INLABRU WORKSHOP

ICES 2025, Copenhagen

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1 Welcome to the course!

- Welcome to the `inlabru` workshop!
- The goal for the workshop is to introduce Bayesian statistics implemented using the `inlabru` package.
- Workshop materials in the github repository inlabru-workshop

2 Learning Objectives for the workshop

At the end of the workshop, participants will be able to:

- Understand the motivation and challenges linked to spatial data
- Understand the statistical models used to analyse spatial and spatio-temporal data
- Understand how to implement such models using the `inlabru` library
- Independently analyse spatial data collected at sea using `inlabru`

3 Intended audience

The tutorial is intended for anyone who desires to improve their analyses of data collected at sea, including those data that are used as inputs to fishery stock assessments.

4 Level

Participants should be familiar with the R environment, and general statistical approaches for modelling such as regression, analysis of covariance, and general linear models.

No knowledge of `R-INLA` is required.

5 Schedule Program

5.0.1 Day 1

Time	Topic
10:00 - 10:30	ICES informative session
10:30 - 11:30	**Session 1**: Introduction to `inlabru`
11:30 - 13:00	Practical Session 1
13:00 - 14:30	Lunch break
14:30 - 15:30	**Session 2**: Latent Gaussian Models and INLA
15:30 - 15:45	Coffee Break
15:45 - 16:45	Practical Session 2
16:45 - 17:00	wrap-up and outlook

5.0.2 Day 2

Time	Topic
9:00 - 10:00	**Session 3**: Temporal modelling and smoothing part 1
10:00 - 10:30	Snack
10:30 - 11:30	**Session 4**: Temporal modelling and smoothing part 2
11:30 - 13:00	Practical Session 3
13:00 - 14:30	Lunch break
14:30 - 15:30	**Session 5**: Introduction to Spatial Statistics
15:35 - 15:45	Coffee Break
15:45 - 16:45	Practical Session 4
16:45 - 17:00	wrap-up and outlook

5.0.3 Day 3

Time	Topic
9:00 - 10:00	**Session 6**: Areal Processes
10:00 - 10:30	Snack
10:30 - 11:30	**Session 7**: Geostatistics
11:30 - 13:00	Practical Session 5
13:00 - 14:30	Lunch break
14:30 - 15:30	**Session 8**: Spatial Point processes
15:35 - 15:45	Coffee Break
15:45 - 16:45	Practical Session 5 continued
16:45 - 17:00	wrap-up and outlook

5.0.4 Day 4

Time	Topic
9:00 - 10:00	**Session 9**: Spatiotemporal models
10:00 - 10:30	Snack
10:30 - 11:30	**Session 10**: Model comparison and evaluation
11:30 - 13:00	Practical Session 6
13:00 - 14:30	Lunch break
14:30 - 15:30	**Session 11**: Multilikelihoods/joint likelihood
15:35 - 15:45	Coffee Break
15:45 - 16:45	Practical Session 7
16:45 - 17:00	wrap-up and outlook

5.0.5 Day 5

Time	Topic
9:00 - 10:00	**Session 12**: Zero inflated models
10:00 - 10:30	Snack

Time	Topic
10:30 - 11:30	**Session 13**: Complex observational processes: Distance Sampling
11:30 - 13:00	Practical Session 8: Zero Inflated models - Distance sampling
13:00 - 13:15	Coffee Break
13:15 - 14:00	Closing session

6 In preparation for the workshop

Participants are required to follow the next steps before the day of the workshop:

1. Install R-INLA
2. Install `inlabru` (available from CRAN)

```
# Enable universe(s) by inlabru-org
options(repos = c(
  inlabruorg = "https://inlabru-org.r-universe.dev",
  INLA = "https://inla.r-inla-download.org/R/testing",
  CRAN = "https://cloud.r-project.org"
))

# Install some packages
install.packages("inlabru")
```

3. Make sure you have the latest `R-INLA`, `inlabru` and `R` versions installed.
4. Install the following libraries:

```
install.packages(c(
  "CARBayesdata",
  "DAAG",
  "dplyr",
  "FSAdata",
  "ggplot2",
  "gt",
  "lubridate",
  "magrittr",
  "mapview",
  "patchwork",
  "scico",
  "sdmTMB",
  "sf",
  "spatstat",
  "spdep",
  "terra",
  "tidyr",
  "tidyterra",
  "tidyverse"
))
```