

# Reproduce\_conditional2

XC

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what is `\newcommand` ?

ref: <https://stackoverflow.com/questions/41655383/r-markdown-similar-feature-to-newcommand-in-latex>  
`\newcommand{bI} {I}`

## Setting up

```
# INLA
#install.packages("INLA",repos=c(getOption("repos"),INLA="https://inla.r-inla-download.org/R/stable"),
library(INLA)
```

```
# For core operation
library(Matrix)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##   filter, lag

## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union
```

```
library(tidyr)
```

```
##
## Attaching package: 'tidyr'

## The following objects are masked from 'package:Matrix':
##
##   expand, pack, unpack
```

```
# for plotting and for arranging the figures into panels for publication
library(ggplot2)
library(gridExtra)
```

```
##
## Attaching package: 'gridExtra'

## The following object is masked from 'package:dplyr':
##
##      combine
```

```
library(grid)
#install.packages("extrafont")
library(extrafont)
```

```
## Registering fonts with R
```

```
# provides the data
#install.packages("maptools")
library(maptools)
```

```
## Checking rgeos availability: TRUE
## Please note that 'maptools' will be retired by the end of 2023,
## plan transition at your earliest convenience;
## some functionality will be moved to 'sp'.
```

```
#install.packages("mapproj")
library(mapproj)
```

```
## Loading required package: maps
```

```
library(RandomFields)
```

```
## Loading required package: RandomFieldsUtils
```

```
##
## Attaching package: 'RandomFields'
```

```
## The following object is masked from 'package:RandomFieldsUtils':
##
##      RFOptions
```

```
# contains a handy routing for computing CRPSs, crps: Continuous Ranked Probability Score

#install.packages("verification")
library(verification)
```

```
## Loading required package: fields
```

```

## Loading required package: spam

## Loading required package: dotCall64

## Spam version 2.7-0 (2021-06-25) is loaded.
## Type 'help( Spam)' or 'demo( spam)' for a short introduction
## and overview of this package.
## Help for individual functions is also obtained by adding the
## suffix '.spam' to the function name, e.g. 'help( chol.spam)'.

##
## Attaching package: 'spam'

## The following object is masked from 'package:INLA':
##
##      Oral

## The following object is masked from 'package:Matrix':
##
##      det

## The following objects are masked from 'package:base':
##
##      backsolve, forwardsolve

## Loading required package: viridis

## Loading required package: viridisLite

##
## Attaching package: 'viridis'

## The following object is masked from 'package:maps':
##
##      unemp

## See https://github.com/NCAR/Fields for
## an extensive vignette, other supplements and source code

## Loading required package: boot

## Loading required package: CircStats

## Loading required package: MASS

##
## Attaching package: 'MASS'

## The following object is masked from 'package:dplyr':
##
##      select

```

```
## Loading required package: dtw

## Loading required package: proxy

##
## Attaching package: 'proxy'

## The following object is masked from 'package:spam':
##
##      as.matrix

## The following object is masked from 'package:Matrix':
##
##      as.matrix

## The following objects are masked from 'package:stats':
##
##      as.dist, dist

## The following object is masked from 'package:base':
##
##      as.matrix

## Loaded dtw v1.22-3. See ?dtw for help, citation("dtw") for use in publication.

# for parallel operations we will be requiring `foreach` and `doParallel`
#install.packages("foreach")
library(foreach)
library(doParallel)
```

```
## Loading required package: iterators
```

Example below consider four models that vary only through the interaction function  $b_o(h)$ . The models are

$$\begin{array}{ll}
\text{Model 1 (independent Matérns):} & b_o(h) \equiv 0, \\
\text{Model 2 (pointwise dependence):} & b_o(h) \equiv A\delta(h), \\
\text{Model 3 (diffused dependence):} & \text{Model 4 with } \Delta = 0 \\
\text{Model 4 (asymmetric dependence):} & b_o(h) \equiv \begin{cases} A\{1 - (\|h - \Delta\|/r)^2\}^2, & \|h - \Delta\| \leq r \\ 0, & \text{otherwise,} \end{cases}
\end{array}$$

where  $\Delta = (\Delta_1, \Delta_2)^T$  is a shift-parameter vector that captures asymmetry,  $r$  is the aperture parameter, and  $A$  is a scaling parameter. In Models 3 and 4,  $b_o(h)$  is a shifted bisquare function defined on  $\mathbb{R}^2$ . The covariance functions  $C_{11}(\cdot)$  and  $C_{2|1}(\cdot)$  are Matérn covariance functions. For each model we also consider a *reversed* dependence, where we switch  $Y_2$  and  $Y_1$ . This gives us a total of eight models to fit and compare.

First, set program options, indicating which parts of the program we want to run and which parts we want to skip

```

### Model choice
model_names <- c("independent","pointwise","moving_average_delta0","moving_average")
img_path <- "../paper/art"                ## Where to save the figures
show_figs <- 1                            ## Show the figures in document
print_figs <- 0                           ## Print figures to file (leave =0)
LK_analysis <- 0                          ## Carry out likelihood analysis
LOO_analysis <- 0                         ## Carry out LOO analysis
Shifted_Pars_estimation <- 0              ## Fit shifted parimonious Matern
RF_estimation <- 0                       ## Carry out LOO with RFields
useMPI <- 0                              ## MPI backend available?

```