was taught in two parts: (1) a 1.5 day in person course for ICES stock assessment Expert Group Chairs at the ICES Secretariat, and (2) a two day online course for ICES stock assessors.

The course was provided at no cost for ICES stock assessors, stock assessment Expert Group chairs and ICES staff.

Programme PART I (25–26 January 2016)

25 January 2017 Course Introduction at WGChairs (14:00–17:00)

- Course overview
  - ICES approach to proxy reference points
  - Orientation to the ICES Technical Guidance
  - Methods introduction
- Orientation to the virtual research environments used in the course
  - Individual assistance with accessing the VREs (on an as needed basis)
  - Creating a collaborative assessment environment at ICES
- ICES Advice Rule for proxy reference points (how these values will be used in the advice)
- Length-based methods
  - Length-based indicators (LBI)
    - o Data needed
    - o Assumptions
    - o Output
    - o Data format required
    - o Running the model
    - o Interpreting the results;
    - o Q&A

26 January 2017 In-depth methods use and application course at ICES Secretariat

- Quick course overview (9:00-9:15)
  - Mean-length Z (9:30 - 10:15)
    - o Data needed
    - o Assumptions
    - o Output
    - o Data format required
    - o Running the model
    - o Interpreting the results
  - Length-based spawner per recruit (LB-SPR) (10:15–11:00)
    - o Data needed
    - o Assumptions
    - o Output
    - o Provides Fmsy
    - o Data format required
    - o Running the model
    - o Interpreting the results
- Biomass dynamics models
  - SPiCT (11:00–12:00)

- o Data needed
- o Assumptions
- o Provides F/Fmsy and B/MSYBtrigger
- o Data format required
- o Running the model
- o Interpreting the results

Lunch (12:00 – 12:30)

- SPiCT cont. (12:30–16:00)
- Question and answer/course wrap up (16:00–17:00)

Programme PART 2 (14–15 FEBRUARY)

14 February 2017 In-depth methods use and application online course

- Flex time for VRE and web conference set up with participants (9:00 – 9:30)
- Introductions (9:30 – 9:45)
- Course overview (9:45 – 10:30)
  - ICES approach to proxy reference points
  - Orientation to the ICES Technical Guidance
  - Methods introduction
  - How these values will be used in the advice
  - 2017 advisory process/timeline
- Orientation to raising length-data in InterCatch with Henrik Kjems (10:30–11:30)
- Orientation to the virtual research environment used in the course (11:30–12:00)
- Individual assistance with accessing the VREs (on an as needed basis)

Lunch (12:00–13:30

- Length-based methods (13:30 – 18:00)
  - Length-based indicators (LBI)
    - o Data needed
    - o Assumptions
    - o Output
    - o Data format required
    - o Running the model
    - o Interpreting the results
    - o Question and answers
    - o Individual work time with instructors available for one-on-one Q&A

  - Mean-length Z
    - o Data needed
    - o Assumptions
    - o Output
    - o Data format required
    - o Running the model
    - o Interpreting the results
    - o Question and answers

- o Individual work time with instructors available for one-on-one Q&A

- Length-based spawner per recruit (LB-SPR)
  - o Data needed
  - o Assumptions
  - o Output
  - o Data format required
  - o Running the model
  - o Interpreting the results
  - o Question and answers
  - o Individual work time with instructors available for one-on-one Q&A

15 February 2017 In-depth methods use and application online course

- Biomass dynamics models
  - SPiCT (9:00–12:00)
    - o Data needed
    - o Assumptions
    - o Provides F/Fmsy and B/MSYBtrigger
    - o Data format required
    - o Running the model
    - o Interpreting the results

Lunch (12:00–13:00)

- SPiCT cont. (13:00–17:00)
  - o Interpreting the results
  - o Question and answers
- Question and answer/course wrap up (17:00–18:00)

3.2 Course products

The length-based methods were developed as a part of WKLifeIV and further clarified by the ICES Secretariat and Quang Huynh and are implemented as R scripts (https://github.com/ices-tools-dev/ICES_MSY). Several of the methods (Length-based spawning potential ratio and length-based indicators) have been developed as web applications using the shiny R package.

The SPiCT model is implemented as an R package, is open source, and is available at GitHub: https://github.com/mawp/spict. The package is already installed in the VRE, but participants may choose to install it on their own computer also.

The course exercises for SPiCT are available as a Git repository at: https://goo.gl/gPpzpA

The presentations given at the course are available in the "presentations" folder in the ICES_MSY project under the VRE.

3.3 Deliverables

The course was given as a mixture of presentations of the methods and demonstrations and exercises using the Bluebridge VRE. The presentations covered the methods' assumptions, required data input, and interpretation of model output.

3.4 Course instructors

Casper Berg, DTU Aqua   **Catch and survey-based method**

Casper Berg is a researcher at the DTU Aqua section for Marine Living Resources. He is a co-developer of the SPiCT and SAM stock assessment models and the stockassessment.org website. He is also working with analysis and standardization of trawl survey data.

Alexandros Kokkalis, DTU Aqua   **Catch and survey-based method**

Alexandros Kokkalis is a postdoctoral researcher at the DTU Aqua Section for Ecosystem Based Marine Management. He has taught SPiCT at the National Marine Information and Research Centre in Namibia. He is a collaborator of the SPiCT GitHub repository. He has developed s6model, a size-based assessment method.

Anne Cooper, ICES Advisory Department staff   **Length-based methods and ICES category 3-4 methods framework**

Anne Cooper is the ICES Professional Officer charged with method development and implementation and ICES advice rules for category 2-6 stocks. As such, she has worked since the first implementation of assessment methods for these stocks. She taught a 2016 ICES training course on data-limited stock assessment methods in 2016, and she lead the development of the present course for the ICES Training Programme.

Scott Large, ICES Advisory Department staff   **Length-based methods, e-infrastructure and method application**

Scott Large is the ICES Professional Officer responsible for the planning and implementation of ICES activities in the BlueAssesssment work package of the BlueBRIDGE project. He is also working with expanding ICES use of reproducible and repeatable practices, largely ICES Github organizations.

3.5   Recommendations

Course material should be placed on a web-based platform that is fully available to the ICES community throughout perpetuity.

Some background presentations could be pre-recorded and made available to participants prior to the course to reduce course hours and deepen content.

Annex 1: List of course participants

Programme PART I (25–26 January 2016)

| Name	E-mail
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Annex 2: Course evaluation responses

Survey PART 2 (14-15 FEBRUARY)
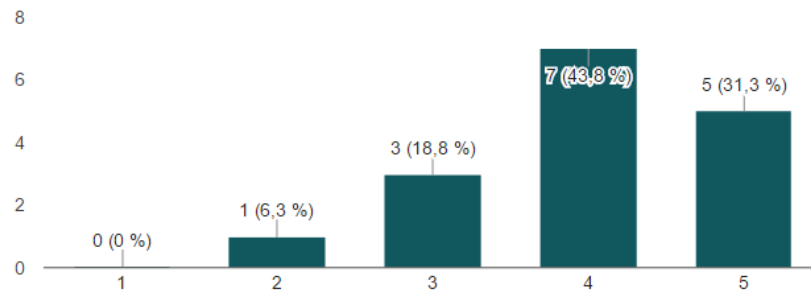
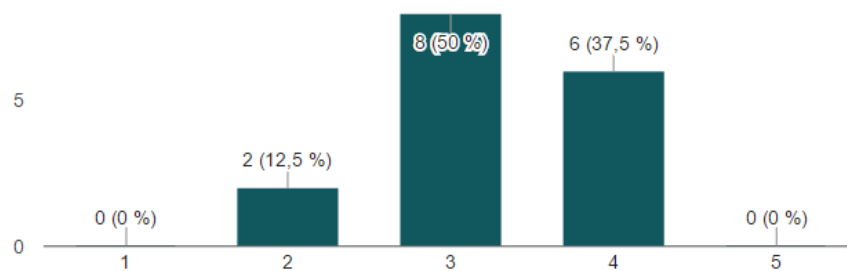### How did you hear about this course? (17 réponses)

- ● ICES website
- ● E-mail
- ● Word of mouth
- ● Other

47,1%
17,6%
29,4%
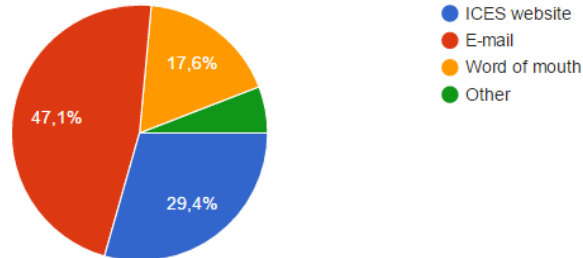
Comments (une réponse)

Seen on ICES Newsletter

Course content

Did the Training course meet your expectations? (16 réponses)

0 (0 %) 1 (6,3 %) 3 (18,8 %) 7 (43,8 %) 5 (31,3 %)

Was the level of instruction appropriate? (16 réponses)

0 (0 %) 2 (12,5 %) 8 (50 %) 6 (37,5 %) 0 (0 %)

Was the length of the training course appropriate? (16 réponses)
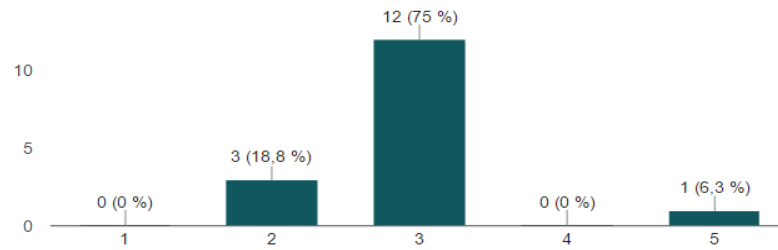
Comments (6 réponses)

I found the level of instruction about right. I am not an R user at present but was able to follow what was happening

I now feel more confident using these methods. I felt the length-based lectures were good at covering the data requirements, assumptions and outputs but were too vague on how the methods actually work.

Should get the R-script send by e-mail before the course. Difficult to work in GetHub when no experience with it before...

It was a lot of material in just two days. I would have appreciated to have maybe 2.5 days or even 3, but with more time for recap and questions

It was very good course but there was not time to work with your own data

I had technical difficulties with both the webex and the server. Both on windows and linkux portition of my laptop. I missed the webex test the previous week mainly due to time difference. However the course looked interesting and of value.

What did you like best or find more useful about the training course?
(8 réponses)

the step by step run through of the availible scripts was fantastic

I have been involved in the WKLIFE workshops from their inception and it was good to see some of the methods developed being made available

The ICES advice when to use, which order to consider the methods.

Besides the methods presented, the VRE environment was very useful for practical training.

The live demonstration. No travling time

R codes for all methods were provided and also many of the presentations were helpful
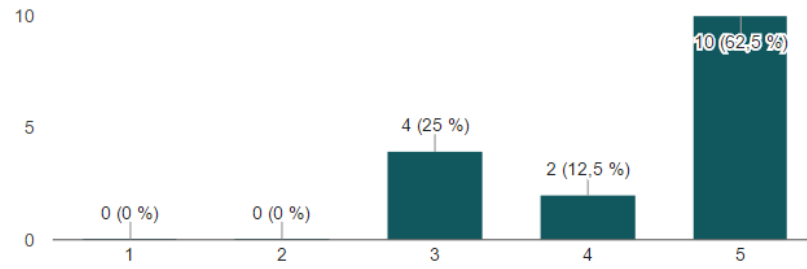
Good to avoid travelling
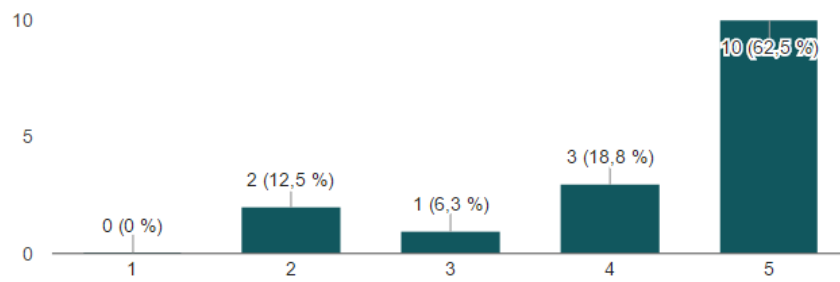
The exercises were very good prepared

Course Organization

Inscription to the training course and communication with organizers were efficient.
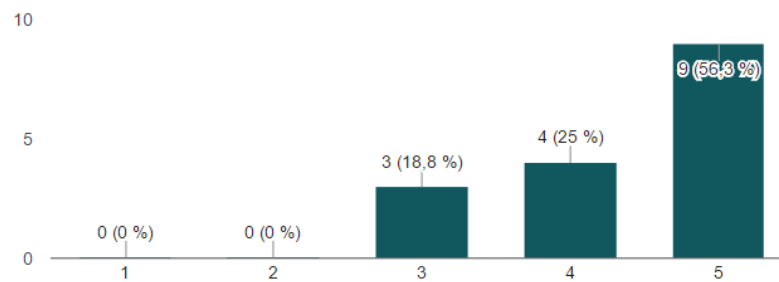(16 réponses)

The training platform (Webex) was adequate and comfortable. (16 réponses)

How did you find the combination of online oral teaching and shared screens?
(16 réponses)

Comments (4 réponses)

There was an issue with the sound; I could get sound for some of the time, the rest of the time I dialled in which was ok, but not entirely comfortable, I am not sure of the cause; could have been on my computer
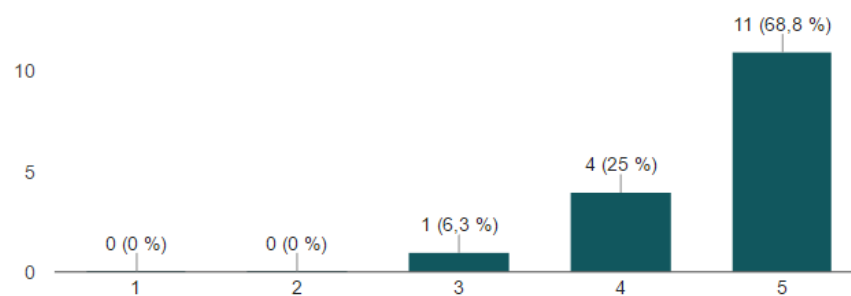
No problems with the course being online.

Very intensive with long days. 3-4 hours WebEx for 3 days - then opportunity to work with own data
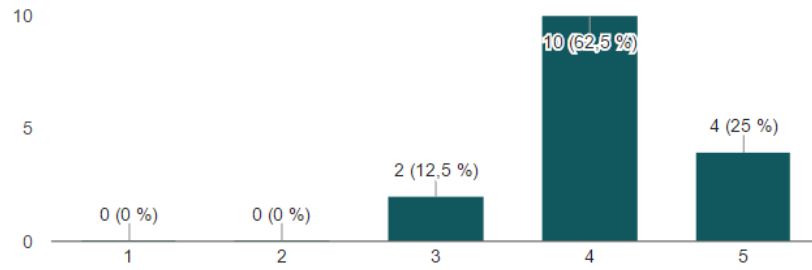
the method was fine to me, the shared screen did not cause any trouble

Teaching and Learning Support

The instructors were helpful, informative, and approachable. (16 réponses)

The working documents were presented in a way that facilitated learning.
(16 réponses)

Did you find keeping source code for the course in GitHub useful? (14 réponses)

| |
|---|
| Yes |
| Yes |
| Yes |
| Yes |
| Yes, very useful |
| Yes, once I had got the hang of accessing the files |
| Yes. It allowed to to download and explore in my own time. |
| Very useful |
| Yes, very much |
| Difficult when non experienced! |
| Yes, absolutely |
| Yes, very useful |

Did you find the Shiny applications useful (Length-based indicators and
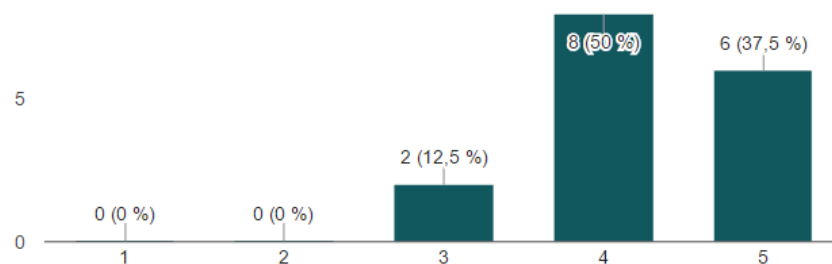LBSPR)? If so, what other tools do you think could be useful in such a format?
(11 réponses)

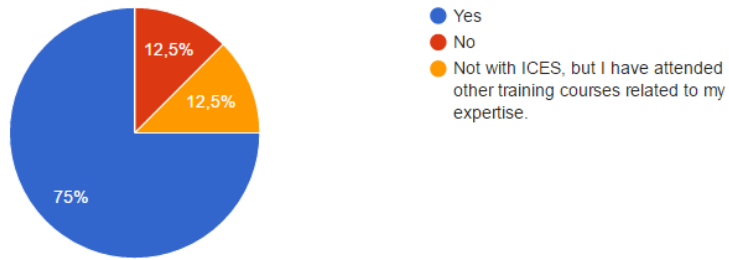| |
|---|
| The tools were very useful |
| I have not used these applications yet, except on the course. Why are they called 'Shiny' |
| No. I would prefer to work with the source code as this allows me to see what the models are doing and modify to suit my own data if necessary, rather than sending to a 'black box'. |
| Yes it was useful |
| Yes, it is useful. However, I am not using RStudio and didn't explore this package potential applications |
| Yes, SAM |
| Yes |
| I am not sure yet, as i haven't used it by myself yet |
| I personally prefer using the package(s). |
| yes |
| There was not time to almost see the aplications |

Overall Evaluation

Overall, how would you rate this training course? (16 réponses)
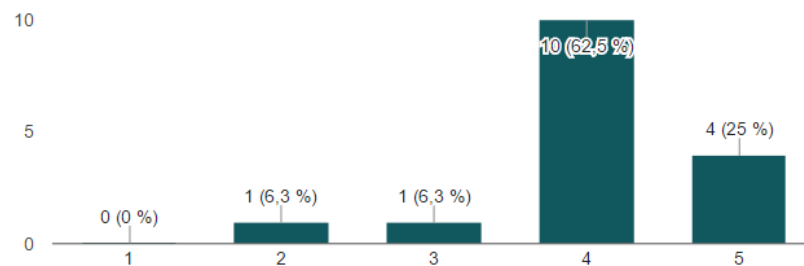
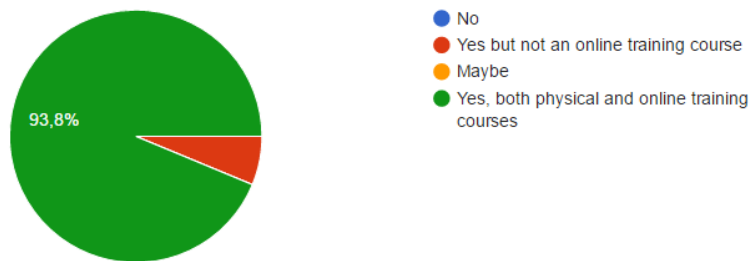### Overall, how would you rate the quality of the teaching? (16 réponses)

Have you taken any other ICES training courses? (16 réponses)

- Yes
- No
- Not with ICES, but I have attended other training courses related to my expertise.

75%
12,5%
12,5%

Would you be interested in another training course within ICES? (16 réponses)

- No
- Yes but not an online training course
- Maybe
- Yes, both physical and online training courses

93,8%

If yes, which topic would you be interested in? (10 réponses)

Management Strategy Evaluation

A starter course for R online would be usefull

Advanced stock assessment, Bayesian statistics

Management strategy evaluation, spatial and temporal correlation analysis, multispecies and ecosystem modelling, stock assessment and advice

Topics related to stock assessment as e.g. models, survey abundance estimation, MSE

learning assessment/ calculation of life history parameters in R

Stock Assessment,;How to use SAM, Stock Synthesis etc.

more R training, probably with more time for questions and exercises. For this training course, the instructors were really rushing through the stuff and my R (let alone my modeling, LBI, SPiCT knwledge) is way to intermediate to keep up with them

Bayesian modelling

Bayesian models for assessment

General comments on the Training Course

(5 réponses)

I think the course instructors were the main asset of the course. Their experience, knowledge and patience with the online process made it accessible to everyone involved.

Thanks very much for an informative course

Suggest to take course like this over several days and fewer hours per day. Very intensiv with long days, and little time to try own data. Make a very good report from this course that show all from how to log in in GitHub, how the background data file should look like to be read in R, how to analyze the output from the model etc. The "spoon" learning :) Very good initiative with online course to save travel money. Thanks for an informative course.

Thanks very much for your effort

As said before, especially the last half of the second day was rushing through theory and topics with waaaaay too less stops. It was basically the two instructors talking with each other on a very advanced level and typing codes faster than I could ever read...

I liked the first day of the training though, the speed was good enough, although it was also very limited time for playing around with the scripts.