

Map Comparison BTM

Load packages

```
library(raster)
```

```
## Warning: package 'raster' was built under R version 3.6.1
```

```
## Loading required package: sp
```

```
## Warning: package 'sp' was built under R version 3.6.1
```

```
library(diffeR)
```

```
## Warning: package 'diffeR' was built under R version 3.6.1
```

```
## Loading required package: rgdal
```

```
## Warning: package 'rgdal' was built under R version 3.6.1
```

```
## rgdal: version: 1.4-8, (SVN revision 845)
```

```
## Geospatial Data Abstraction Library extensions to R successfully loaded
```

```
## Loaded GDAL runtime: GDAL 2.2.3, released 2017/11/20
```

```
## Path to GDAL shared files: C:/Users/Diesing_Markus/Documents/R/R-3.6.0/library/rgdal/gdal
```

```
## GDAL binary built with GEOS: TRUE
```

```
## Loaded PROJ.4 runtime: Rel. 4.9.3, 15 August 2016, [PJ_VERSION: 493]
```

```
## Path to PROJ.4 shared files: C:/Users/Diesing_Markus/Documents/R/R-3.6.0/library/rgdal/proj
```

```
## Linking to sp version: 1.3-2
```

```
## Loading required package: ggplot2
```

```
## Warning: package 'ggplot2' was built under R version 3.6.1
```

```
## Loading required package: reshape2
```

Citation for packages

```
citation("raster")
```

```
##
## To cite package 'raster' in publications use:
##
## Robert J. Hijmans (2019). raster: Geographic Data Analysis and
## Modeling. R package version 3.0-7.
## https://CRAN.R-project.org/package=raster
##
## A BibTeX entry for LaTeX users is
##
## @Manual{,
##   title = {raster: Geographic Data Analysis and Modeling},
##   author = {Robert J. Hijmans},
##   year = {2019},
##   note = {R package version 3.0-7},
##   url = {https://CRAN.R-project.org/package=raster},
## }
```

```
citation("diffeR")
```

```
##
## To cite package 'diffeR' in publications use:
##
## Robert Gilmore Pontius Jr. and Ali Santacruz (2019). diffeR: Metrics
## of Difference for Comparing Pairs of Maps or Pairs of Variables. R
## package version 0.0-6. https://CRAN.R-project.org/package=diffeR
##
## A BibTeX entry for LaTeX users is
##
## @Manual{,
##   title = {diffeR: Metrics of Difference for Comparing Pairs of Maps or Pairs of
## Variables},
##   author = {Robert Gilmore {Pontius Jr.} and Ali Santacruz},
##   year = {2019},
##   note = {R package version 0.0-6},
##   url = {https://CRAN.R-project.org/package=diffeR},
## }
##
## ATTENTION: This citation information has been auto-generated from the
## package DESCRIPTION file and may need manual editing, see
## 'help("citation")'.
```

Load raster files

```
comp <- raster("../input/btm.tif")
ref <- raster("../input/reference.tif")
```

Inspect raster files

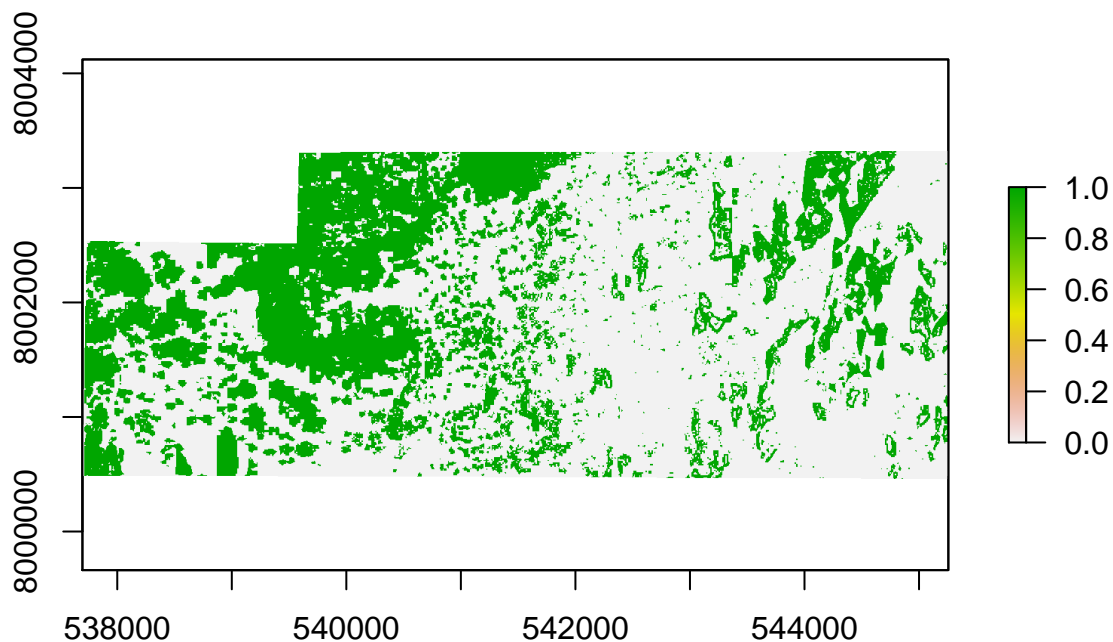
comp

```
## class      : RasterLayer
## dimensions  : 2850, 7560, 21546000 (nrow, ncol, ncell)
## resolution  : 1, 1 (x, y)
## extent     : 537696, 545256, 8000467, 8003317 (xmin, xmax, ymin, ymax)
## crs        : +proj=utm +zone=24 +south +datum=WGS84 +units=m +no_defs +ellps=WGS84 +towgs84=0,0,0
## source     : C:/Users/Diesing_Markus/OneDrive - Norges Geologiske Undersøkelse/Projects/Reefs Brazil
## names      : btm
## values     : 0, 1 (min, max)
```

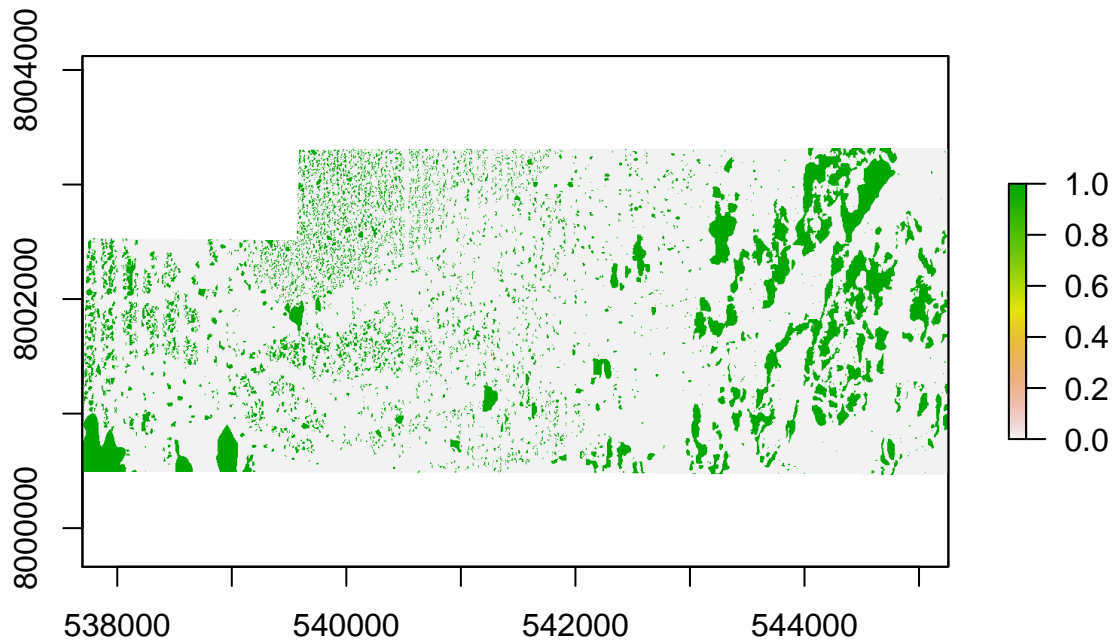
ref

```
## class      : RasterLayer
## dimensions  : 2850, 7560, 21546000 (nrow, ncol, ncell)
## resolution  : 1, 1 (x, y)
## extent     : 537696, 545256, 8000467, 8003317 (xmin, xmax, ymin, ymax)
## crs        : +proj=utm +zone=24 +south +datum=WGS84 +units=m +no_defs +ellps=WGS84 +towgs84=0,0,0
## source     : C:/Users/Diesing_Markus/OneDrive - Norges Geologiske Undersøkelse/Projects/Reefs Brazil
## names      : reference
## values     : 0, 1 (min, max)
```

plot(comp)



```
plot(ref)
```



Map comparison

This gives the contingency table upon which all other calculations are based.

```
ctmatCompRef <- crosstabm(comp, ref)
ctmatCompRef
```

```
##           0           1
## 0 11885107 1119297
## 1  5012426 1836819
```

PCC, Sensitivity and Specificity

```
OA <- sum(ctmatCompRef[,1])
OP <- sum(ctmatCompRef[,2])
PA <- sum(ctmatCompRef[1,])
PP <- sum(ctmatCompRef[2,])
N  <- OA + OP
```

```

TN <- ctmatCompRef[1,1]
FP <- ctmatCompRef[2,1]
FN <- ctmatCompRef[1,2]
TP <- ctmatCompRef[2,2]

pcc <- (TN + TP) / N
spec <- TN / OA
sens <- TP / OP
acc <- data.frame(round(pcc, 3), round(sens, 3), round(spec, 3))
colnames(acc) <- c("PCC", "Sensitivity", "Specificity")
rownames(acc) <- "Overall"

acc

```

```

##           PCC Sensitivity Specificity
## Overall 0.691      0.621      0.703

```

Agreement, Quantity Disagreement and Allocation Disagreement

```

Q <- overallQtyD(ctmatCompRef) / N
A <- overallAllocD(ctmatCompRef) / N
C <- 1 - (Q + A)

diffTab <- data.frame(matrix(nrow = 1, ncol = 3))
rownames(diffTab) <- "Overall"
colnames(diffTab) <- c("Agreement", "Quantity Disagreement", "Allocation Disagreement")
diffTab[1] <- round(C, 3)
diffTab[2] <- round(Q, 3)
diffTab[3] <- round(A, 3)

diffTab

```

```

##           Agreement Quantity Disagreement Allocation Disagreement
## Overall      0.691              0.196              0.113

```

Error of Omission and Commission

```

om_err_A <- FP / OA
om_err_P <- FN / OP
com_err_A <- FN / PA
com_err_P <- FP / PP

errTab <- data.frame(matrix(nrow = 2, ncol = 2))
rownames(errTab) <- c("0", "1")
colnames(errTab) <- c("Omission", "Commission")
errTab[1,1] <- round(om_err_A, 3)
errTab[2,1] <- round(om_err_P, 3)

```

```
errTab[1,2] <- round(com_err_A, 3)
errTab[2,2] <- round(com_err_P, 3)
```

```
errTab
```

```
##      Omission Commission
## 0      0.297      0.086
## 1      0.379      0.732
```

Reef area in km2 (reference and predicted)

```
ReefArea_Ref_km2 <- OP / 1000000
ReefArea_Comp_km2 <- PP / 1000000
areaTab <- data.frame(matrix(nrow = 1, ncol = 2))
rownames(areaTab) <- "Area (km2)"
colnames(areaTab) <- c("Comparison", "Reference")
areaTab[1] <- round(ReefArea_Comp_km2, 2)
areaTab[2] <- round(ReefArea_Ref_km2, 2)
```

```
areaTab
```

```
##              Comparison Reference
## Area (km2)      6.85      2.96
```