

# Descriptives and tests of coarse grained samples

## Geology, GEO-112, Geography Degree, UASD

### Load packages

```
library(readODS)
library(sp)
library(tidyverse)

## Loading tidyverse: ggplot2
## Loading tidyverse: tibble
## Loading tidyverse: tidyr
## Loading tidyverse: readr
## Loading tidyverse: purrr
## Loading tidyverse: dplyr

## Conflicts with tidy packages -----

## filter(): dplyr, stats
## lag():    dplyr, stats

library(plotKML)

## plotKML version 0.5-6 (2016-05-02)
## URL: http://plotkml.r-forge.r-project.org/
```

### Set the working directory, read the data, prepare the data

```
#Working directory
wd <- '/home/jr/Documentos/clases_UASD/sem201802/datos_campo/'
setwd(wd)

#Spatial object
fcoords <- list.files(wd, '*coord.ods')
coords <- read_ods(
  fcoords,
  col_types = c('text', 'text', 'numeric', 'numeric', 'text')
)
str(coords)

## 'data.frame':   60 obs. of  6 variables:
## $ responsable      : chr  "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" .
## $ nombre de muestra: chr  "M1" "M2" "M3" "M4" ...
## $ x                 : chr  "342496.286" "342569.8" "342757.28" "342503.963" ...
## $ y                 : chr  "2029593.406" "2029390.689" "2029201.855" "2030225.116" ...
## $ datum             : chr  "ESPG:32619" "ESPG:32619" "ESPG:32619" "ESPG:32619" ...
## $ nombre temporal  : chr  "1ra" "2da" "3ra" "4ta" ...

coords[,c(3,4)] <- sapply(coords[,c(3,4)], as.numeric)
str(coords)

## 'data.frame':   60 obs. of  6 variables:
```

```
## $ responsable      : chr "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" .
## $ nombre de muestra: chr "M1" "M2" "M3" "M4" ...
## $ x                : num 342496 342570 342757 342504 342627 ...
## $ y                : num 2029593 2029391 2029202 2030225 2030510 ...
## $ datum            : chr "ESPG:32619" "ESPG:32619" "ESPG:32619" "ESPG:32619" ...
## $ nombre temporal  : chr "1ra" "2da" "3ra" "4ta" ...
```

#### *#Samples*

```
fsamples <- list.files(wd, '*samples.ods')
samples <- read_ods(fsamples, range = 'A1:G1140')
```

```
## Parsed with column specification:
## cols(
##   responsable = col_character(),
##   `nombre de muestra` = col_character(),
##   `id secuencial` = col_integer(),
##   tipologia = col_character(),
##   a = col_double(),
##   b = col_integer(),
##   c = col_integer(),
##   col_character()
## )
```

```
str(samples)
```

```
## 'data.frame': 1140 obs. of 7 variables:
## $ responsable      : chr "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" .
## $ nombre de muestra: chr "M1" "M1" "M1" "M1" ...
## $ id secuencial    : chr "1" "2" "3" "4" ...
## $ tipologia        : chr "sedimentaria" "sedimentaria" "sedimentaria" "sedimentaria" ...
## $ a                : chr "61" "67" "118" "53" ...
## $ b                : chr "49" "39" "54" "40" ...
## $ c                : chr "35" "29" "36" "29" ...
```

```
samples[,c(5,6,7)] <- sapply(samples[,c(5,6,7)], as.numeric)
str(samples)
```

```
## 'data.frame': 1140 obs. of 7 variables:
## $ responsable      : chr "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" .
## $ nombre de muestra: chr "M1" "M1" "M1" "M1" ...
## $ id secuencial    : chr "1" "2" "3" "4" ...
## $ tipologia        : chr "sedimentaria" "sedimentaria" "sedimentaria" "sedimentaria" ...
## $ a                : num 61 67 118 53 81 73 43 129 58 70 ...
## $ b                : num 49 39 54 40 43 42 37 58 35 40 ...
## $ c                : num 35 29 36 29 34 21 16 33 26 19 ...
```

#### *# Two letters abbreviation for responsible name*

```
samples$responsible.abbv <- gsub(
  '\\b(\\pL)\\pL{2,}|.|','\\U\\1',
  iconv(samples$responsible, to='ASCII//TRANSLIT'),
  perl = TRUE)
```

#### *# Responsible.sample field (e.g. ET.M1)*

```
samples$resp.m <- paste(
  samples$responsible.abbv,
  samples$`nombre de muestra`, sep = '.')
```

## Descriptive statistics and inferences

### Descriptive statistics

```
sapply(
  unique(samples$responsable),
  function(x)
    psych::describe(samples[samples$responsable==x,c(5,6,7)]),
  simplify = F
)
```

## \$`Ernesto Santana`

	vars	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis
## a	1	210	77.70	18.58	74.5	76.17	16.31	43	151	108	0.99	1.47
## b	2	210	49.01	12.02	47.0	47.92	10.38	30	94	64	0.93	0.80
## c	3	210	30.73	9.66	30.0	30.26	10.38	11	61	50	0.45	-0.02

## se

## a 1.28

## b 0.83

## c 0.67

##

## \$`Ernesto Santana y Miqueas Ventura`

	vars	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis
## a	1	30	86.17	21.99	82.5	84.92	19.27	53	160	107	1.06	2.05
## b	2	30	62.60	16.34	63.0	62.25	14.83	29	100	71	0.23	-0.23
## c	3	30	44.57	13.33	40.5	43.96	14.08	23	73	50	0.37	-0.76

## se

## a 4.01

## b 2.98

## c 2.43

##

## \$`Edel Tejeda`

	vars	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis
## a	1	240	99.07	35.68	90	96.10	37.06	38	198	160	0.64	-0.47
## b	2	240	66.27	23.74	60	64.21	25.20	33	148	115	0.73	-0.02
## c	3	240	38.92	17.41	35	37.07	15.57	10	95	85	0.92	0.37

## se

## a 2.30

## b 1.53

## c 1.12

##

## \$`Edel Tejeda y Álvaro Taveras`

	vars	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis
## a	1	30	118.03	19.14	120.0	118.58	14.83	80	160	80	-0.20	-0.46
## b	2	30	65.07	17.94	63.5	63.92	14.83	35	112	77	0.62	0.03
## c	3	30	38.40	10.48	36.5	38.00	12.60	23	60	37	0.29	-1.28

## se

## a 3.49

## b 3.28

## c 1.91

##

## \$`Álvaro Taveras`

	vars	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis
## a	1	210	95.17	33.58	85	91.51	22.24	40	186	146	0.93	0.01

```
## b      2 210 62.44 21.41      58    60.05 19.27  34 135    101 0.94      0.38
## c      3 210 36.99 16.62      33    34.68 11.86  12  95     83 1.28      1.45
##      se
## a 2.32
## b 1.48
## c 1.15
##
## $`Lewis Cueto`
##   vars  n mean    sd median trimmed  mad min max range skew kurtosis
## a     1 210 78.02 15.98    75   76.65 14.83  45 160   115 1.13     2.86
## b     2 210 52.92 11.93    50   51.79  7.41  30 110    80 1.15     2.26
## c     3 210 30.87  8.71    30   30.65  7.41  10  55    45 0.19     0.04
##      se
## a 1.10
## b 0.82
## c 0.60
##
## $`Lewis Cueto y Daniel Beltrés`
##   vars  n mean    sd median trimmed  mad min max range skew kurtosis
## a     1  30 102.40 26.03   96.0   100.83 29.65  65 150    85 0.39    -1.13
## b     2  30  72.87 22.46   66.5    70.96 20.76  38 120    82 0.62    -0.86
## c     3  30  45.73 13.52   42.5    45.46 16.31  25  70    45 0.25    -1.40
##      se
## a 4.75
## b 4.10
## c 2.47
##
## $`Miqueas Ventura`
##   vars  n mean    sd median trimmed  mad min max range skew kurtosis
## a     1 180 86.38 19.35   86.5    85.85 21.50  35 153   118 0.30     0.08
## b     2 180 59.53 14.89   59.0    59.31 14.83  23 106    83 0.23     0.10
## c     3 180 37.64 14.29   37.0    37.54 14.83   8  82    74 0.19    -0.40
##      se
## a 1.44
## b 1.11
## c 1.07
```

```
sapply(
  unique(samples$responsable),
  function(x)
    sapply(
      unique(samples[samples$responsable==x,'nombre de muestra']),
      function(y)
        psych::describe(
          samples[samples$responsable==x&samples$`nombre de muestra`==y,c(5,6,7)]
        ),
      simplify = F
    )
)
```

```
## $`Ernesto Santana`
## $`Ernesto Santana`$M1
##   vars  n mean    sd median trimmed  mad min max range skew kurtosis  se
## a     1  30 70.2 21.90   66.0   67.29 19.27  43 129    86 1.00     0.35 4.00
## b     2  30 45.7 12.71   41.5   43.83 11.12  32  83    51 1.18     0.75 2.32
```

```

## c      3 30 28.5 10.70    29.0    27.25 11.12  14  59    45 0.88    0.49 1.95
##
## $`Ernesto Santana`$M2
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 73.23 14.78   69.5    72.0 12.60  53 107    54 0.75    -0.42
## b     2 30 46.57  8.56   47.0    46.5  7.41  32  64    32 0.00    -0.76
## c     3 30 28.47  7.36   28.0    28.0  7.41  16  48    32 0.57    -0.11
##      se
## a 2.70
## b 1.56
## c 1.34
##
## $`Ernesto Santana`$M3
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 81.73 19.66   80.5   79.50 17.79  50 145    95 1.18     1.88
## b     2 30 51.03 10.80   47.5   50.75 10.38  30  72    42 0.26    -0.94
## c     3 30 31.40  8.95   32.5   30.96  8.15  18  49    31 0.28    -0.89
##      se
## a 3.59
## b 1.97
## c 1.63
##
## $`Ernesto Santana`$M4
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 75.57 15.68   72.5   73.88 12.60  53 121    68 0.94     0.49
## b     2 30 45.67  7.81   46.0   44.96  4.45  33  70    37 0.92     1.41
## c     3 30 28.67  8.12   29.5   28.58  9.64  12  46    34 0.10    -0.56
##      se
## a 2.86
## b 1.43
## c 1.48
##
## $`Ernesto Santana`$M5
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 85.83 21.30   81.5   82.88 17.05  52 151    99 1.32     1.78
## b     2 30 55.50 14.57   56.0   55.29 17.79  33  87    54 0.12    -1.06
## c     3 30 33.63 11.61   32.5   33.46 10.38  11  61    50 0.28    -0.30
##      se
## a 3.89
## b 2.66
## c 2.12
##
## $`Ernesto Santana`$M6
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis   se
## a     1 30 70.83 11.42   69.5   69.67 8.15  54 106    52 1.15     1.52 2.09
## b     2 30 45.73 13.77   42.0   43.00 8.90  31  94    63 1.95     3.77 2.51
## c     3 30 31.47  8.72   29.0   31.00 8.90  15  54    39 0.47    -0.12 1.59
##
## $`Ernesto Santana`$M7
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 86.53 16.63   83.0   87.21 16.31  49 115    66 -0.21    -0.77
## b     2 30 52.90 11.15   53.0   52.42 12.60  36  86    50 0.64     0.46
## c     3 30 32.97 10.79   34.5   33.17 11.12  14  54    40 -0.16    -0.97
##      se

```

```

## a 3.04
## b 2.04
## c 1.97
##
##
## $`Ernesto Santana y Miqueas Ventura`
## $`Ernesto Santana y Miqueas Ventura`$Ocoa
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 86.17 21.99   82.5   84.92 19.27  53 160   107 1.06    2.05
## b     2 30 62.60 16.34   63.0   62.25 14.83  29 100    71 0.23   -0.23
## c     3 30 44.57 13.33   40.5   43.96 14.08  23  73    50 0.37   -0.76
##      se
## a 4.01
## b 2.98
## c 2.43
##
##
## $`Edel Tejeda`
## $`Edel Tejeda`$M1
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 121.43 36.81   128   122.25 35.58  38 198   160 -0.24   -0.08
## b     2 30  83.07 25.63    78   81.33 19.27  38 148   110 0.57   -0.02
## c     3 30  47.93 15.58    46   47.08 14.83  23  78    55 0.35   -0.93
##      se
## a 6.72
## b 4.68
## c 2.85
##
## $`Edel Tejeda`$M2
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis  se
## a     1 30  82.13 18.07   80.0   81.46 15.57  50 120    70 0.27   -0.70 3.3
## b     2 30  54.20 15.35   54.0   52.67 16.31  34  95    61 0.89    0.71 2.8
## c     3 30  33.67 11.49   30.5   32.71  9.64  18  63    45 0.77    0.06 2.1
##
## $`Edel Tejeda`$M3
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 126.53 19.43   123   125.79 17.79  93 170    77 0.31   -0.60
## b     2 30  84.27 13.46    82   83.67 16.31  65 112    47 0.36   -0.99
## c     3 30  53.17 13.02    50   51.75 11.12  35  95    60 1.12    1.56
##      se
## a 3.55
## b 2.46
## c 2.38
##
## $`Edel Tejeda`$M4
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30  96.27 14.89   96.5   96.75 20.02  68 120    52 -0.19   -1.01
## b     2 30  66.50 15.25   68.0   66.25 17.79  40  95    55 0.04   -1.07
## c     3 30  31.40 10.23   29.0   30.29 11.12  18  55    37 0.67   -0.39
##      se
## a 2.72
## b 2.78
## c 1.87
##

```

```

## $`Edel Tejeda`$M5
##   vars  n  mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 72.27 13.42   73.5   72.96 14.83 48 90   42 -0.42   -1.10
## b    2 30 49.77 10.67   48.0   48.58 11.86 37 75   38 0.81   -0.28
## c    3 30 29.83  7.91   31.0   29.62  8.90 18 48   30 0.18   -1.01
##      se
## a 2.45
## b 1.95
## c 1.44
##
## $`Edel Tejeda`$M6
##   vars  n  mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 154.2 19.14   155  153.92 23.72 120 186   66 0.06   -1.27
## b    2 30  96.6 16.64    95   96.04 13.34  60 135   75 0.26   -0.09
## c    3 30  63.5 15.05    60   62.96 14.83  40  95   55 0.26   -1.02
##      se
## a 3.49
## b 3.04
## c 2.75
##
## $`Edel Tejeda`$M7
##   vars  n  mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30  65.83 8.98   65.5   65.75  8.15  48  85   37 0.07   -0.69
## b    2 30  44.53 7.45   43.0   44.12 10.38  35  60   25 0.33   -1.16
## c    3 30  29.60 6.98   29.5   29.92  6.67  14  45   31 -0.18   -0.15
##      se
## a 1.64
## b 1.36
## c 1.27
##
## $`Edel Tejeda`$M8
##   vars  n  mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30  73.90 17.24   70.0   72.42 14.83  45 120   75 0.76    0.28
## b    2 30  51.23 12.60   50.0   50.04 14.83  33  80   47 0.63   -0.28
## c    3 30  22.23  6.39   22.5   22.04  7.41  10  35   25 0.18   -1.01
##      se
## a 3.15
## b 2.30
## c 1.17
##
##
## $`Edel Tejeda y Álvaro Taveras`
## $`Edel Tejeda y Álvaro Taveras`$Ocoa
##   vars  n  mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 118.03 19.14  120.0  118.58 14.83  80 160   80 -0.20   -0.46
## b    2 30  65.07 17.94   63.5   63.92 14.83  35 112   77 0.62    0.03
## c    3 30  38.40 10.48   36.5   38.00 12.60  23  60   37 0.29   -1.28
##      se
## a 3.49
## b 3.28
## c 1.91
##
##
## $`Álvaro Taveras`

```

```

## $`Álvaro Taveras`$M1
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 91.50 28.34   83.0   89.58 22.24  48 155   107 0.68   -0.32
## b     2 30 62.07 19.01   62.5   61.00 18.53  34 110    76 0.44   -0.47
## c     3 30 36.03 16.73   33.5   34.92 18.53  12  78    66 0.56   -0.56
##       se
## a 5.17
## b 3.47
## c 3.05
##
## $`Álvaro Taveras`$M2
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 80.83 13.42    80   80.88 14.83  57 115    58 0.13   -0.24
## b     2 30 52.13 10.24    53   51.92 12.60  36  74    38 0.09   -1.09
## c     3 30 29.60  7.28    28   28.92  4.45  18  48    30 0.84   -0.06
##       se
## a 2.45
## b 1.87
## c 1.33
##
## $`Álvaro Taveras`$M3
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 102.40 31.72   96.5  100.46 37.06  56 170   114 0.37   -0.93
## b     2 30  63.17 18.67   65.5   61.79 19.27  35 111    76 0.51   -0.24
## c     3 30  38.20 11.64   38.0   38.21 11.86  14  60    46 0.05   -0.51
##       se
## a 5.79
## b 3.41
## c 2.12
##
## $`Álvaro Taveras`$M4
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 80.60 18.58    80   80.12 14.83  40 120    80 0.11   -0.38
## b     2 30 55.93 15.07    54   54.04 13.34  36  95    59 0.93    0.03
## c     3 30 28.83  9.30    27   28.21 10.38  15  48    33 0.47   -1.12
##       se
## a 3.39
## b 2.75
## c 1.70
##
## $`Álvaro Taveras`$M5
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 103.30 39.21   88.0  100.62 28.17  50 185   135 0.62   -1.03
## b     2 30  68.73 23.80   62.0   66.92 22.24  38 120    82 0.59   -0.95
## c     3 30  43.63 21.18   37.5   41.33 18.53  18  95    77 0.91   -0.28
##       se
## a 7.16
## b 4.35
## c 3.87
##
## $`Álvaro Taveras`$M6
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 125.43 46.72  140.0  127.46 45.96  48 186   138 -0.44   -1.48
## b     2 30  78.60 30.83   86.5   78.04 37.06  35 135   100 -0.06   -1.28

```



```

## c      3 30 52.20 21.31 50.0 51.62 26.69 15 95 80 0.22 -1.18
##      se
## a 8.53
## b 5.63
## c 3.89
##
## $`Álvaro Taveras`$M7
##      vars n mean      sd median trimmed      mad min max range skew kurtosis
## a      1 30 82.13 19.49 82.5 82.12 18.53 48 120 72 0.08 -0.79
## b      2 30 56.43 15.55 56.0 55.21 20.76 37 95 58 0.54 -0.69
## c      3 30 30.40 8.70 29.5 29.62 8.15 18 55 37 0.82 0.32
##      se
## a 3.56
## b 2.84
## c 1.59
##
##
## $`Lewis Cueto`
## $`Lewis Cueto`$M1
##      vars n mean      sd median trimmed      mad min max range skew kurtosis
## a      1 30 81.33 17.37 80.0 80.00 14.83 55 130 75 0.68 0.11
## b      2 30 60.33 12.66 60.0 58.96 14.83 45 90 45 0.80 -0.22
## c      3 30 36.67 7.69 37.5 36.25 11.12 25 50 25 0.33 -1.14
##      se
## a 3.17
## b 2.31
## c 1.40
##
## $`Lewis Cueto`$M2
##      vars n mean      sd median trimmed      mad min max range skew kurtosis
## a      1 30 73.33 20.57 67.5 70.42 18.53 55 160 105 2.41 7.74
## b      2 30 49.00 6.21 50.0 49.17 7.41 35 60 25 -0.26 -0.66
## c      3 30 35.00 7.19 35.0 34.79 7.41 25 50 25 0.34 -1.13
##      se
## a 3.75
## b 1.13
## c 1.31
##
## $`Lewis Cueto`$M3
##      vars n mean      sd median trimmed      mad min max range skew kurtosis
## a      1 30 83.67 12.99 80 82.92 14.83 60 115 55 0.55 -0.37
## b      2 30 57.17 15.12 55 55.62 14.83 35 110 75 1.31 2.67
## c      3 30 32.00 9.34 30 31.04 7.41 20 55 35 0.87 0.18
##      se
## a 2.37
## b 2.76
## c 1.71
##
## $`Lewis Cueto`$M4
##      vars n mean      sd median trimmed      mad min max range skew kurtosis
## a      1 30 80.33 12.86 80 79.17 11.12 60 120 60 1.08 1.62
## b      2 30 52.00 9.25 50 51.04 7.41 40 75 35 0.91 -0.11
## c      3 30 27.00 8.47 25 27.71 7.41 10 40 30 -0.49 -0.61
##      se

```

```

## a 2.35
## b 1.69
## c 1.55
##
## $`Lewis Cueto`$M5
##   vars  n mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 80.83 15.54   80.0   80.21 14.83 55 120    65 0.42   -0.56
## b     2 30 56.17 13.18   50.0   55.21  7.41 40  85    45 0.62   -0.98
## c     3 30 27.83  9.16   27.5   27.50 11.12 10  50    40 0.30   -0.25
##       se
## a 2.84
## b 2.41
## c 1.67
##
## $`Lewis Cueto`$M6
##   vars  n mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 69.63 12.34   65.0   69.58 11.12 45  90    45 0.18   -0.87
## b     2 30 45.37  8.80   45.0   44.62  7.41 30  70    40 0.74    0.47
## c     3 30 28.07  7.89   26.5   28.00  9.64 15  45    30 0.10   -0.89
##       se
## a 2.25
## b 1.61
## c 1.44
##
## $`Lewis Cueto`$M7
##   vars  n mean    sd median trimmed   mad min max range skew kurtosis   se
## a     1 30 77.0 15.30   74.0   75.12 9.64 57 120    63 1.16    0.59 2.79
## b     2 30 50.4  9.63   52.5   50.21 8.90 34  72    38 0.02   -0.83 1.76
## c     3 30 29.5  6.51   30.0   29.21 7.41 17  43    26 0.31   -0.56 1.19
##
##
## $`Lewis Cueto y Daniel Beltrés`
## $`Lewis Cueto y Daniel Beltrés`$0coa
##   vars  n mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 102.40 26.03   96.0  100.83 29.65 65 150    85 0.39   -1.13
## b     2 30 72.87 22.46   66.5   70.96 20.76 38 120    82 0.62   -0.86
## c     3 30 45.73 13.52   42.5   45.46 16.31 25  70    45 0.25   -1.40
##       se
## a 4.75
## b 4.10
## c 2.47
##
##
## $`Miqueas Ventura`
## $`Miqueas Ventura`$M1
##   vars  n mean    sd median trimmed   mad min max range skew kurtosis
## a     1 30 88.33 19.03   88.5   88.25 20.76 55 122    67 0.00   -1.14
## b     2 30 56.43  8.87   55.5   56.29  9.64 40  73    33 0.12   -0.92
## c     3 30 37.13  9.30   37.0   36.88  7.41 18  61    43 0.27    0.26
##       se
## a 3.47
## b 1.62
## c 1.70
##

```

```
## $`Miqueas Ventura`$M2
##   vars  n  mean    sd median trimmed   mad min  max range  skew kurtosis
## a    1 30 86.95 15.55   88.0   87.67 15.57  56 111.5  55.5 -0.36   -0.83
## b    2 30 62.37  9.36   62.5   61.96  8.90  45  94.0  49.0  0.96    2.31
## c    3 30 41.53 12.35   42.0   41.00 12.60  19  82.0  63.0  0.81    1.78
##      se
## a 2.84
## b 1.71
## c 2.25
##
## $`Miqueas Ventura`$M3
##   vars  n  mean    sd median trimmed   mad min  max range  skew kurtosis
## a    1 30 78.23 15.97   74.5   77.08 14.08  54 113    59 0.60   -0.64
## b    2 30 55.43 11.80   51.5   54.33  8.90  37  79    42 0.75   -0.71
## c    3 30 31.07 10.95   29.5   30.08 10.38  12  57    45 0.62   -0.13
##      se
## a 2.92
## b 2.15
## c 2.00
##
## $`Miqueas Ventura`$M4
##   vars  n  mean    sd median trimmed   mad min  max range  skew kurtosis
## a    1 30 100.80 17.53    97   98.46 14.08  79 153    74 1.17    1.01
## b    2 30  74.47 11.03    74   73.88 10.38  50 105    55 0.51    0.44
## c    3 30  52.30  8.92    55   53.62  5.93  31  65    34 -1.17    0.54
##      se
## a 3.20
## b 2.01
## c 1.63
##
## $`Miqueas Ventura`$M5
##   vars  n  mean    sd median trimmed   mad min  max range  skew kurtosis
## a    1 30 84.30 22.54   83.0   83.75 17.79  35 130    95 0.12   -0.35
## b    2 30 54.30 21.29   51.0   53.29 25.20  23 106    83 0.43   -0.80
## c    3 30 30.63 19.58   25.5   28.79 18.53   8  72    64 0.65   -0.94
##      se
## a 4.12
## b 3.89
## c 3.57
##
## $`Miqueas Ventura`$M6
##   vars  n  mean    sd median trimmed   mad min  max range  skew kurtosis
## a    1 30 79.63 17.25   78.5   79.00 19.27  53 115    62 0.35   -1.13
## b    2 30 54.17 12.78   53.0   53.92 14.08  32  76    44 0.24   -1.08
## c    3 30 33.17  9.18   32.0   32.79  9.64  13  59    46 0.47    0.56
##      se
## a 3.15
## b 2.33
## c 1.68
```

## Inferences. Combinations of responsables-samples

```
comb <- as.data.frame(
  gtools::combinations(
    length(unique(samples$resp.m)),
    r= 2,
    unique(samples$resp.m)
  )
)
head(comb)
```

```
##      V1    V2
## 1 AT.M1 AT.M2
## 2 AT.M1 AT.M3
## 3 AT.M1 AT.M4
## 4 AT.M1 AT.M5
## 5 AT.M1 AT.M6
## 6 AT.M1 AT.M7
```

## Inferences. t-Tests between responsables-samples (all against all)

The smaller the p-value the better the result

```
rownames(comb) <- paste(comb[,1], comb[,2], sep = ' - ')
ttests <- t(
  sapply(
    rownames(comb),
    function(x)
      sapply(c('a','b','c'),
        function(y)
          t.test(
            samples[samples$resp.m==comb[x,1], y],
            samples[samples$resp.m==comb[x,2], y]
          )$p.value,
          simplify = T,
          USE.NAMES = T
        )
      )
)
ttests
```

##		a	b	c
##	AT.M1 - AT.M2	6.956812e-02	1.539072e-02	6.063435e-02
##	AT.M1 - AT.M3	1.658831e-01	8.218839e-01	5.629049e-01
##	AT.M1 - AT.M4	8.422789e-02	1.716850e-01	4.515563e-02
##	AT.M1 - AT.M5	1.872813e-01	2.357019e-01	1.287329e-01
##	AT.M1 - AT.M6	1.362682e-03	1.584989e-02	1.871616e-03
##	AT.M1 - AT.M7	1.419696e-01	2.142177e-01	1.090175e-01
##	AT.M1 - ES.M1	1.939336e-03	2.661626e-04	4.298995e-02
##	AT.M1 - ES.M2	3.111574e-03	2.115225e-04	2.887858e-02
##	AT.M1 - ES.M3	1.270173e-01	8.175293e-03	1.879159e-01
##	AT.M1 - ES.M4	9.866995e-03	9.043867e-05	3.576624e-02
##	AT.M1 - ES.M5	3.852214e-01	1.388903e-01	5.214454e-01
##	AT.M1 - ES.M6	6.684806e-04	3.622566e-04	1.918919e-01

## AT.M1 - ES.M7	4.119268e-01	2.729643e-02	4.029271e-01
## AT.M1 - ESMV.0coa	4.189911e-01	9.076420e-01	3.315383e-02
## AT.M1 - ETAT.0coa	9.141742e-05	5.320443e-01	5.145868e-01
## AT.M1 - ET.M1	8.566143e-04	6.867034e-04	6.041608e-03
## AT.M1 - ET.M2	1.333456e-01	8.325271e-02	5.258603e-01
## AT.M1 - ET.M3	8.968160e-07	3.138405e-06	4.625861e-05
## AT.M1 - ET.M4	4.192355e-01	3.233909e-01	2.018151e-01
## AT.M1 - ET.M5	1.687427e-03	3.396494e-03	7.372511e-02
## AT.M1 - ET.M6	1.144427e-13	4.905063e-10	1.033974e-08
## AT.M1 - ET.M7	3.682923e-05	3.381016e-05	5.922673e-02
## AT.M1 - ET.M8	5.529274e-03	1.214543e-02	1.500876e-04
## AT.M1 - LCDB.0coa	1.262527e-01	4.913956e-02	1.660795e-02
## AT.M1 - LC.M1	1.003790e-01	6.793564e-01	8.515289e-01
## AT.M1 - LC.M2	6.363767e-03	1.030809e-03	7.576170e-01
## AT.M1 - LC.M3	1.763280e-01	2.739864e-01	2.549992e-01
## AT.M1 - LC.M4	5.629147e-02	1.253817e-02	1.155873e-02
## AT.M1 - LC.M5	7.737869e-02	1.682831e-01	2.298045e-02
## AT.M1 - LC.M6	3.912293e-04	8.380932e-05	2.315066e-02
## AT.M1 - LC.M7	1.758852e-02	4.492740e-03	5.354968e-02
## AT.M1 - MV.M1	6.136130e-01	1.488830e-01	7.543989e-01
## AT.M1 - MV.M2	4.448125e-01	9.385406e-01	1.532841e-01
## AT.M1 - MV.M3	3.044404e-02	1.108216e-01	1.798175e-01
## AT.M1 - MV.M4	1.328872e-01	3.366361e-03	2.561818e-05
## AT.M1 - MV.M5	2.808829e-01	1.415284e-01	2.555788e-01
## AT.M1 - MV.M6	5.593916e-02	6.460617e-02	4.149744e-01
## AT.M2 - AT.M3	1.440713e-03	6.786684e-03	1.230526e-03
## AT.M2 - AT.M4	9.557419e-01	2.587437e-01	7.234847e-01
## AT.M2 - AT.M5	5.302494e-03	1.141733e-03	1.527313e-03
## AT.M2 - AT.M6	1.617992e-05	7.908112e-05	3.364699e-06
## AT.M2 - AT.M7	7.647494e-01	2.118124e-01	7.007012e-01
## AT.M2 - ES.M1	2.791067e-02	3.520094e-02	6.435045e-01
## AT.M2 - ES.M2	4.150649e-02	2.615322e-02	5.510094e-01
## AT.M2 - ES.M3	8.367422e-01	6.870755e-01	3.963641e-01
## AT.M2 - ES.M4	1.677342e-01	8.066780e-03	6.409652e-01
## AT.M2 - ES.M5	2.820124e-01	3.051855e-01	1.132792e-01
## AT.M2 - ES.M6	2.945830e-03	4.603033e-02	3.719688e-01
## AT.M2 - ES.M7	1.496083e-01	7.824790e-01	1.626250e-01
## AT.M2 - ESMV.0coa	2.624605e-01	4.583131e-03	2.431810e-06
## AT.M2 - ETAT.0coa	9.662285e-12	1.286894e-03	4.114719e-04
## AT.M2 - ET.M1	1.792867e-06	3.669777e-07	7.290328e-07
## AT.M2 - ET.M2	7.529997e-01	5.422490e-01	1.078020e-01
## AT.M2 - ET.M3	1.493438e-14	1.602497e-14	3.598664e-11
## AT.M2 - ET.M4	8.916621e-05	8.212495e-05	4.356959e-01
## AT.M2 - ET.M5	1.638033e-02	3.843768e-01	9.057525e-01
## AT.M2 - ET.M6	4.285961e-23	1.088169e-16	4.628603e-14
## AT.M2 - ET.M7	5.347567e-06	1.804571e-03	1.000000e+00
## AT.M2 - ET.M8	8.778655e-02	7.626160e-01	1.057173e-04
## AT.M2 - LCDB.0coa	2.184479e-04	4.078789e-05	7.410906e-07
## AT.M2 - LC.M1	9.011626e-01	7.846984e-03	5.559416e-04
## AT.M2 - LC.M2	1.006463e-01	1.584620e-01	5.395154e-03
## AT.M2 - LC.M3	4.095479e-01	1.373963e-01	2.717362e-01
## AT.M2 - LC.M4	8.833870e-01	9.579744e-01	2.073465e-01
## AT.M2 - LC.M5	1.000000e+00	1.910651e-01	4.117482e-01
## AT.M2 - LC.M6	1.368130e-03	8.088931e-03	4.371570e-01

## AT.M2 - LC.M7	3.066388e-01	5.022114e-01	9.554601e-01
## AT.M2 - MV.M1	8.359040e-02	8.755000e-02	9.473297e-04
## AT.M2 - MV.M2	1.084574e-01	1.600502e-04	3.655635e-05
## AT.M2 - MV.M3	4.976468e-01	2.520861e-01	5.439458e-01
## AT.M2 - MV.M4	7.466295e-06	3.886454e-11	2.737696e-15
## AT.M2 - MV.M5	4.727662e-01	6.180352e-01	7.878947e-01
## AT.M2 - MV.M6	7.647327e-01	4.994131e-01	1.009647e-01
## AT.M3 - AT.M4	2.153203e-03	1.043689e-01	1.099845e-03
## AT.M3 - AT.M5	9.224856e-01	3.179039e-01	2.245108e-01
## AT.M3 - AT.M6	2.987871e-02	2.320399e-02	2.840744e-03
## AT.M3 - AT.M7	4.491106e-03	1.346926e-01	4.826409e-03
## AT.M3 - ES.M1	3.026434e-05	9.499869e-05	1.385649e-03
## AT.M3 - ES.M2	4.486932e-05	7.015258e-05	3.200493e-04
## AT.M3 - ES.M3	3.882346e-03	3.458498e-03	1.407742e-02
## AT.M3 - ES.M4	1.553425e-04	2.886450e-05	5.563243e-04
## AT.M3 - ES.M5	2.137978e-02	8.173899e-02	1.334789e-01
## AT.M3 - ES.M6	9.882010e-06	1.344741e-04	1.415978e-02
## AT.M3 - ES.M7	1.942882e-02	1.284514e-02	7.610664e-02
## AT.M3 - ESMV.0coa	2.530614e-02	9.008969e-01	5.359690e-02
## AT.M3 - ETAT.0coa	2.520143e-02	6.892358e-01	9.444837e-01
## AT.M3 - ET.M1	3.621949e-02	1.151121e-03	8.296894e-03
## AT.M3 - ET.M2	3.889493e-03	4.689193e-02	1.343091e-01
## AT.M3 - ET.M3	8.644464e-04	6.232374e-06	1.713177e-05
## AT.M3 - ET.M4	3.433643e-01	4.520599e-01	1.947909e-02
## AT.M3 - ET.M5	2.403830e-05	1.346917e-03	2.003451e-03
## AT.M3 - ET.M6	7.610630e-10	9.047566e-10	1.343212e-09
## AT.M3 - ET.M7	7.196660e-07	1.042979e-05	1.113872e-03
## AT.M3 - ET.M8	8.459024e-05	5.473699e-03	4.160373e-08
## AT.M3 - LCDB.0coa	1.000000e+00	7.420045e-02	2.434038e-02
## AT.M3 - LC.M1	2.589650e-03	4.945679e-01	5.498544e-01
## AT.M3 - LC.M2	1.064911e-04	3.632793e-04	2.062151e-01
## AT.M3 - LC.M3	4.804782e-03	1.768967e-01	2.674285e-02
## AT.M3 - LC.M4	1.097352e-03	5.356118e-03	8.344727e-05
## AT.M3 - LC.M5	1.741467e-03	9.935489e-02	3.267875e-04
## AT.M3 - LC.M6	5.815318e-06	2.680955e-05	2.425198e-04
## AT.M3 - LC.M7	2.944165e-04	1.786798e-03	8.462522e-04
## AT.M3 - MV.M1	4.268711e-02	8.169891e-02	6.963970e-01
## AT.M3 - MV.M2	2.112535e-02	8.348035e-01	2.863677e-01
## AT.M3 - MV.M3	5.633023e-04	6.095255e-02	1.755001e-02
## AT.M3 - MV.M4	8.100262e-01	6.395403e-03	2.432938e-06
## AT.M3 - MV.M5	1.382489e-02	9.173196e-02	7.511895e-02
## AT.M3 - MV.M6	1.220739e-03	3.398617e-02	6.819345e-02
## AT.M4 - AT.M5	6.508727e-03	1.627252e-02	1.147213e-03
## AT.M4 - AT.M6	1.908715e-05	7.891702e-04	2.409571e-06
## AT.M4 - AT.M7	7.562624e-01	8.998232e-01	5.031260e-01
## AT.M4 - ES.M1	5.219929e-02	6.217724e-03	8.979934e-01
## AT.M4 - ES.M2	9.481711e-02	4.860120e-03	8.661614e-01
## AT.M4 - ES.M3	8.192769e-01	1.537226e-01	2.805921e-01
## AT.M4 - ES.M4	2.616293e-01	1.866844e-03	9.413203e-01
## AT.M4 - ES.M5	3.147827e-01	9.102442e-01	8.262842e-02
## AT.M4 - ES.M6	1.783558e-02	8.251719e-03	2.626932e-01
## AT.M4 - ES.M7	1.976034e-01	3.795215e-01	1.175674e-01
## AT.M4 - ESMV.0coa	2.940355e-01	1.059858e-01	2.388089e-06
## AT.M4 - ETAT.0coa	2.071408e-10	3.714927e-02	4.292485e-04

## AT.M4 - ET.M1	2.518700e-06	8.507900e-06	5.967684e-07
## AT.M4 - ET.M2	7.470767e-01	6.605983e-01	7.870907e-02
## AT.M4 - ET.M3	3.474906e-13	2.292665e-10	3.611408e-11
## AT.M4 - ET.M4	6.725668e-04	9.102547e-03	3.134152e-01
## AT.M4 - ET.M5	5.159467e-02	7.313013e-02	6.554042e-01
## AT.M4 - ET.M6	9.120451e-22	4.652242e-14	2.163425e-14
## AT.M4 - ET.M7	3.224128e-04	5.925377e-04	7.194264e-01
## AT.M4 - ET.M8	1.530247e-01	1.954906e-01	2.329225e-03
## AT.M4 - LCDB.Ocoa	4.652922e-04	1.210424e-03	7.250184e-07
## AT.M4 - LC.M1	8.750551e-01	2.259274e-01	7.771377e-04
## AT.M4 - LC.M2	1.564074e-01	2.518893e-02	5.782041e-03
## AT.M4 - LC.M3	4.621058e-01	7.528780e-01	1.933823e-01
## AT.M4 - LC.M4	9.487092e-01	2.290860e-01	4.279651e-01
## AT.M4 - LC.M5	9.581066e-01	9.493251e-01	6.763576e-01
## AT.M4 - LC.M6	9.580754e-03	1.773382e-03	7.319063e-01
## AT.M4 - LC.M7	4.161187e-01	9.654938e-02	7.490178e-01
## AT.M4 - MV.M1	1.166749e-01	8.762471e-01	1.029707e-03
## AT.M4 - MV.M2	1.566746e-01	5.270117e-02	3.666368e-05
## AT.M4 - MV.M3	5.987986e-01	8.867563e-01	3.981296e-01
## AT.M4 - MV.M4	5.964208e-05	1.403628e-06	3.464639e-14
## AT.M4 - MV.M5	4.906812e-01	7.329897e-01	6.515474e-01
## AT.M4 - MV.M6	8.352836e-01	6.263467e-01	7.444430e-02
## AT.M5 - AT.M6	5.170466e-02	1.709024e-01	1.238069e-01
## AT.M5 - AT.M7	1.131819e-02	2.171780e-02	3.020446e-03
## AT.M5 - ES.M1	2.053817e-04	2.759183e-05	1.120488e-03
## AT.M5 - ES.M2	3.566512e-04	2.703817e-05	7.078301e-04
## AT.M5 - ES.M3	1.006362e-02	6.244651e-04	5.874623e-03
## AT.M5 - ES.M4	9.124722e-04	1.388764e-05	8.840540e-04
## AT.M5 - ES.M5	3.748511e-02	1.242778e-02	2.818201e-02
## AT.M5 - ES.M6	1.164842e-04	3.473314e-05	5.982157e-03
## AT.M5 - ES.M7	3.725068e-02	2.004962e-03	1.806696e-02
## AT.M5 - ESMV.Ocoa	4.244140e-02	2.499956e-01	8.389714e-01
## AT.M5 - ETAT.Ocoa	7.139697e-02	5.033213e-01	2.318458e-01
## AT.M5 - ET.M1	6.989381e-02	2.865688e-02	3.744189e-01
## AT.M5 - ET.M2	1.042277e-02	7.056051e-03	2.835625e-02
## AT.M5 - ET.M3	5.760121e-03	3.202186e-03	4.096443e-02
## AT.M5 - ET.M4	3.642506e-01	6.671073e-01	6.774897e-03
## AT.M5 - ET.M5	2.261267e-04	2.783773e-04	1.906343e-03
## AT.M5 - ET.M6	1.081130e-07	2.814360e-06	1.081175e-04
## AT.M5 - ET.M7	1.472096e-05	6.370904e-06	1.484567e-03
## AT.M5 - ET.M8	5.462270e-04	9.057376e-04	6.898905e-06
## AT.M5 - LCDB.Ocoa	9.169858e-01	4.917933e-01	6.490938e-01
## AT.M5 - LC.M1	7.715271e-03	9.489483e-02	9.887987e-02
## AT.M5 - LC.M2	5.850212e-04	1.089968e-04	4.156945e-02
## AT.M5 - LC.M3	1.340470e-02	2.919448e-02	8.850747e-03
## AT.M5 - LC.M4	4.345575e-03	9.439827e-04	2.868360e-04
## AT.M5 - LC.M5	5.897738e-03	1.495017e-02	5.662413e-04
## AT.M5 - LC.M6	7.601099e-05	1.249527e-05	5.675957e-04
## AT.M5 - LC.M7	1.508489e-03	3.648849e-04	1.329097e-03
## AT.M5 - MV.M1	6.691881e-02	1.171290e-02	1.316643e-01
## AT.M5 - MV.M2	4.032048e-02	1.807818e-01	6.411175e-01
## AT.M5 - MV.M3	2.449898e-03	8.895362e-03	6.037858e-03
## AT.M5 - MV.M4	7.514906e-01	2.381520e-01	4.554658e-02
## AT.M5 - MV.M5	2.593286e-02	1.627294e-02	1.653641e-02

## AT.M5 - MV.M6	4.322333e-03	5.011520e-03	1.734211e-02
## AT.M6 - AT.M7	3.395595e-05	1.048325e-03	7.202582e-06
## AT.M6 - ES.M1	6.677437e-07	3.579404e-06	2.383220e-06
## AT.M6 - ES.M2	1.305607e-06	4.242698e-06	1.456028e-06
## AT.M6 - ES.M3	2.998779e-05	4.729589e-05	1.575999e-05
## AT.M6 - ES.M4	2.975345e-06	2.610774e-06	1.823007e-06
## AT.M6 - ES.M5	1.318864e-04	6.097316e-04	1.290067e-04
## AT.M6 - ES.M6	5.443706e-07	4.057213e-06	1.604064e-05
## AT.M6 - ES.M7	1.244469e-04	1.243287e-04	6.817697e-05
## AT.M6 - ESMV.0coa	1.547273e-04	1.575247e-02	1.026860e-01
## AT.M6 - ETAT.0coa	4.270015e-01	4.322495e-02	2.739201e-03
## AT.M6 - ET.M1	7.140154e-01	5.441762e-01	3.800675e-01
## AT.M6 - ET.M2	3.109558e-05	3.564241e-04	1.290324e-04
## AT.M6 - ET.M3	9.058252e-01	3.617661e-01	8.330161e-01
## AT.M6 - ET.M4	2.505099e-03	6.071354e-02	1.938290e-05
## AT.M6 - ET.M5	9.084180e-07	2.460241e-05	4.271545e-06
## AT.M6 - ET.M6	3.411893e-03	7.251305e-03	2.139710e-02
## AT.M6 - ET.M7	1.058717e-07	1.457919e-06	3.278172e-06
## AT.M6 - ET.M8	1.803716e-06	6.112831e-05	1.451675e-08
## AT.M6 - LCDB.0coa	2.267433e-02	4.139812e-01	1.667765e-01
## AT.M6 - LC.M1	2.281791e-05	4.687024e-03	6.051905e-04
## AT.M6 - LC.M2	1.798316e-06	1.334485e-05	1.767399e-04
## AT.M6 - LC.M3	4.107247e-05	1.405460e-03	2.610508e-05
## AT.M6 - LC.M4	1.342825e-05	6.926582e-05	5.404051e-07
## AT.M6 - LC.M5	1.760590e-05	7.303025e-04	1.107122e-06
## AT.M6 - LC.M6	3.700813e-07	2.325751e-06	1.134118e-06
## AT.M6 - LC.M7	4.765828e-06	3.163404e-05	2.934099e-06
## AT.M6 - MV.M1	2.565217e-04	6.015053e-04	1.012860e-03
## AT.M6 - MV.M2	1.353807e-04	9.213369e-03	2.188851e-02
## AT.M6 - MV.M3	7.449535e-06	4.556480e-04	1.734235e-05
## AT.M6 - MV.M4	1.028642e-02	4.936690e-01	9.812072e-01
## AT.M6 - MV.M5	8.737795e-05	8.254391e-04	1.393608e-04
## AT.M6 - MV.M6	1.275037e-05	2.683079e-04	6.014817e-05
## AT.M7 - ES.M1	2.975114e-02	4.945871e-03	4.537137e-01
## AT.M7 - ES.M2	5.135473e-02	3.887876e-03	3.567654e-01
## AT.M7 - ES.M3	9.371938e-01	1.243637e-01	6.624376e-01
## AT.M7 - ES.M4	1.561943e-01	1.519009e-03	4.283202e-01
## AT.M7 - ES.M5	4.855913e-01	8.112607e-01	2.274634e-01
## AT.M7 - ES.M6	8.681943e-03	6.569136e-03	6.371618e-01
## AT.M7 - ES.M7	3.508981e-01	3.165037e-01	3.148954e-01
## AT.M7 - ESMV.0coa	4.552830e-01	1.398224e-01	1.145896e-05
## AT.M7 - ETAT.0coa	1.371086e-09	5.124700e-02	2.156851e-03
## AT.M7 - ET.M1	5.509965e-06	1.282548e-05	2.494715e-06
## AT.M7 - ET.M2	1.000000e+00	5.777310e-01	2.197289e-01
## AT.M7 - ET.M3	2.478822e-12	6.689657e-10	1.759841e-10
## AT.M7 - ET.M4	2.615395e-03	1.410943e-02	6.848727e-01
## AT.M7 - ET.M5	2.656494e-02	5.838659e-02	7.927495e-01
## AT.M7 - ET.M6	7.143491e-21	1.162974e-13	9.317771e-14
## AT.M7 - ET.M7	1.599192e-04	4.944333e-04	6.959608e-01
## AT.M7 - ET.M8	8.849938e-02	1.604127e-01	1.228325e-04
## AT.M7 - LCDB.0coa	1.225694e-03	1.782747e-03	3.481055e-06
## AT.M7 - LC.M1	8.673094e-01	2.913746e-01	4.531398e-03
## AT.M7 - LC.M2	9.433614e-02	1.988873e-02	2.963058e-02
## AT.M7 - LC.M3	7.214869e-01	8.537650e-01	4.951184e-01



## AT.M7 - LC.M4	6.747259e-01	1.860310e-01	1.305273e-01
## AT.M7 - LC.M5	7.762527e-01	9.431301e-01	2.704507e-01
## AT.M7 - LC.M6	4.631973e-03	1.438040e-03	2.811165e-01
## AT.M7 - LC.M7	2.615089e-01	7.709567e-02	6.519303e-01
## AT.M7 - MV.M1	2.175987e-01	1.000000e+00	5.327179e-03
## AT.M7 - MV.M2	2.947074e-01	7.975065e-02	1.781927e-04
## AT.M7 - MV.M3	4.002770e-01	7.800998e-01	7.950093e-01
## AT.M7 - MV.M4	2.547685e-04	3.612195e-06	1.249670e-13
## AT.M7 - MV.M5	6.919662e-01	6.594070e-01	9.527240e-01
## AT.M7 - MV.M6	6.008633e-01	5.399805e-01	2.356714e-01
## ES.M1 - ES.M2	5.322974e-01	7.579974e-01	9.888399e-01
## ES.M1 - ES.M3	3.607608e-02	8.525708e-02	2.597338e-01
## ES.M1 - ES.M4	2.801923e-01	9.902837e-01	9.460766e-01
## ES.M1 - ES.M5	6.880763e-03	7.421494e-03	8.020246e-02
## ES.M1 - ES.M6	8.889640e-01	9.922603e-01	2.442726e-01
## ES.M1 - ES.M7	1.968073e-03	2.322103e-02	1.128851e-01
## ES.M1 - ESMV.0coa	6.602650e-03	3.971930e-05	3.587215e-06
## ES.M1 - ETAT.0coa	1.511802e-12	1.258863e-05	6.210537e-04
## ES.M1 - ET.M1	3.839402e-08	8.282413e-09	7.572419e-07
## ES.M1 - ET.M2	2.509263e-02	2.306022e-02	7.669095e-02
## ES.M1 - ET.M3	5.103328e-15	1.969823e-16	7.385675e-11
## ES.M1 - ET.M4	1.809685e-06	4.005073e-07	2.877130e-01
## ES.M1 - ET.M5	6.614225e-01	1.848925e-01	5.854424e-01
## ES.M1 - ET.M6	1.660393e-22	9.951989e-19	2.575896e-14
## ES.M1 - ET.M7	3.186409e-01	6.665025e-01	6.393203e-01
## ES.M1 - ET.M8	4.702592e-01	9.578931e-02	8.327586e-03
## ES.M1 - LCDB.0coa	3.038813e-06	6.533931e-07	1.109876e-06
## ES.M1 - LC.M1	3.342585e-02	3.710412e-05	1.316931e-03
## ES.M1 - LC.M2	5.700817e-01	2.083842e-01	7.998204e-03
## ES.M1 - LC.M3	5.708836e-03	2.400911e-03	1.824951e-01
## ES.M1 - LC.M4	3.391131e-02	3.253667e-02	5.496464e-01
## ES.M1 - LC.M5	3.468304e-02	2.724695e-03	7.964271e-01
## ES.M1 - LC.M6	9.022826e-01	9.064373e-01	8.590078e-01
## ES.M1 - LC.M7	1.692705e-01	1.123038e-01	6.639130e-01
## ES.M1 - MV.M1	1.154261e-03	3.901494e-04	1.504456e-03
## ES.M1 - MV.M2	1.239206e-03	3.919631e-07	5.359828e-05
## ES.M1 - MV.M3	1.104839e-01	3.219451e-03	3.623654e-01
## ES.M1 - MV.M4	1.734654e-07	4.046246e-13	4.652269e-13
## ES.M1 - MV.M5	1.701728e-02	6.353616e-02	6.030325e-01
## ES.M1 - MV.M6	6.919433e-02	1.268120e-02	7.511564e-02
## ES.M2 - ES.M3	6.370940e-02	8.134076e-02	1.711307e-01
## ES.M2 - ES.M4	5.554486e-01	6.720501e-01	9.207394e-01
## ES.M2 - ES.M5	1.032489e-02	5.725389e-03	4.482790e-02
## ES.M2 - ES.M6	4.845246e-01	7.795376e-01	1.555505e-01
## ES.M2 - ES.M7	1.797225e-03	1.677093e-02	6.485771e-02
## ES.M2 - ESMV.0coa	1.006319e-02	2.141941e-05	6.274625e-07
## ES.M2 - ETAT.0coa	3.662811e-14	7.956502e-06	8.969501e-05
## ES.M2 - ET.M1	7.122407e-08	1.103344e-08	2.275123e-07
## ES.M2 - ET.M2	4.136383e-02	2.159856e-02	4.201758e-02
## ES.M2 - ET.M3	8.041389e-17	1.888357e-17	9.335272e-12
## ES.M2 - ET.M4	1.299134e-07	1.295933e-07	2.078907e-01
## ES.M2 - ET.M5	7.917700e-01	2.054366e-01	4.912196e-01
## ES.M2 - ET.M6	5.530563e-25	2.188704e-18	1.596489e-14
## ES.M2 - ET.M7	2.328377e-02	3.306916e-01	5.430122e-01

## ES.M2 - ET.M8	8.728051e-01	9.955049e-02	9.036479e-04
## ES.M2 - LCDB.0coa	2.816710e-06	6.235836e-07	1.931849e-07
## ES.M2 - LC.M1	5.668496e-02	9.000821e-06	8.777910e-05
## ES.M2 - LC.M2	9.828270e-01	2.132402e-01	9.675803e-04
## ES.M2 - LC.M3	5.232086e-03	1.669132e-03	1.093843e-01
## ES.M2 - LC.M4	5.196671e-02	2.159970e-02	4.769760e-01
## ES.M2 - LC.M5	5.712979e-02	1.563746e-03	7.689750e-01
## ES.M2 - LC.M6	3.101210e-01	5.944175e-01	8.398356e-01
## ES.M2 - LC.M7	3.361648e-01	1.087709e-01	5.669447e-01
## ES.M2 - MV.M1	1.146884e-03	4.973371e-05	1.888787e-04
## ES.M2 - MV.M2	8.973696e-04	5.995213e-09	8.928556e-06
## ES.M2 - MV.M3	2.132528e-01	1.578088e-03	2.855844e-01
## ES.M2 - MV.M4	1.621866e-08	2.169927e-15	4.724230e-16
## ES.M2 - MV.M5	2.895237e-02	7.264092e-02	5.738419e-01
## ES.M2 - MV.M6	1.282832e-01	9.269650e-03	3.288939e-02
## ES.M3 - ES.M4	1.846937e-01	3.173667e-02	2.204774e-01
## ES.M3 - ES.M5	4.416097e-01	1.829392e-01	4.076040e-01
## ES.M3 - ES.M6	1.164441e-02	1.028504e-01	9.767945e-01
## ES.M3 - ES.M7	3.114935e-01	5.126640e-01	5.429730e-01
## ES.M3 - ESMV.0coa	4.137439e-01	2.158730e-03	4.096024e-05
## ES.M3 - ETAT.0coa	1.133210e-09	6.112802e-04	7.338133e-03
## ES.M3 - ET.M1	4.718675e-06	1.938456e-07	7.615467e-06
## ES.M3 - ET.M2	9.348892e-01	3.595494e-01	3.976304e-01
## ES.M3 - ET.M3	2.107855e-12	7.354156e-15	7.186635e-10
## ES.M3 - ET.M4	2.122109e-03	3.423102e-05	1.000000e+00
## ES.M3 - ET.M5	3.398197e-02	6.493470e-01	4.754303e-01
## ES.M3 - ET.M6	6.775478e-21	4.522793e-17	2.636669e-13
## ES.M3 - ET.M7	2.386407e-04	9.033466e-03	3.888731e-01
## ES.M3 - ET.M8	1.062707e-01	9.476080e-01	3.041094e-05
## ES.M3 - LCDB.0coa	1.029030e-03	2.061672e-05	1.261109e-05
## ES.M3 - LC.M1	9.337221e-01	3.365036e-03	1.765618e-02
## ES.M3 - LC.M2	1.112617e-01	3.759685e-01	9.150560e-02
## ES.M3 - LC.M3	6.550645e-01	7.638652e-02	8.003671e-01
## ES.M3 - LC.M4	7.454448e-01	7.109577e-01	5.532406e-02
## ES.M3 - LC.M5	8.447631e-01	1.044443e-01	1.326364e-01
## ES.M3 - LC.M6	6.289903e-03	2.990756e-02	1.315197e-01
## ES.M3 - LC.M7	3.025494e-01	8.113966e-01	3.513671e-01
## ES.M3 - MV.M1	1.915886e-01	3.875233e-02	1.807777e-02
## ES.M3 - MV.M2	2.592221e-01	5.820574e-05	6.213157e-04
## ES.M3 - MV.M3	4.522825e-01	1.372765e-01	8.977526e-01
## ES.M3 - MV.M4	2.059536e-04	1.820296e-11	1.055133e-12
## ES.M3 - MV.M5	6.401027e-01	4.575640e-01	8.462974e-01
## ES.M3 - MV.M6	6.616893e-01	3.094796e-01	4.533896e-01
## ES.M4 - ES.M5	3.815700e-02	2.148626e-03	6.031796e-02
## ES.M4 - ES.M6	1.871596e-01	9.816963e-01	2.033526e-01
## ES.M4 - ES.M7	1.097808e-02	5.295446e-03	8.688508e-02
## ES.M4 - ESMV.0coa	3.622217e-02	7.361503e-06	1.095893e-06
## ES.M4 - ETAT.0coa	4.229445e-13	3.061812e-06	1.798932e-04
## ES.M4 - ET.M1	2.083908e-07	6.501078e-09	3.400911e-07
## ES.M4 - ET.M2	1.383467e-01	9.501928e-03	5.696171e-02
## ES.M4 - ET.M3	7.740718e-16	8.380288e-18	1.529684e-11
## ES.M4 - ET.M4	2.337903e-06	3.922982e-08	2.565834e-01
## ES.M4 - ET.M5	3.848994e-01	9.522018e-02	5.751432e-01
## ES.M4 - ET.M6	3.182965e-24	1.838515e-18	1.711336e-14

## ES.M4 - ET.M7	4.977242e-03	5.674211e-01	6.349417e-01
## ES.M4 - ET.M8	6.967191e-01	4.513901e-02	1.222872e-03
## ES.M4 - LCDB.0coa	1.423427e-05	3.096899e-07	3.332724e-07
## ES.M4 - LC.M1	1.823893e-01	1.997495e-06	2.395018e-04
## ES.M4 - LC.M2	6.381504e-01	7.265582e-02	2.258625e-03
## ES.M4 - LC.M3	3.360774e-02	6.015691e-04	1.457023e-01
## ES.M4 - LC.M4	2.033253e-01	5.822622e-03	4.397397e-01
## ES.M4 - LC.M5	1.965410e-01	4.752042e-04	7.106656e-01
## ES.M4 - LC.M6	1.091303e-01	8.893818e-01	7.726851e-01
## ES.M4 - LC.M7	7.214279e-01	4.110605e-02	6.627339e-01
## ES.M4 - MV.M1	6.355683e-03	5.967172e-06	4.074384e-04
## ES.M4 - MV.M2	6.510913e-03	4.932121e-10	1.637249e-05
## ES.M4 - MV.M3	5.166535e-01	4.143508e-04	3.392980e-01
## ES.M4 - MV.M4	2.256835e-07	3.555060e-16	2.369413e-15
## ES.M4 - MV.M5	8.745669e-02	4.402777e-02	6.141524e-01
## ES.M4 - MV.M6	3.433123e-01	3.162173e-03	4.901323e-02
## ES.M5 - ES.M6	1.436274e-03	9.868488e-03	4.173675e-01
## ES.M5 - ES.M7	8.876802e-01	4.409212e-01	8.185948e-01
## ES.M5 - ESMV.0coa	9.526488e-01	8.100889e-02	1.281849e-03
## ES.M5 - ETAT.0coa	7.737742e-08	2.727801e-02	1.005111e-01
## ES.M5 - ET.M1	3.433569e-05	5.855013e-06	1.767114e-04
## ES.M5 - ET.M2	4.711353e-01	7.376872e-01	9.911181e-01
## ES.M5 - ET.M3	1.812286e-10	7.945228e-11	8.576609e-08
## ES.M5 - ET.M4	3.238198e-02	5.939339e-03	4.323739e-01
## ES.M5 - ET.M5	4.841964e-03	8.779484e-02	1.445163e-01
## ES.M5 - ET.M6	7.469868e-19	1.962366e-14	9.689168e-12
## ES.M5 - ET.M7	2.843002e-05	6.605414e-04	1.094911e-01
## ES.M5 - ET.M8	2.049431e-02	2.300804e-01	2.368533e-05
## ES.M5 - LCDB.0coa	9.206279e-03	8.432285e-04	4.589626e-04
## ES.M5 - LC.M1	3.736538e-01	1.755110e-01	2.384269e-01
## ES.M5 - LC.M2	2.433123e-02	3.026925e-02	5.860685e-01
## ES.M5 - LC.M3	6.364897e-01	6.653789e-01	5.506367e-01
## ES.M5 - LC.M4	2.319592e-01	2.719564e-01	1.445997e-02
## ES.M5 - LC.M5	3.036650e-01	8.531719e-01	3.610334e-02
## ES.M5 - LC.M6	7.591152e-04	2.050931e-03	3.449372e-02
## ES.M5 - LC.M7	7.069298e-02	1.159703e-01	9.573525e-02
## ES.M5 - MV.M1	6.334756e-01	7.656657e-01	2.027625e-01
## ES.M5 - MV.M2	8.174968e-01	3.464902e-02	1.333280e-02
## ES.M5 - MV.M3	1.237739e-01	9.845273e-01	3.819850e-01
## ES.M5 - MV.M4	4.357805e-03	5.405489e-07	4.209999e-09
## ES.M5 - MV.M5	7.874999e-01	7.998821e-01	4.738505e-01
## ES.M5 - MV.M6	2.205094e-01	7.077201e-01	8.634841e-01
## ES.M6 - ES.M7	8.624528e-05	3.084822e-02	5.562160e-01
## ES.M6 - ESMV.0coa	1.496472e-03	6.341235e-05	4.014216e-05
## ES.M6 - ETAT.0coa	1.958821e-15	1.935167e-05	7.297518e-03
## ES.M6 - ET.M1	2.345797e-08	9.881546e-09	7.580378e-06
## ES.M6 - ET.M2	5.646894e-03	2.836185e-02	4.071876e-01
## ES.M6 - ET.M3	8.147098e-18	9.440037e-16	6.827426e-10
## ES.M6 - ET.M4	8.211479e-10	8.057253e-07	9.784254e-01
## ES.M6 - ET.M5	6.576293e-01	2.101452e-01	4.505494e-01
## ES.M6 - ET.M6	3.580828e-25	2.061913e-18	2.712837e-13
## ES.M6 - ET.M7	6.470459e-02	6.766988e-01	3.641496e-01
## ES.M6 - ET.M8	4.204240e-01	1.120763e-01	2.037582e-05
## ES.M6 - LCDB.0coa	3.687163e-07	8.740540e-07	1.232432e-05

## ES.M6 - LC.M1	7.905642e-03	7.267789e-05	1.744160e-02
## ES.M6 - LC.M2	5.634010e-01	2.432487e-01	9.250553e-02
## ES.M6 - LC.M3	1.496394e-04	3.345987e-03	8.200247e-01
## ES.M6 - LC.M4	3.717164e-03	4.364158e-02	4.886932e-02
## ES.M6 - LC.M5	6.375576e-03	3.995421e-03	1.211708e-01
## ES.M6 - LC.M6	6.972827e-01	9.026920e-01	1.189098e-01
## ES.M6 - LC.M7	8.257716e-02	1.343587e-01	3.268744e-01
## ES.M6 - MV.M1	7.940924e-05	7.861691e-04	1.803898e-02
## ES.M6 - MV.M2	2.885833e-05	1.355145e-06	6.129351e-04
## ES.M6 - MV.M3	4.394201e-02	4.877976e-03	8.762300e-01
## ES.M6 - MV.M4	2.931738e-10	2.683329e-12	7.643830e-13
## ES.M6 - MV.M5	5.568984e-03	7.015916e-02	8.324295e-01
## ES.M6 - MV.M6	2.384036e-02	1.699077e-02	4.650919e-01
## ES.M7 - ESMV.Ocoa	9.421922e-01	9.742692e-03	4.882182e-04
## ES.M7 - ETAT.Ocoa	6.783318e-09	2.758737e-03	5.268475e-02
## ES.M7 - ET.M1	2.719070e-05	6.529161e-07	6.997785e-05
## ES.M7 - ET.M2	3.304894e-01	7.088668e-01	8.086608e-01
## ES.M7 - ET.M3	8.297375e-12	8.472793e-14	1.962842e-08
## ES.M7 - ET.M4	2.024070e-02	2.374240e-04	5.660667e-01
## ES.M7 - ET.M5	5.674459e-04	2.706848e-01	2.051496e-01
## ES.M7 - ET.M6	6.377415e-21	2.355458e-16	2.798976e-12
## ES.M7 - ET.M7	3.217071e-07	1.257387e-03	1.576194e-01
## ES.M7 - ET.M8	5.422755e-03	5.895986e-01	2.385851e-05
## ES.M7 - LCDB.Ocoa	7.010235e-03	8.057616e-05	1.648674e-04
## ES.M7 - LC.M1	2.409879e-01	1.902274e-02	1.322409e-01
## ES.M7 - LC.M2	8.381401e-03	1.010925e-01	3.945063e-01
## ES.M7 - LC.M3	4.599880e-01	2.190421e-01	7.120295e-01
## ES.M7 - LC.M4	1.119443e-01	7.348899e-01	2.069065e-02
## ES.M7 - LC.M5	1.754191e-01	3.043147e-01	5.186610e-02
## ES.M7 - LC.M6	4.085988e-05	5.276061e-03	4.978720e-02
## ES.M7 - LC.M7	2.443484e-02	3.566498e-01	1.385243e-01
## ES.M7 - MV.M1	6.978793e-01	1.798578e-01	1.146794e-01
## ES.M7 - MV.M2	9.204950e-01	7.564461e-04	5.889494e-03
## ES.M7 - MV.M3	5.339802e-02	3.961482e-01	5.011704e-01
## ES.M7 - MV.M4	2.015286e-03	3.736735e-10	4.037416e-10
## ES.M7 - MV.M5	6.640614e-01	7.511576e-01	5.703306e-01
## ES.M7 - MV.M6	1.200793e-01	6.840814e-01	9.386323e-01
## ESMV.Ocoa - ETAT.Ocoa	1.518309e-07	5.799223e-01	5.136232e-02
## ESMV.Ocoa - ET.M1	4.337769e-05	5.649350e-04	3.723052e-01
## ESMV.Ocoa - ET.M2	4.409288e-01	4.469089e-02	1.265489e-03
## ESMV.Ocoa - ET.M3	4.029711e-10	6.653100e-07	1.422340e-02
## ESMV.Ocoa - ET.M4	4.229378e-02	3.433216e-01	7.317054e-05
## ESMV.Ocoa - ET.M5	4.828686e-03	7.281706e-04	4.130014e-06
## ESMV.Ocoa - ET.M6	2.272488e-18	6.547922e-11	3.240050e-06
## ESMV.Ocoa - ET.M7	3.421203e-05	2.225208e-06	2.192077e-06
## ESMV.Ocoa - ET.M8	1.958809e-02	3.882607e-03	2.457003e-10
## ESMV.Ocoa - LCDB.Ocoa	1.158515e-02	4.795559e-02	7.376045e-01
## ESMV.Ocoa - LC.M1	3.488941e-01	5.506301e-01	7.198110e-03
## ESMV.Ocoa - LC.M2	2.306364e-02	1.335888e-04	1.201880e-03
## ESMV.Ocoa - LC.M3	5.944093e-01	1.866796e-01	9.533088e-05
## ESMV.Ocoa - LC.M4	2.159889e-01	3.382102e-03	1.665649e-07
## ESMV.Ocoa - LC.M5	2.829669e-01	9.888317e-02	6.638817e-07
## ESMV.Ocoa - LC.M6	8.013916e-04	7.095379e-06	4.748647e-07
## ESMV.Ocoa - LC.M7	6.655517e-02	9.646405e-04	1.671352e-06

## ESMV.Ocoa - MV.M1	6.847461e-01	7.602965e-02	1.541584e-02
## ESMV.Ocoa - MV.M2	8.740457e-01	9.461907e-01	3.642889e-01
## ESMV.Ocoa - MV.M3	1.158042e-01	5.681620e-02	7.233589e-05
## ESMV.Ocoa - MV.M4	6.128114e-03	1.789811e-03	1.095542e-02
## ESMV.Ocoa - MV.M5	7.465904e-01	9.600081e-02	2.213374e-03
## ESMV.Ocoa - MV.M6	2.057462e-01	3.014524e-02	3.192921e-04
## ETAT.Ocoa - ET.M1	6.557761e-01	2.700268e-03	7.599093e-03
## ETAT.Ocoa - ET.M2	4.857567e-10	1.454302e-02	1.009413e-01
## ETAT.Ocoa - ET.M3	9.319026e-02	1.925540e-05	1.084368e-05
## ETAT.Ocoa - ET.M4	8.449683e-06	7.400930e-01	1.126927e-02
## ETAT.Ocoa - ET.M5	8.927735e-15	2.118102e-04	7.528107e-04
## ETAT.Ocoa - ET.M6	8.552238e-10	2.412361e-09	8.192762e-10
## ETAT.Ocoa - ET.M7	9.753618e-17	1.043169e-06	3.588424e-04
## ETAT.Ocoa - ET.M8	3.444295e-13	1.101960e-03	3.499463e-09
## ETAT.Ocoa - LCDB.Ocoa	1.056330e-02	1.428692e-01	2.251403e-02
## ETAT.Ocoa - LC.M1	1.534911e-10	2.430867e-01	4.685412e-01
## ETAT.Ocoa - LC.M2	4.112389e-12	4.597692e-05	1.490688e-01
## ETAT.Ocoa - LC.M3	8.860970e-11	7.045657e-02	1.544119e-02
## ETAT.Ocoa - LC.M4	5.069751e-12	9.533102e-04	2.219097e-05
## ETAT.Ocoa - LC.M5	2.986607e-11	3.293601e-02	1.095999e-04
## ETAT.Ocoa - LC.M6	8.713365e-16	2.851549e-06	6.900642e-05
## ETAT.Ocoa - LC.M7	1.070180e-12	2.805799e-04	2.527828e-04
## ETAT.Ocoa - MV.M1	1.232252e-07	2.281294e-02	6.224307e-01
## ETAT.Ocoa - MV.M2	5.149238e-09	4.687915e-01	2.938675e-01
## ETAT.Ocoa - MV.M3	4.554718e-12	1.750348e-02	1.037583e-02
## ETAT.Ocoa - MV.M4	5.910342e-04	1.820871e-02	8.463520e-07
## ETAT.Ocoa - MV.M5	5.798742e-08	3.857313e-02	6.186325e-02
## ETAT.Ocoa - MV.M6	3.519451e-11	9.075683e-03	4.423764e-02
## ET.M1 - ET.M2	4.667830e-06	3.044487e-06	1.744786e-04
## ET.M1 - ET.M3	5.056683e-01	8.214753e-01	1.636158e-01
## ET.M1 - ET.M4	1.300642e-03	3.827747e-03	1.206513e-05
## ET.M1 - ET.M5	4.442228e-08	8.651661e-08	1.089840e-06
## ET.M1 - ET.M6	8.708647e-05	1.896231e-02	2.245208e-04
## ET.M1 - ET.M7	3.214369e-09	3.388891e-09	6.839481e-07
## ET.M1 - ET.M8	1.132188e-07	2.752135e-07	3.520551e-10
## ET.M1 - LCDB.Ocoa	2.473077e-02	1.066323e-01	5.614252e-01
## ET.M1 - LC.M1	3.051238e-06	8.260610e-05	9.562907e-04
## ET.M1 - LC.M2	1.282132e-07	4.706977e-08	1.761680e-04
## ET.M1 - LC.M3	5.958556e-06	1.843609e-05	1.600698e-05
## ET.M1 - LC.M4	1.400151e-06	3.126436e-07	6.505382e-08
## ET.M1 - LC.M5	2.075646e-06	6.885255e-06	1.977845e-07
## ET.M1 - LC.M6	1.428737e-08	5.390179e-09	1.700193e-07
## ET.M1 - LC.M7	3.801402e-07	1.188213e-07	5.641229e-07
## ET.M1 - MV.M1	7.484115e-05	4.768083e-06	2.068618e-03
## ET.M1 - MV.M2	2.953634e-05	1.870502e-04	8.342162e-02
## ET.M1 - MV.M3	6.869237e-07	3.509651e-06	1.158201e-05
## ET.M1 - MV.M4	8.306308e-03	9.930842e-02	1.893582e-01
## ET.M1 - MV.M5	2.129268e-05	1.563242e-05	3.780745e-04
## ET.M1 - MV.M6	1.426821e-06	1.828540e-06	4.886000e-05
## ET.M2 - ET.M3	7.440871e-13	5.304411e-11	8.088138e-08
## ET.M2 - ET.M4	1.658875e-03	2.868868e-03	4.228844e-01
## ET.M2 - ET.M5	1.986201e-02	1.996305e-01	1.383250e-01
## ET.M2 - ET.M6	1.387143e-21	1.289494e-14	9.223644e-12
## ET.M2 - ET.M7	6.619139e-05	3.417072e-03	1.040510e-01

## ET.M2 - ET.M8	7.617203e-02	4.166872e-01	1.977263e-05
## ET.M2 - LCDB.0coa	9.572658e-04	4.383350e-04	4.512499e-04
## ET.M2 - LC.M1	8.618288e-01	9.682707e-02	2.401822e-01
## ET.M2 - LC.M2	8.368556e-02	9.345136e-02	5.924425e-01
## ET.M2 - LC.M3	7.074611e-01	4.538105e-01	5.400206e-01
## ET.M2 - LC.M4	6.585295e-01	5.044743e-01	1.338420e-02
## ET.M2 - LC.M5	7.662361e-01	5.963979e-01	3.396517e-02
## ET.M2 - LC.M6	2.895422e-03	8.812785e-03	3.226278e-02
## ET.M2 - LC.M7	2.400602e-01	2.562613e-01	9.064507e-02
## ET.M2 - MV.M1	2.008254e-01	4.935289e-01	2.041978e-01
## ET.M2 - MV.M2	2.731774e-01	1.634345e-02	1.328274e-02
## ET.M2 - MV.M3	3.794971e-01	7.284266e-01	3.732779e-01
## ET.M2 - MV.M4	1.484633e-04	2.928310e-07	3.637079e-09
## ET.M2 - MV.M5	6.828306e-01	9.834259e-01	4.678156e-01
## ET.M2 - MV.M6	5.856940e-01	9.927391e-01	8.529169e-01
## ET.M3 - ET.M4	9.419486e-09	1.256499e-05	1.788210e-09
## ET.M3 - ET.M5	2.407228e-17	1.601863e-15	5.903280e-11
## ET.M3 - ET.M6	7.247383e-07	2.587009e-03	6.178100e-03
## ET.M3 - ET.M7	9.658302e-19	3.232987e-18	3.366702e-11
## ET.M3 - ET.M8	6.851668e-16	6.589533e-14	8.336083e-15
## ET.M3 - LCDB.0coa	1.554520e-04	2.113586e-02	3.418409e-02
## ET.M3 - LC.M1	2.265357e-13	2.081751e-09	2.928280e-07
## ET.M3 - LC.M2	1.069629e-14	3.979393e-16	2.901693e-08
## ET.M3 - LC.M3	1.204507e-13	8.775044e-10	1.972593e-09
## ET.M3 - LC.M4	8.556706e-15	7.465890e-15	2.332710e-12
## ET.M3 - LC.M5	4.201334e-14	3.191915e-11	9.540431e-12
## ET.M3 - LC.M6	3.333659e-18	5.732426e-18	6.727679e-12
## ET.M3 - LC.M7	1.833432e-15	1.542984e-15	2.792317e-11
## ET.M3 - MV.M1	2.009228e-10	9.879833e-13	1.195321e-06
## ET.M3 - MV.M2	5.825539e-12	1.602137e-09	7.717580e-04
## ET.M3 - MV.M3	7.239859e-15	3.012475e-12	2.175918e-09
## ET.M3 - MV.M4	1.396239e-06	3.173269e-03	7.648191e-01
## ET.M3 - MV.M5	1.679471e-10	3.722951e-08	3.060625e-06
## ET.M3 - MV.M6	5.467478e-14	2.148550e-12	7.728255e-09
## ET.M4 - ET.M5	1.690067e-08	9.025035e-06	5.096666e-01
## ET.M4 - ET.M6	1.746004e-18	9.455830e-10	4.014068e-13
## ET.M4 - ET.M7	1.082894e-12	1.078264e-08	4.295859e-01
## ET.M4 - ET.M8	1.477292e-06	8.856940e-05	1.273346e-04
## ET.M4 - LCDB.0coa	2.683897e-01	2.047376e-01	2.323412e-05
## ET.M4 - LC.M1	7.243605e-04	9.391600e-02	2.828713e-02
## ET.M4 - LC.M2	8.053831e-06	9.748032e-07	1.208316e-01
## ET.M4 - LC.M3	9.354297e-04	2.063098e-02	8.132879e-01
## ET.M4 - LC.M4	4.279700e-05	5.089946e-05	7.488252e-02
## ET.M4 - LC.M5	2.315135e-04	6.821202e-03	1.602249e-01
## ET.M4 - LC.M6	4.371338e-10	3.848082e-08	1.632323e-01
## ET.M4 - LC.M7	6.941691e-06	1.136558e-05	3.948554e-01
## ET.M4 - MV.M1	7.767406e-02	3.058656e-03	2.685321e-02
## ET.M4 - MV.M2	2.115766e-02	2.119177e-01	1.034078e-03
## ET.M4 - MV.M3	3.088876e-05	2.699862e-03	9.034439e-01
## ET.M4 - MV.M4	2.849448e-01	2.434434e-02	1.311005e-11
## ET.M4 - MV.M5	1.889591e-02	1.366601e-02	8.500884e-01
## ET.M4 - MV.M6	1.864237e-04	1.267466e-03	4.841472e-01
## ET.M5 - ET.M6	2.970980e-25	1.566195e-17	5.285619e-14
## ET.M5 - ET.M7	3.374490e-02	3.211557e-02	9.039999e-01

## ET.M5 - ET.M8	6.837477e-01	6.285316e-01	1.385412e-04
## ET.M5 - LCDB.0coa	1.198779e-06	8.204823e-06	1.250737e-06
## ET.M5 - LC.M1	2.765753e-02	9.279701e-04	1.255781e-03
## ET.M5 - LC.M2	8.129255e-01	7.353190e-01	1.045590e-02
## ET.M5 - LC.M3	1.457769e-03	3.303986e-02	3.363744e-01
## ET.M5 - LC.M4	2.077369e-02	3.899349e-01	1.857500e-01
## ET.M5 - LC.M5	2.605364e-02	4.334091e-02	3.692541e-01
## ET.M5 - LC.M6	4.320608e-01	8.688767e-02	3.900150e-01
## ET.M5 - LC.M7	2.078806e-01	8.101704e-01	8.591994e-01
## ET.M5 - MV.M1	4.059889e-04	1.094880e-02	1.805104e-03
## ET.M5 - MV.M2	2.444897e-04	9.465535e-06	6.375973e-05
## ET.M5 - MV.M3	1.227954e-01	5.589899e-02	6.191059e-01
## ET.M5 - MV.M4	2.971438e-09	2.693373e-12	1.112595e-14
## ET.M5 - MV.M5	1.545767e-02	3.029046e-01	8.366912e-01
## ET.M5 - MV.M6	7.022908e-02	1.533828e-01	1.373496e-01
## ET.M6 - ET.M7	4.823085e-25	1.103329e-18	4.945940e-14
## ET.M6 - ET.M8	3.667545e-24	1.003493e-16	1.203512e-16
## ET.M6 - LCDB.0coa	6.161421e-12	2.209926e-05	1.128133e-05
## ET.M6 - LC.M1	4.100365e-22	3.971650e-13	4.814363e-11
## ET.M6 - LC.M2	1.407178e-22	5.468935e-17	8.551127e-12
## ET.M6 - LC.M3	2.469013e-22	1.488255e-13	5.346554e-13
## ET.M6 - LC.M4	3.373117e-23	1.072702e-16	3.463330e-15
## ET.M6 - LC.M5	7.527097e-23	1.170931e-14	7.913413e-15
## ET.M6 - LC.M6	1.047797e-25	8.124104e-19	9.976505e-15
## ET.M6 - LC.M7	6.252827e-24	2.774315e-17	5.165406e-14
## ET.M6 - MV.M1	2.321970e-19	4.325346e-15	1.182687e-10
## ET.M6 - MV.M2	3.969332e-21	7.809324e-13	7.753626e-08
## ET.M6 - MV.M3	1.917211e-23	2.732659e-15	4.173300e-13
## ET.M6 - MV.M4	3.411195e-16	1.653158e-07	1.005787e-03
## ET.M6 - MV.M5	1.497571e-18	1.048522e-11	1.333436e-09
## ET.M6 - MV.M6	1.247551e-22	1.482253e-15	1.702428e-12
## ET.M7 - ET.M8	2.798514e-02	1.572493e-02	7.552142e-05
## ET.M7 - LCDB.0coa	1.482262e-08	1.369515e-07	6.707371e-07
## ET.M7 - LC.M1	8.298607e-05	3.944982e-07	4.463111e-04
## ET.M7 - LC.M2	7.469379e-02	1.457293e-02	4.565205e-03
## ET.M7 - LC.M3	1.015001e-07	1.814937e-04	2.646208e-01
## ET.M7 - LC.M4	5.549633e-06	1.101015e-03	1.997684e-01
## ET.M7 - LC.M5	3.522660e-05	1.181737e-04	4.045425e-01
## ET.M7 - LC.M6	1.783571e-01	6.937374e-01	4.286728e-01
## ET.M7 - LC.M7	1.205726e-03	1.084347e-02	9.544433e-01
## ET.M7 - MV.M1	6.751753e-07	6.032567e-07	8.124443e-04
## ET.M7 - MV.M2	6.090502e-08	4.560323e-11	3.253363e-05
## ET.M7 - MV.M3	5.660103e-04	8.706341e-05	5.390511e-01
## ET.M7 - MV.M4	1.882887e-12	6.856515e-17	1.843187e-15
## ET.M7 - MV.M5	1.707789e-04	2.316699e-02	7.869153e-01
## ET.M7 - MV.M6	3.405422e-04	8.519617e-04	9.595455e-02
## ET.M8 - LCDB.0coa	7.321602e-06	3.348517e-05	9.142578e-11
## ET.M8 - LC.M1	1.015279e-01	7.117092e-03	1.093453e-10
## ET.M8 - LC.M2	9.083329e-01	3.889751e-01	1.110759e-09
## ET.M8 - LC.M3	1.637029e-02	1.043982e-01	1.815548e-05
## ET.M8 - LC.M4	1.071853e-01	7.892679e-01	1.707966e-02
## ET.M8 - LC.M5	1.072609e-01	1.437831e-01	8.269442e-03
## ET.M8 - LC.M6	2.753022e-01	4.150243e-02	2.650858e-03
## ET.M8 - LC.M7	4.643407e-01	7.746624e-01	5.332708e-05

## ET.M8 - MV.M1	3.184271e-03	7.029165e-02	2.231847e-09
## ET.M8 - MV.M2	3.185940e-03	2.841270e-04	1.619387e-09
## ET.M8 - MV.M3	3.167041e-01	1.879141e-01	3.974985e-04
## ET.M8 - MV.M4	1.398484e-07	3.207676e-10	1.190257e-20
## ET.M8 - MV.M5	4.969391e-02	5.004742e-01	3.192501e-02
## ET.M8 - MV.M6	2.029007e-01	3.745423e-01	1.981918e-06
## LCDB.Ocoa - LC.M1	5.529005e-04	1.065293e-02	2.540205e-03
## LCDB.Ocoa - LC.M2	1.257144e-05	2.921136e-06	3.890590e-04
## LCDB.Ocoa - LC.M3	1.019720e-03	2.537321e-03	2.990266e-05
## LCDB.Ocoa - LC.M4	1.505572e-04	3.218359e-05	5.128843e-08
## LCDB.Ocoa - LC.M5	3.055444e-04	9.922371e-04	2.018719e-07
## LCDB.Ocoa - LC.M6	1.952222e-07	2.710021e-07	1.456140e-07
## LCDB.Ocoa - LC.M7	3.131916e-05	1.096794e-05	5.161898e-07
## LCDB.Ocoa - MV.M1	2.044468e-02	6.297584e-04	5.924766e-03
## LCDB.Ocoa - MV.M2	7.548470e-03	2.318140e-02	2.139834e-01
## LCDB.Ocoa - MV.M3	7.406221e-05	4.924249e-04	2.335611e-05
## LCDB.Ocoa - MV.M4	7.811529e-01	7.278612e-01	3.087745e-02
## LCDB.Ocoa - MV.M5	5.607564e-03	1.726621e-03	1.039550e-03
## LCDB.Ocoa - MV.M6	2.117542e-04	2.551225e-04	1.025564e-04
## LC.M1 - LC.M2	1.091390e-01	7.169065e-05	3.896543e-01
## LC.M1 - LC.M3	5.581847e-01	3.829203e-01	3.914352e-02
## LC.M1 - LC.M4	8.008908e-01	5.246897e-03	2.154801e-05
## LC.M1 - LC.M5	9.068662e-01	2.166597e-01	1.614385e-04
## LC.M1 - LC.M6	4.035211e-03	2.273578e-06	7.245940e-05
## LC.M1 - LC.M7	3.094889e-01	1.196202e-03	2.628986e-04
## LC.M1 - MV.M1	1.421706e-01	1.728753e-01	8.330423e-01
## LC.M1 - MV.M2	1.922099e-01	4.823227e-01	7.305659e-02
## LC.M1 - MV.M3	4.746567e-01	1.263401e-01	2.599639e-02
## LC.M1 - MV.M4	6.160728e-05	2.314218e-05	1.151664e-09
## LC.M1 - MV.M5	5.703182e-01	1.884909e-01	1.244993e-01
## LC.M1 - MV.M6	7.050073e-01	6.549937e-02	1.150155e-01
## LC.M2 - LC.M3	2.417452e-02	9.366745e-03	1.690145e-01
## LC.M2 - LC.M4	1.204439e-01	1.464458e-01	2.237199e-04
## LC.M2 - LC.M5	1.168727e-01	1.014505e-02	1.380627e-03
## LC.M2 - LC.M6	4.023645e-01	7.035460e-02	7.596208e-04
## LC.M2 - LC.M7	4.368166e-01	5.066667e-01	2.952097e-03
## LC.M2 - MV.M1	4.821847e-03	4.332143e-04	3.246149e-01
## LC.M2 - MV.M2	5.499669e-03	3.294687e-08	1.582667e-02
## LC.M2 - MV.M3	3.072359e-01	1.135059e-02	1.063627e-01
## LC.M2 - MV.M4	7.404171e-07	1.843015e-14	2.957899e-11
## LC.M2 - MV.M5	5.383132e-02	1.993047e-01	2.588741e-01
## LC.M2 - MV.M6	2.038383e-01	5.304521e-02	3.928440e-01
## LC.M3 - LC.M4	3.221257e-01	1.169847e-01	3.398920e-02
## LC.M3 - LC.M5	4.468382e-01	7.857966e-01	8.640348e-02
## LC.M3 - LC.M6	6.887468e-05	5.791980e-04	8.350204e-02
## LC.M3 - LC.M7	7.421687e-02	4.403431e-02	2.345851e-01
## LC.M3 - MV.M1	2.725194e-01	8.198041e-01	3.714187e-02
## LC.M3 - MV.M2	3.786616e-01	1.157976e-01	1.382920e-03
## LC.M3 - MV.M3	1.539577e-01	6.226097e-01	7.237826e-01
## LC.M3 - MV.M4	7.254825e-05	5.327824e-06	5.970131e-12
## LC.M3 - MV.M5	8.945111e-01	5.502422e-01	7.317464e-01
## LC.M3 - MV.M6	3.108403e-01	4.102078e-01	6.273793e-01
## LC.M4 - LC.M5	8.924972e-01	1.622215e-01	7.158246e-01
## LC.M4 - LC.M6	1.717097e-03	6.108503e-03	6.156823e-01



## LC.M4 - LC.M7	3.649271e-01	5.142487e-01	2.053503e-01
## LC.M4 - MV.M1	6.207553e-02	6.308019e-02	4.542705e-05
## LC.M4 - MV.M2	7.791922e-02	6.271149e-05	2.323003e-06
## LC.M4 - MV.M3	5.771070e-01	2.149407e-01	1.133988e-01
## LC.M4 - MV.M4	3.786499e-06	9.331191e-12	3.215898e-16
## LC.M4 - MV.M5	4.068082e-01	5.903095e-01	3.564769e-01
## LC.M4 - MV.M6	8.592221e-01	4.553266e-01	8.970806e-03
## LC.M5 - LC.M6	3.120931e-03	4.794501e-04	9.161976e-01
## LC.M5 - LC.M7	3.396984e-01	5.829844e-02	4.203690e-01
## LC.M5 - MV.M1	1.001408e-01	9.270904e-01	2.507000e-04
## LC.M5 - MV.M2	1.329947e-01	4.043740e-02	9.934157e-06
## LC.M5 - MV.M3	5.253140e-01	8.211334e-01	2.199979e-01
## LC.M5 - MV.M4	1.877774e-05	2.793939e-07	5.324660e-15
## LC.M5 - MV.M5	4.911019e-01	6.847755e-01	4.819763e-01
## LC.M5 - MV.M6	7.781023e-01	5.530410e-01	2.807388e-02
## LC.M6 - LC.M7	4.482772e-02	3.894165e-02	4.460898e-01
## LC.M6 - MV.M1	3.891787e-05	9.583084e-06	1.467404e-04
## LC.M6 - MV.M2	1.353521e-05	1.137646e-09	6.810742e-06
## LC.M6 - MV.M3	2.331297e-02	4.395410e-04	2.288974e-01
## LC.M6 - MV.M4	1.436656e-10	5.508047e-16	5.842746e-16
## LC.M6 - MV.M5	3.101214e-03	4.009979e-02	5.093732e-01
## LC.M6 - MV.M6	1.261759e-02	3.086203e-03	2.466789e-02
## LC.M7 - MV.M1	1.384298e-02	1.439596e-02	5.498073e-04
## LC.M7 - MV.M2	1.535116e-02	8.653305e-06	2.407439e-05
## LC.M7 - MV.M3	7.611462e-01	7.565850e-02	5.039028e-01
## LC.M7 - MV.M4	6.381530e-07	1.540983e-12	9.364343e-16
## LC.M7 - MV.M5	1.483384e-01	3.660118e-01	7.652571e-01
## LC.M7 - MV.M6	5.340684e-01	2.029748e-01	8.008790e-02
## MV.M1 - MV.M2	7.590104e-01	1.449322e-02	1.248225e-01
## MV.M1 - MV.M3	2.998694e-02	7.120049e-01	2.438892e-02
## MV.M1 - MV.M4	1.067034e-02	3.929048e-09	2.480605e-08
## MV.M1 - MV.M5	4.570480e-01	6.152333e-01	1.079953e-01
## MV.M1 - MV.M6	6.866560e-02	4.285989e-01	1.017035e-01
## MV.M2 - MV.M3	3.643413e-02	1.457939e-02	9.860168e-04
## MV.M2 - MV.M4	2.009204e-03	2.585246e-05	2.996044e-04
## MV.M2 - MV.M5	5.983765e-01	6.467269e-02	1.295012e-02
## MV.M2 - MV.M6	8.978154e-02	6.469559e-03	4.342324e-03
## MV.M3 - MV.M4	2.634801e-06	2.432732e-08	3.298541e-11
## MV.M3 - MV.M5	2.344653e-01	7.998236e-01	9.161950e-01
## MV.M3 - MV.M6	7.454309e-01	6.914943e-01	4.241854e-01
## MV.M4 - MV.M5	2.533239e-03	3.547967e-05	2.169528e-06
## MV.M4 - MV.M6	1.561590e-05	1.582630e-08	2.963273e-11
## MV.M5 - MV.M6	3.717738e-01	9.766600e-01	5.245612e-01

Inferences. Number and relative frequencies of statistically significant differences between samples by responsables (all against all)

- The higher the TRUE relative frequencies the better the result

```
respnames <- unique(
  samples$responsable.abbv)[
  nchar(unique(samples$responsable.abbv))==2
]#This excludes Ocoa samples
ttests.nrlf <- map(
```

```

respnames,
~ttests %>%
  as.data.frame() %>%
  rownames_to_column('m1 - m2') %>%
  mutate_if(is.numeric, funs(<=0.05)) %>%
  filter(grepl(.x, `m1 - m2`)) %>%
  filter(!grepl('Ocoa', `m1 - m2`)) %>%
  gather(variable, value, -`m1 - m2`) %>%
  dplyr::select(variable, value) %>%
  group_by(variable, value) %>%
  dplyr::summarise(freq=n()) %>%
  dplyr::add_tally(freq) %>%
  mutate(proportion=round(freq/n*100,2))
) %>% set_names(respnames)
ttests.nrlf

```

```

## $ES
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value   freq     n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a          FALSE    99   217      45.6
## 2 a          TRUE    118   217      54.4
## 3 b          FALSE    83   217      38.2
## 4 b          TRUE    134   217      61.8
## 5 c          FALSE   130   217      59.9
## 6 c          TRUE     87   217      40.1
##
## $ET
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value   freq     n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a          FALSE    60   244      24.6
## 2 a          TRUE   184   244      75.4
## 3 b          FALSE    70   244      28.7
## 4 b          TRUE   174   244      71.3
## 5 c          FALSE    90   244      36.9
## 6 c          TRUE   154   244      63.1
##
## $AT
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value   freq     n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a          FALSE    87   217      40.1
## 2 a          TRUE   130   217      59.9
## 3 b          FALSE    86   217      39.6
## 4 b          TRUE   131   217      60.4
## 5 c          FALSE    99   217      45.6
## 6 c          TRUE   118   217      54.4
##
## $LC
## # A tibble: 6 x 5

```

```
## # Groups:   variable [3]
##   variable value  freq      n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a          FALSE  113   217        52.1
## 2 a          TRUE   104   217        47.9
## 3 b          FALSE   98   217        45.2
## 4 b          TRUE   119   217        54.8
## 5 c          FALSE  108   217        49.8
## 6 c          TRUE   109   217        50.2
##
## $MV
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq      n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a          FALSE   90   189        47.6
## 2 a          TRUE    99   189        52.4
## 3 b          FALSE   83   189        43.9
## 4 b          TRUE   106   189        56.1
## 5 c          FALSE   84   189        44.4
## 6 c          TRUE   105   189        55.6
```

**Inferences.** Number and relative frequencies of statistically significant differences pairwise by responsible

- The higher the TRUE relative frequencies the better the result

```
resnamesc <- as.data.frame(gtools::combinations(length(resnames), r=2, resnames))
rownames(resnamesc) <- paste(
  resnamesc$V1,
  '-',
  resnamesc$V2,
  '=',
  resnamesc$V2,
  '-',
  resnamesc$V1
)
ttests.nrlf.p <- map(
  rownames(resnamesc),
  ~ttests %>%
    as.data.frame() %>%
    rownames_to_column('m1 - m2') %>%
    mutate_if(is.numeric, funs(<=0.05)) %>%
    filter(
      grepl(
        paste0(
          '^',
          resnamesc[,x,1],
          '\\.M. - ',
          resnamesc[,x,2],
          '\\.*$|^',
          resnamesc[,x,2],
          '\\.M. - ',
          resnamesc[,x,1],

```

```

    '.*$'),
    `m1 - m2`)) %>%
gather(variable, value, -`m1 - m2`) %>%
dplyr::select(variable, value) %>%
group_by(variable, value) %>%
dplyr::summarise(freq=n()) %>%
dplyr::add_tally(freq) %>%
mutate(proportion=round(freq/n*100,2))
) %>% setNames(rownames(responsesc))
ttests.nrlf.p

```

```

## $`AT - ES = ES - AT`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq    n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a        FALSE   22   56       39.3
## 2 a        TRUE    34   56       60.7
## 3 b        FALSE   16   56       28.6
## 4 b        TRUE    40   56       71.4
## 5 c        FALSE   30   56       53.6
## 6 c        TRUE    26   56       46.4
##
## $`AT - ET = ET - AT`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq    n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a        FALSE   16   63       25.4
## 2 a        TRUE    47   63       74.6
## 3 b        FALSE   20   63       31.8
## 4 b        TRUE    43   63       68.2
## 5 c        FALSE   23   63       36.5
## 6 c        TRUE    40   63       63.5
##
## $`AT - LC = LC - AT`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq    n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a        FALSE   25   56       44.6
## 2 a        TRUE    31   56       55.4
## 3 b        FALSE   25   56       44.6
## 4 b        TRUE    31   56       55.4
## 5 c        FALSE   24   56       42.9
## 6 c        TRUE    32   56       57.1
##
## $`AT - MV = MV - AT`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq    n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a        FALSE   23   42       54.8
## 2 a        TRUE    19   42       45.2

```

```

## 3 b      FALSE    26    42    61.9
## 4 b      TRUE     16    42    38.1
## 5 c      FALSE    21    42     50
## 6 c      TRUE     21    42     50
##
## $`ES - ET = ET - ES`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a      FALSE    15     63     23.8
## 2 a      TRUE     48     63     76.2
## 3 b      FALSE    20     63     31.8
## 4 b      TRUE     43     63     68.2
## 5 c      FALSE    29     63     46.0
## 6 c      TRUE     34     63     54.0
##
## $`ES - LC = LC - ES`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a      FALSE    33     56     58.9
## 2 a      TRUE     23     56     41.1
## 3 b      FALSE    26     56     46.4
## 4 b      TRUE     30     56     53.6
## 5 c      FALSE    35     56     62.5
## 6 c      TRUE     21     56     37.5
##
## $`ES - MV = MV - ES`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a      FALSE    22     42     52.4
## 2 a      TRUE     20     42     47.6
## 3 b      FALSE    14     42     33.3
## 4 b      TRUE     28     42     66.7
## 5 c      FALSE    21     42     50
## 6 c      TRUE     21     42     50
##
## $`ET - LC = LC - ET`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a      FALSE    18     64     28.1
## 2 a      TRUE     46     64     71.9
## 3 b      FALSE    19     64     29.7
## 4 b      TRUE     45     64     70.3
## 5 c      FALSE    21     64     32.8
## 6 c      TRUE     43     64     67.2
##
## $`ET - MV = MV - ET`

```

```
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value   freq     n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a          FALSE    11    48        22.9
## 2 a          TRUE     37    48        77.1
## 3 b          FALSE    13    48        27.1
## 4 b          TRUE     35    48        72.9
## 5 c          FALSE    16    48        33.3
## 6 c          TRUE     32    48        66.7
##
## `$LC - MV = MV - LC`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value   freq     n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a          FALSE    26    42        61.9
## 2 a          TRUE     16    42        38.1
## 3 b          FALSE    23    42        54.8
## 4 b          TRUE     19    42        45.2
## 5 c          FALSE    20    42        47.6
## 6 c          TRUE     22    42        52.4
```

**Inferences. Statistically significant differences between samples of the same person**

- The higher the TRUE relative frequencies the better the result

```
ttests.nrlf.s <- map(
  resnames,
  ~ttests %>%
    as.data.frame() %>%
    rownames_to_column('m1 - m2') %>%
    mutate_if(is.numeric, funs(<.=0.05)) %>%
    filter(grepl(
      paste0(
        '^',
        .x,
        '\\.M. - ',
        .x,
        '\. *$'
      ), `m1 - m2`)) %>%
    gather(variable, value, -`m1 - m2`) %>%
    dplyr::select(variable, value) %>%
    group_by(variable, value) %>%
    dplyr::summarise(freq=n()) %>%
    dplyr::add_tally(freq) %>%
    mutate(proportion=round(freq/n*100,2))
) %>% set_names(resnames)
ttests.nrlf.s
```

```
## $ES
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value   freq     n proportion
```

```

##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a         FALSE   14   28         50
## 2 a         TRUE    14   28         50
## 3 b         FALSE   13   28        46.4
## 4 b         TRUE    15   28        53.6
## 5 c         FALSE   20   28        71.4
## 6 c         TRUE     8   28        28.6
##
## $ET
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a         FALSE    3    28        10.7
## 2 a         TRUE   25    28        89.3
## 3 b         FALSE    4    28        14.3
## 4 b         TRUE   24    28        85.7
## 5 c         FALSE    7    28         25
## 6 c         TRUE   21    28         75
##
## $AT
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a         FALSE   10   21        47.6
## 2 a         TRUE   11   21        52.4
## 3 b         FALSE   11   21        52.4
## 4 b         TRUE   10   21        47.6
## 5 c         FALSE    9   21        42.9
## 6 c         TRUE   12   21        57.1
##
## $LC
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a         FALSE   15   21        71.4
## 2 a         TRUE    6   21        28.6
## 3 b         FALSE   10   21        47.6
## 4 b         TRUE   11   21        52.4
## 5 c         FALSE   11   21        52.4
## 6 c         TRUE   10   21        47.6
##
## $MV
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>      <lgl> <int> <int>      <dbl>
## 1 a         FALSE    8   15        53.3
## 2 a         TRUE     7   15        46.7
## 3 b         FALSE    7   15        46.7
## 4 b         TRUE     8   15        53.3
## 5 c         FALSE    6   15         40

```

```
## 6 c      TRUE      9      15      60
```

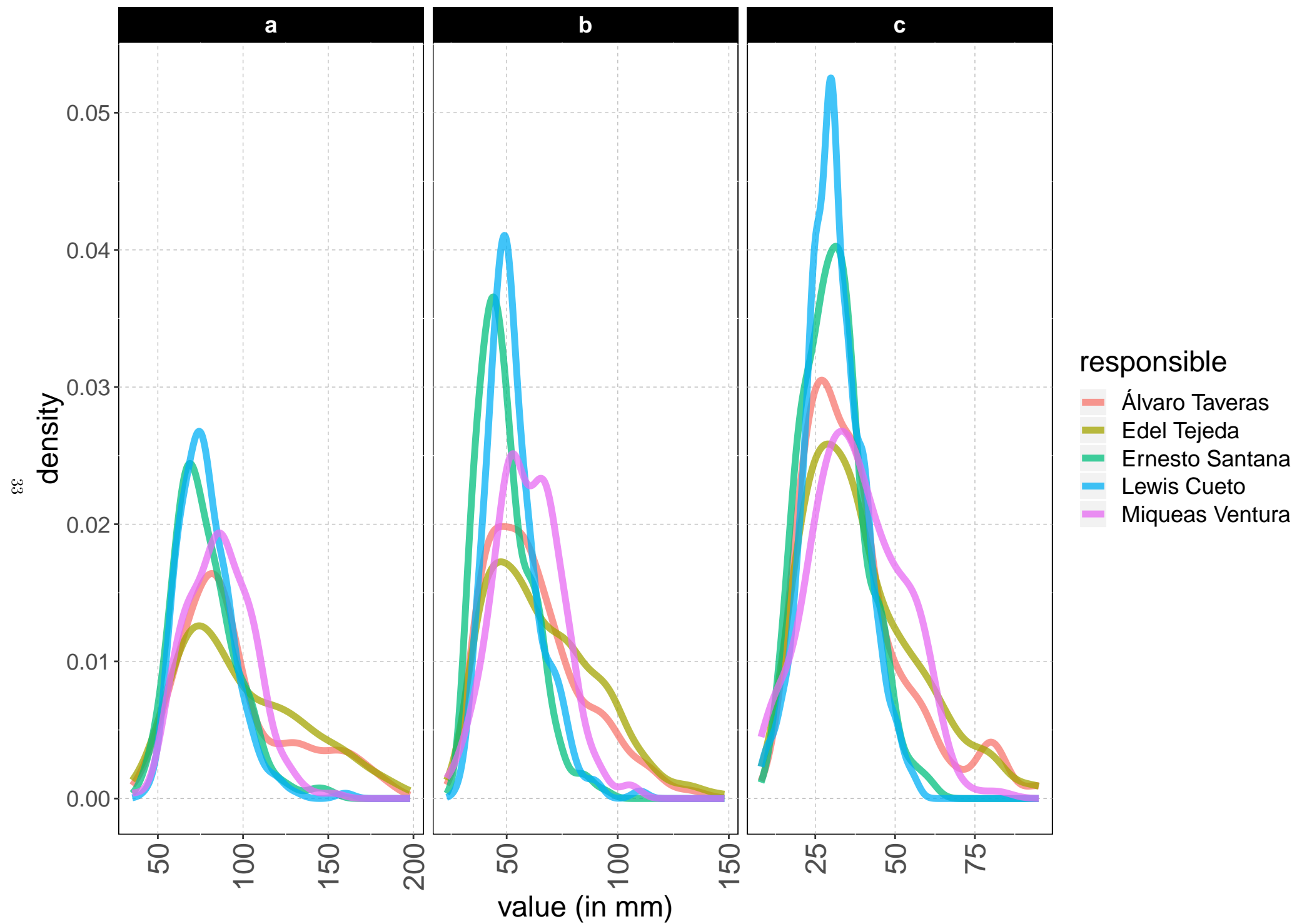
## Plots

```
# Density plots
respon.dens <- samples %>%
  filter(!grepl('0coa', `nombre de muestra`)) %>%
  select(responsable=responsable, a, b, c) %>%
  gather(axis, `value (in mm)`, -responsable) %>%
  ggplot(aes(x=`value (in mm)`, colour = responsable)) +
  geom_line(alpha = 0.75, stat = 'density', size = 2, fill = 'gray95') +
  facet_grid(~axis, scales = 'free_x') +
  theme(
    text = element_text(size = 18),
    axis.text.x=element_text(size = 18, angle = 90, hjust = 1, vjust = 0.5),
    panel.background = element_rect(fill = 'white', colour = 'black'),
    panel.grid.major = element_line(colour = "grey", linetype = "dashed", size = 0.25),
    strip.background = element_rect(colour = "black", fill = "black"),
    strip.text.x = element_text(colour = "white", face = "bold")
  )
```

```
## Warning: Ignoring unknown parameters: fill
```

```
respon.dens
```

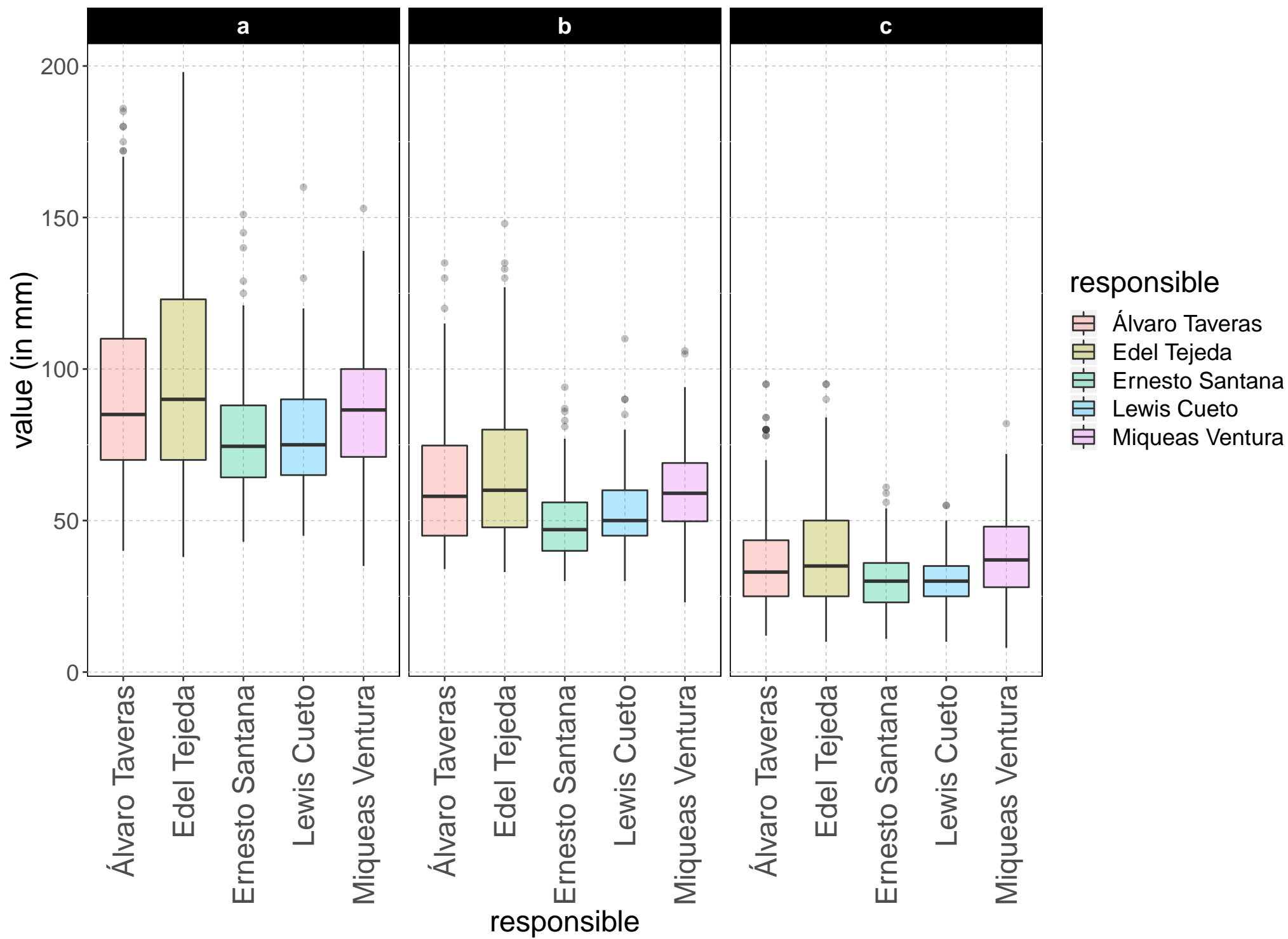




```

# Box-plots
respon.bp <- samples %>%
  filter(!grepl('Ocoa', `nombre de muestra`)) %>%
  select(responsible=responsable, a, b, c) %>%
  gather(axis, `value (in mm)`, -responsible) %>%
  ggplot(aes(x=responsible, y=`value (in mm)`, fill = responsible)) +
  geom_boxplot(alpha = 0.3) +
  facet_grid(~axis, scales = 'free_x') +
  theme(
    text = element_text(size = 18),
    axis.text.x=element_text(size = 18, angle = 90, hjust = 1, vjust = 0.5),
    panel.background = element_rect(fill = 'white', colour = 'black'),
    panel.grid.major = element_line(colour = "grey", linetype = "dashed", size = 0.25),
    strip.background = element_rect(colour = "black", fill = "black"),
    strip.text.x = element_text(colour = "white", face = "bold")
  )
respon.bp

```



## Maps

```
# coords.sp <- coords
# coordinates(coords.sp) <- ~x+y
# proj4string(coords.sp) <- CRS("+init=epsg:32619")
# plotKML(coords.sp, 'kml')
# spTransform(coords.sp, CRS("+init=epsg:4326"))
```