

# Plots\_Github

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## 1 Library

## 2 Required data sets

If problems running the plots, think about “`dev.off()`”

### 2.0.0.1 IN TEXT FIGURES

### 3 Figure 1 : Study area (map)

```
fig1 <- ggplot(aes(x=c(35, 85), y=c(-25, 25)), data=Ob7_NLOG) +  
  geom_point(data = Ob7_NLOG, mapping = aes(x = longitude, y = latitude),  
             colour = "blue", shape=1, size=1) +  
  geom_map(data = world, map = world, aes(long, lat, map_id = region),  
           color = "black", fill = "lightgray", size = 0.1) +  
  geom_segment(aes(x=40,y=(-10),xend=85,yend=(-10)),linetype=2)+  
  xlim(min(35),max(85))+  
  ylim(min(-25),max(25))+  
  xlab("Longitude (deg)") +  
  ylab("Latitude (deg)") +  
  theme(panel.border = element_rect(fill = NA, colour = "black"))+  
  theme(text = element_text(size = 15))+  
  theme(axis.text.x = element_text(size = 15))+  
  theme(axis.text.y = element_text(size = 15))
```

#### 3.1 Save plot

```
ggsave(file=file.path(PATH FIG, "Fig1_Study Area.png"), fig1, width = 10, height = 10, units = "cm")  
ggsave(file=file.path(PATH FIG, "Fig1.eps"), fig1, width = 10, height = 10, units = "cm")
```

### 4 Figure 2 : Yearly number of NLOG observations (histograms)

```
fig2 <- ggplot(data = Ob7_NLOG) +  
  geom_bar(mapping = aes(x = year, fill=as.factor(Zone)), binwidth=0.5, color = "black", position = pos  
  stat_count(aes(x = year, y=..count.., fill=as.factor(Zone), label=..count..),size = 6, geom="text", v  
  ylab("Number of observations") +  
  scale_x_continuous(name="Years", breaks=c(2014,2015,2016,2017,2018,2019),  
                      labels = c("2014","2015","2016","2017","2018","2019")) +  
  scale_fill_manual(values = c("grey48","grey86"), name = "Zone",  
                    labels = c (">10°S","<10°S")) +  
  theme(panel.border = element_rect(fill = NA, colour = "black")) +  
  theme(text = element_text(size = 25)) +  
  theme(axis.text.x = element_text(size = 25)) +  
  theme(axis.text.y = element_text(size = 25)) +  
  theme(legend.text = element_text(size=25)) +  
  theme(legend.key.size = unit(1, 'cm'))
```

#### 4.1 Save plot

```
ggsave(file=file.path(PATH FIG, "Fig2_Nb of NLOGs.png"), fig2, width = 30, height = 18, units = "cm")  
ggsave(file=file.path(PATH FIG, "Fig2.eps"), fig2, width = 30, height = 18, units = "cm")
```

## 5 Figure 3 : Distribution of the environmental variables according to NLOG = 0 or NLOG > 0

### 5.1 SSCI - Moz

```
## SSCI
#Moz
f3.ssci.moz <- ggplot()+
  geom_histogram(stat = 'bin', aes(x=SSCImean, y = ..density.., fill = "NLOG = 0"),
                 binwidth = 0.02, size = 1,
                 data = NLOG_VE_zero_Moz, alpha=0.5)+
  geom_histogram(stat = 'bin', aes(x=SSCImean, y = ..density.., fill = "NLOG > 0"),
                 binwidth = 0.02, size = 1,
                 data = NLOG_VE_sup_zero_Moz, alpha = 0.5)+
  scale_fill_manual(name = "NLOG abundance index (Number per observation effort)",
                    values = c("NLOG = 0" = "steelblue3", "NLOG > 0" = "yellow1"))+
  scale_x_continuous(breaks=c(0,0.1,0.2,0.3,0.4,0.5,0.6,0.7))+
  scale_y_continuous(labels = function(x) x*100*b.width)+
  xlab("Mean SSCI (m.s-1)")+
  ylab("Frequency (%)")+
  ggtitle("< 10°S")+
  theme(text = element_text(size = 20))+
  theme(plot.title = element_text(hjust = 0.5))+
  theme(axis.text.x = element_text(size = 20))+
  theme(axis.text.y = element_text(size = 20))+
  theme(legend.text = element_text(size=20))+
  theme(legend.title = element_text(size=20))+
  annotate(geom="text", x=0.445, y=8.75, label="P = 0.099",
           color="black", fontface="bold.italic", size=6)
```

### 5.2 SSCI - North

```
## SSCI
#North
f3.ssci.north <- ggplot()+
  geom_histogram(stat = 'bin', aes(x=SSCImean, y = ..density.., fill = "NLOG = 0"),
                 binwidth = 0.02, size = 1,
                 data = NLOG_VE_zero_North, alpha=0.5)+
  geom_histogram(stat = 'bin', aes(x=SSCImean, y = ..density.., fill = "NLOG > 0"),
                 binwidth = 0.02, size = 1,
                 data = NLOG_VE_sup_zero_North, alpha = 0.5)+
  scale_fill_manual(name = "NLOG abundance index (Number per observation effort)",
                    values = c("NLOG = 0" = "steelblue3", "NLOG > 0" = "yellow1"))+
  scale_x_continuous(breaks=c(0,0.1,0.2,0.3,0.4,0.5,0.6))+
  scale_y_continuous(labels = function(x) x*100*b.width)+
  xlab("Mean SSCI (m.s-1)")+
  ylab(" ")+
  ggtitle("\u2265 10°S") #\u2265 is the code for the >= symbol
  theme(text = element_text(size = 20))+
  theme(plot.title = element_text(hjust = 0.5))+
```

```

theme(axis.text.x = element_text(size = 20))+  

theme(axis.text.y = element_text(size = 20))+  

theme(legend.text = element_text(size=20))+  

theme(legend.title = element_text(size=20))+  

annotate(geom="text", x=0.62, y=4.3, label="P = 0.013",  

        color="black", fontface="bold.italic", size=6)

```

### 5.3 SLA - Moz

```

## SLA  

#Moz  

f3.sla.moz <- ggplot() +  

  geom_histogram(stat = 'bin', aes(x=slamean, y = ..density.., fill = "NLOG = 0"),  

                binwidth = 0.02, bins = 30, size = 1,  

                data = NLOG_VE_zero_Moz, alpha=0.5) +  

  geom_histogram(stat = 'bin', aes(x=slamean, y = ..density.., fill = "NLOG > 0"),  

                binwidth = 0.02, bins = 30, size = 1,  

                data = NLOG_VE_sup_zero_Moz, alpha = 0.5) +  

  scale_fill_manual(name = "NLOG abundance index (Number per observation effort)",  

                    values = c("NLOG = 0" = "steelblue3", "NLOG > 0" = "yellow1")) +  

  scale_x_continuous(breaks=c(-0.10,-0.05,0,0.05,0.10,0.15,0.20,0.25,0.30)) +  

  scale_y_continuous(labels = function(x) x*100*b.width) +  

  xlab("Mean SLA (m)") +  

  ylab("Frequency (%)") +  

  ggtitle(" ") +  

  theme(text = element_text(size = 20)) +  

  theme(axis.text.x = element_text(size = 20)) +  

  theme(axis.text.y = element_text(size = 20)) +  

  theme(legend.text = element_text(size=20)) +  

  theme(legend.title = element_text(size=20)) +  

  annotate(geom="text", x=0.14, y=13, label="P = 0.345",  

          color="black", fontface="bold.italic", size=6)

```

### 5.4 SLA - North

```

## SLA  

#North  

f3.sla.north <- ggplot() +  

  geom_histogram(stat = 'bin', aes(x=slamean, y = ..density.., fill = "NLOG = 0"),  

                binwidth = 0.02, size = 1,  

                data = NLOG_VE_zero_North, alpha=0.5) +  

  geom_histogram(stat = 'bin', aes(x=slamean, y = ..density.., fill = "NLOG > 0"),  

                binwidth = 0.02, size = 1,  

                data = NLOG_VE_sup_zero_North, alpha = 0.5) +  

  scale_fill_manual(name = "NLOG abundance index (Number per observation effort)",  

                    values = c("NLOG = 0" = "steelblue3", "NLOG > 0" = "yellow1")) +  

  scale_x_continuous(breaks=c(-0.10,-0.05,0,0.05,0.10,0.15,0.20,0.25,0.30)) +  

  scale_y_continuous(labels = function(x) x*100*b.width) +  

  xlab("Mean SLA (m)") +

```

```

ylab(" ")+  

ggtitle(" ")+  

theme(text = element_text(size = 20))+  

theme(axis.text.x = element_text(size = 18))+  

theme(axis.text.y = element_text(size = 20))+  

theme(legend.text = element_text(size=20))+  

theme(legend.title = element_text(size=20))+  

annotate(geom="text", x=0.28, y=5, label="P = 0.292",  

        color="black", fontface="bold.italic", size=6)

```

## 5.5 FSLE - Moz

```

## FSLE  

#Moz  

f3.fsle.moz <- ggplot() +  

  geom_histogram(stat = 'bin', aes(x=FSLEmean, y = ..density.., fill = "NLOG = 0"),  

                 binwidth = 0.02, size = 1,  

                 data = NLOG_VE_zero_Moz, alpha=0.5) +  

  geom_histogram(stat = 'bin', aes(x=FSLEmean, y = ..density.., fill = "NLOG > 0"),  

                 binwidth = 0.02, size = 1,  

                 data = NLOG_VE_sup_zero_Moz, alpha = 0.5) +  

  scale_fill_manual(name = "NLOG abundance index (Number per observation effort)",  

                    values = c("NLOG = 0" = "steelblue3", "NLOG > 0" = "yellow1")) +  

  scale_x_continuous(breaks=c(-0.14,-0.12,-0.10,-0.08,-0.06,-0.04,-0.02,0)) +  

  scale_y_continuous(labels = function(x) x*100*b.width) +  

  xlab("Mean FSLE (days-1)") +  

  ylab("Frequency (%)") +  

  ggtitle(" ") +  

  theme(text = element_text(size = 20)) +  

  theme(axis.text.x = element_text(size = 20)) +  

  theme(axis.text.y = element_text(size = 20)) +  

  theme(legend.text = element_text(size=20)) +  

  theme(legend.title = element_text(size=20)) +  

  annotate(geom="text", x=-0.037, y=15, label="P = 0.114",  

          color="black", fontface="bold.italic", size=6)

```

## 5.6 FSLE - North

```

## FSLE  

#North  

f3.fsle.north <- ggplot() +  

  geom_histogram(stat = 'bin', aes(x=FSLEmean, y = ..density.., fill = "NLOG = 0"),  

                 binwidth = 0.02, size = 1,  

                 data = NLOG_VE_zero_North, alpha=0.5) +  

  geom_histogram(stat = 'bin', aes(x=FSLEmean, y = ..density.., fill = "NLOG > 0"),  

                 binwidth = 0.02, size = 1,  

                 data = NLOG_VE_sup_zero_North, alpha = 0.5) +  

  scale_fill_manual(name = "NLOG abundance index (Number per observation effort)",  

                    values = c("NLOG = 0" = "steelblue3", "NLOG > 0" = "yellow1"))

```

```

scale_x_continuous(breaks=c(-0.14,-0.12,-0.10,-0.08,-0.06,-0.04,-0.02,0))+  

scale_y_continuous(labels = function(x) x*100*b.width)+  

xlab("Mean FSLE (days-1)")+  

ylab(" ")+  

ggtitle(" ")+  

theme(text = element_text(size = 20))+  

theme(axis.text.x = element_text(size = 20))+  

theme(axis.text.y = element_text(size = 20))+  

theme(legend.text = element_text(size=20))+  

theme(legend.title = element_text(size=20))+  

annotate(geom="text", x=0, y=21, label="P = 0.291",  

        color="black", fontface="bold.italic", size=6)

```

## 5.7 MN\_Epi - Moz

```

## MN_Epi  

#Moz  

f3.mn.moz <- ggplot() +  

  geom_histogram(stat = 'bin', aes(x=MNmean, y = ..density.., fill = "NLOG = 0"),  

                 binwidth = 0.04, bins = 30, size = 1,  

                 data = NLOG_VE_zero_Moz, alpha=0.5) +  

  geom_histogram(stat = 'bin', aes(x=MNmean, y = ..density.., fill = "NLOG > 0"),  

                 binwidth = 0.04, bins = 30, size = 1,  

                 data = NLOG_VE_sup_zero_Moz, alpha = 0.5) +  

  scale_fill_manual(name = "NLOG abundance index (Number per observation effort)",  

                    values = c("NLOG = 0" = "steelblue3", "NLOG > 0" = "yellow1")) +  

  scale_x_continuous(breaks=c(0.25,0.50,0.75,1.00,1.25)) +  

  scale_y_continuous(labels = function(x) x*100*b.width) +  

  xlab("Mean MN_Epi (g.m-2)") +  

  ylab("Frequency (%)") +  

  ggtitle(" ") +  

  theme(text = element_text(size = 20)) +  

  theme(axis.text.x = element_text(size = 20)) +  

  theme(axis.text.y = element_text(size = 20)) +  

  theme(legend.text = element_text(size=20)) +  

  theme(legend.title = element_text(size=20)) +  

  annotate(geom="text", x=1.2, y=4.5, label="P = 0.669",  

          color="black", fontface="bold.italic", size=6)

```

## 5.8 MN\_Epi - North

```

## MN_Epi  

#North  

f3.mn.north <- ggplot() +  

  geom_histogram(stat = 'bin', aes(x=MNmean, y = ..density.., fill = "NLOG = 0"),  

                 binwidth = 0.025, size = 1,  

                 data = NLOG_VE_zero_North, alpha=0.5) +  

  geom_histogram(stat = 'bin', aes(x=MNmean, y = ..density.., fill = "NLOG > 0"),  

                 binwidth = 0.025, size = 1,

```

```

        data = NLOG_VE_sup_zero_North, alpha = 0.5) +
scale_fill_manual(name = "NLOG abundance index (Number per observation effort)",
                  values = c("NLOG = 0" = "steelblue3", "NLOG > 0" = "yellow1")) +
scale_x_continuous(breaks=c(0.3,0.6,0.9)) +
scale_y_continuous(labels = function(x) x*100*b.width) +
xlab("Mean MN_Epi (g.m-2)") +
ylab(" ") +
ggtitle(" ") +
theme(text = element_text(size = 20)) +
theme(axis.text.x = element_text(size = 20)) +
theme(axis.text.y = element_text(size = 20)) +
theme(legend.text = element_text(size=20)) +
theme(legend.title = element_text(size=20)) +
annotate(geom="text", x=1.04, y=2.8, label="P = 0.160",
         color="black", fontface="bold.italic", size=6)

```

## 5.9 Chla - Moz

```

## Chla
#Moz
b.width = 0.02
f3.chla.moz <- ggplot() +
  geom_histogram(stat = 'bin', aes(x=chlamean, y = ..density.., fill = "NLOG = 0"),
                 binwidth = b.width, bins = 30, size = 1,
                 data = NLOG_VE_zero_Moz, alpha=0.5) +
  geom_histogram(stat = 'bin', aes(x=chlamean, y = ..density.., fill = "NLOG > 0"),
                 binwidth = b.width, bins = 30, size = 1,
                 data = NLOG_VE_sup_zero_Moz, alpha = 0.5) +
  scale_fill_manual(name = "NLOG abundance index (Number per observation effort)",
                    values = c("NLOG = 0" = "steelblue3", "NLOG > 0" = "yellow1")) +
  scale_x_continuous(breaks=c(0,0.10,0.20,0.30,0.40,0.50,0.60,0.70,0.80,0.90,1)) +
  scale_y_continuous(labels = function(x) x*100*b.width) +
  xlab("Mean Chl-a (mg.m-3)") +
  ylab("Frequency (%)") +
  ggtitle(" ") +
  theme(text = element_text(size = 20)) +
  theme(axis.text.x = element_text(size = 20)) +
  theme(axis.text.y = element_text(size = 20)) +
  theme(legend.text = element_text(size=20)) +
  theme(legend.title = element_text(size=20)) +
  annotate(geom="text", x=0.93, y=9.1, label="P = 0.441",
           color="black", fontface="bold.italic", size=6)

```

## 5.10 Chla - North

```

## Chla
#North
f3.chla.north <- ggplot() +
  geom_histogram(stat = 'bin', aes(x=chlamean, y = ..density.., fill = "NLOG = 0"),

```

```

        binwidth = 0.02, size = 1,
        data = NLOG_VE_zero_North, alpha=0.5) +
geom_histogram(stat = 'bin', aes(x=chlamean, y = ..density.., fill = "NLOG > 0"),
               binwidth = 0.02, size = 1,
               data = NLOG_VE_sup_zero_North, alpha = 0.5) +
scale_fill_manual(name = "NLOG abundance index (Number per observation effort)",
                  values = c("NLOG = 0" = "steelblue3", "NLOG > 0" = "yellow1")) +
scale_x_continuous(breaks=c(0,0.10,0.20,0.30,0.40,0.50,0.60,0.70,0.80,0.90,1)) +
scale_y_continuous(labels = function(x) x*100*b.width) +
xlab("Mean Chl-a (mg.m-3)") +
ylab(" ") +
ggtitle(" ") +
theme(text = element_text(size = 20)) +
theme(axis.text.x = element_text(size = 20)) +
theme(axis.text.y = element_text(size = 20)) +
theme(legend.text = element_text(size=20)) +
theme(legend.title = element_text(size=20)) +
annotate(geom="text", x=0.69, y=6.5, label="P = 0.012",
         color="black", fontface="bold.italic", size=6)

```

##Combine plots To combine plots, put each plot in an object (a, b, c, d, e, etc...) and use “grid.arrange(a, b, c, d, e, ncol=2, nrow=3)”. You can add labels and use a common legend. It is also possible to use “rremove(“ylab”)” to avoid the y axis text.

```

fig3 <- ggarrange(f3.ssci.moz, f3.ssci.north,
                    f3.sla.moz, f3.sla.north,
                    f3.fsle.moz,f3.fsle.north,
                    f3.mn.moz, f3.mn.north,
                    f3.chla.moz, f3.chla.north,
                    labels = c("(a)","(b)","(c)","(d)","(e)","(f)","(g)","(h)","(i)","(j)"),
                    font.label = list(size = 20),
                    label.x = 0.85,
                    label.y = 0.85,
                    ncol = 2, nrow = 5,
                    common.legend = TRUE, legend = "bottom",
                    widths = c(1, 1),
                    heights = c(1, 1))

```

## 5.11 Save plots

```

ggsave(file=file.path(PATH FIG, "Fig3_Distributions of VE.png"), fig3, width = 35, height = 50, units =
ggsave(file=file.path(PATH FIG, "Fig3.eps"), fig3, width = 35, height = 50, units = "cm")

```

# 6 Figure 4 : Scatter plots : NLOGs vs VE

## 6.1 SSCI

```
#SSCI
f4.ssci <- ggplot(NLOG_VE_sup_zero) +
  geom_point(aes(x = SSCImean, y = NLOG_stand, shape = Zone), size = 3) +
  scale_shape_manual(values = c(1, 17), label = c(">10°S", "<10°S")) +
  scale_x_continuous(breaks=c(0,0.1,0.2,0.3,0.4,0.5,0.6,0.7)) +
  xlab("Mean SSCI (m.s-1)") +
  ylab("NLOG abundance index  
(Number per  
observation effort)") +
  scale_y_continuous(breaks=c(0,0.5,1,1.5,2,2.5)) +
  theme(text = element_text(size = 17)) +
  theme(axis.text.x = element_text(size = 18)) +
  theme(axis.text.y = element_text(size = 18)) +
  theme(legend.text = element_text(size=20)) +
  theme(legend.title = element_text(size=20)) +
  theme(legend.position = "none") +
  theme(legend.key.size = unit(1, 'cm'))
```

## 6.2 SLA

```
#SLA
f4.sla <- ggplot(NLOG_VE_sup_zero) +
  geom_point(aes(x = slamean, y = NLOG_stand, shape = Zone), size = 3) +
  scale_shape_manual(values = c(1, 17), label = c(">10°S", "<10°S")) +
  scale_x_continuous(breaks=c(-0.10,-0.05,0,0.05,0.10,0.15,0.20,0.25,0.30)) +
  xlab("Mean SLA (m)") +
  ylab("") +
  scale_y_continuous(breaks=c(0,0.5,1,1.5,2,2.5)) +
  theme(text = element_text(size = 17)) +
  theme(axis.text.x = element_text(size = 16)) +
  theme(axis.text.y = element_text(size = 18)) +
  theme(legend.text = element_text(size=20)) +
  theme(legend.title = element_text(size=20)) +
  theme(legend.position = "none") +
  theme(legend.key.size = unit(1, 'cm'))
```

## 6.3 FSLE

```
#FSLE
f4.fsle <- ggplot(NLOG_VE_sup_zero) +
  geom_point(aes(x = FSLEmean, y = NLOG_stand, shape = Zone), size = 3) +
  scale_shape_manual(values = c(1, 17), label = c(">10°S", "<10°S")) +
  scale_x_continuous(breaks=c(-0.14,-0.12,-0.10,-0.08,-0.06,-0.04,-0.02,0)) +
  xlab("Mean FSLE (days-1)") +
  ylab("") +
```

```

scale_y_continuous(breaks=c(0,0.5,1,1.5,2,2.5))+  

theme(text = element_text(size = 17))+  

theme(axis.text.x = element_text(size = 18))+  

theme(axis.text.y = element_text(size = 18))+  

theme(legend.text = element_text(size=20))+  

theme(legend.title = element_text(size=20))+  

theme(legend.position = "none")+  

theme(legend.key.size = unit(1, 'cm'))

```

## 6.4 MN\_Epi

```

#MN_Epi  

f4.mn <- ggplot(NLOG_VE_sup_zero)+  

geom_point(aes(x = MNmean, y = NLOG_stand, shape = Zone),size = 3)+  

scale_shape_manual(values = c(1, 17),label = c(">10°S", "<10°S"))+  

scale_x_continuous(breaks=c(0.25,0.50,0.75,1,1.25))+  

xlab("Mean MN_Epi (g.m-2)")+  

ylab("NLOG abundance index  

(Number per  

observation effort)")+  

scale_y_continuous(breaks=c(0,0.5,1,1.5,2,2.5))+  

theme(text = element_text(size = 17))+  

theme(axis.text.x = element_text(size = 18))+  

theme(axis.text.y = element_text(size = 18))+  

theme(legend.text = element_text(size=20))+  

theme(legend.title = element_text(size=20))+  

theme(legend.position = "none")+  

theme(legend.key.size = unit(1, 'cm'))

```

## 6.5 Chla

```

#Chla  

f4.chla <- ggplot(NLOG_VE_sup_zero)+  

geom_point(aes(x = chlamean, y = NLOG_stand, shape = Zone),size = 3)+  

scale_shape_manual(values = c(1, 17),label = c(">10°S", "<10°S"))+  

scale_x_continuous(breaks=c(0,0.10,0.20,0.30,0.40,0.50,0.60,0.70,0.80,0.90,1))+  

xlab("Mean Chl-a (mg.m-3)")+  

ylab("NLOG abundance index  

(Number per  

observation effort)")+  

scale_y_continuous(breaks=c(0,0.5,1,1.5,2,2.5))+  

theme(text = element_text(size = 17))+  

theme(axis.text.x = element_text(size = 18))+  

theme(axis.text.y = element_text(size = 18))+  

theme(legend.text = element_text(size=20))+  

theme(legend.title = element_text(size=20))+  

theme(legend.position = "none")+  

theme(legend.key.size = unit(1, 'cm'))

```

##Combine plots

```

fig4 <- ggarrange(f4.ssci,
                    f4.sla,
                    f4.fsle,
                    f4.mn,
                    f4.chla,
                    labels = c("(a)","(b)","(c)","(d)","(e)"),
                    font.label = list(size = 20),
                    label.x = 0.85,
                    label.y = 0.95,
                    ncol = 2, nrow = 3,
                    common.legend = TRUE, legend = "bottom")

```

## 6.6 Save plots

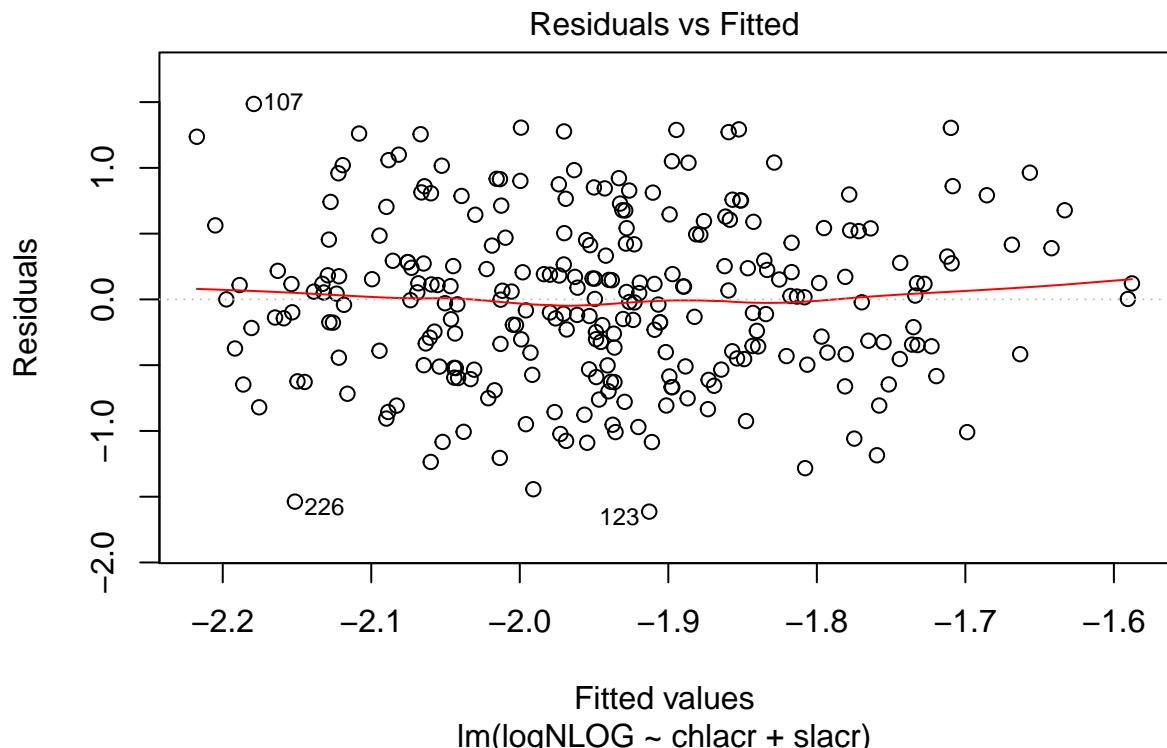
```

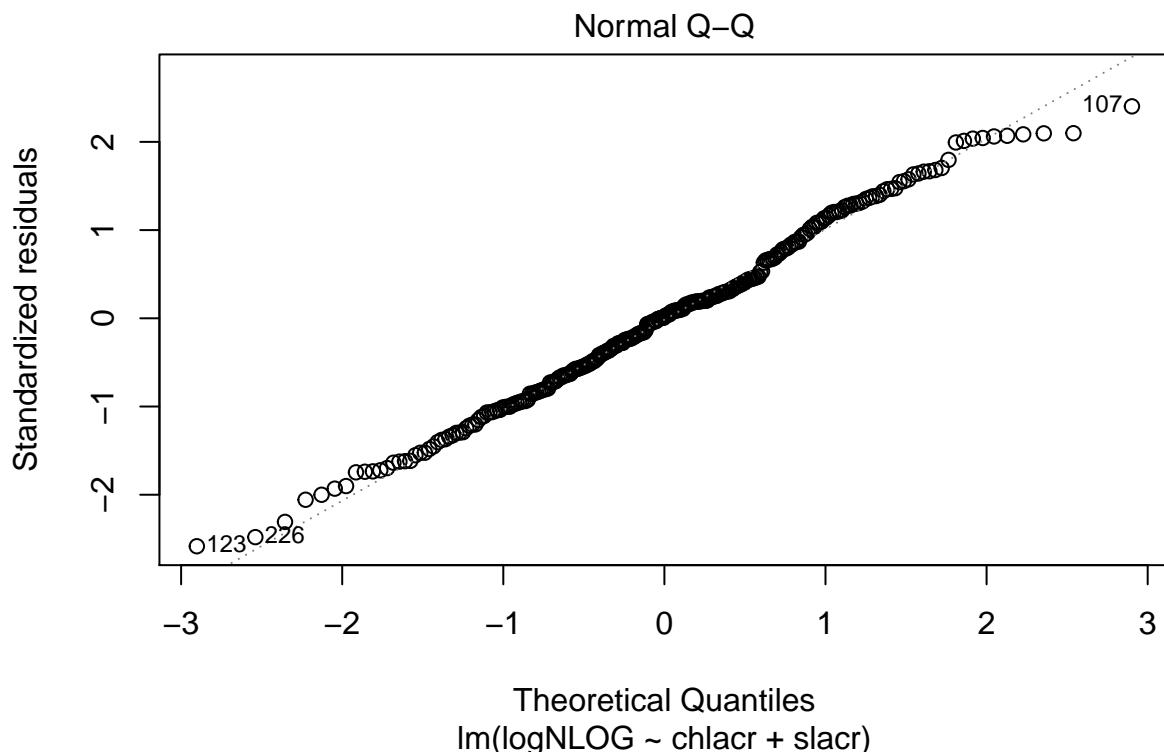
ggsave(file=file.path(PATH FIG, "Fig4_Scatter plots.png"), fig4, width = 30, height = 25, units = "cm")
ggsave(file=file.path(PATH FIG, "Fig4.eps"), fig4, width = 30, height = 25, units = "cm")

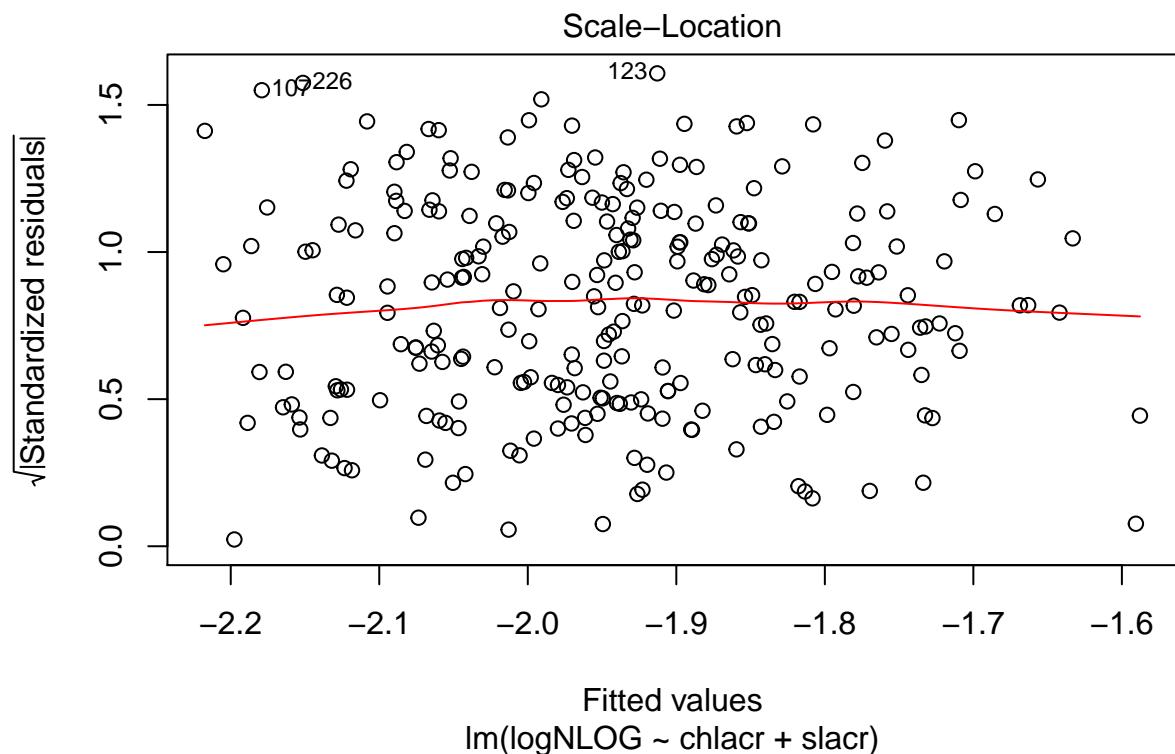
```

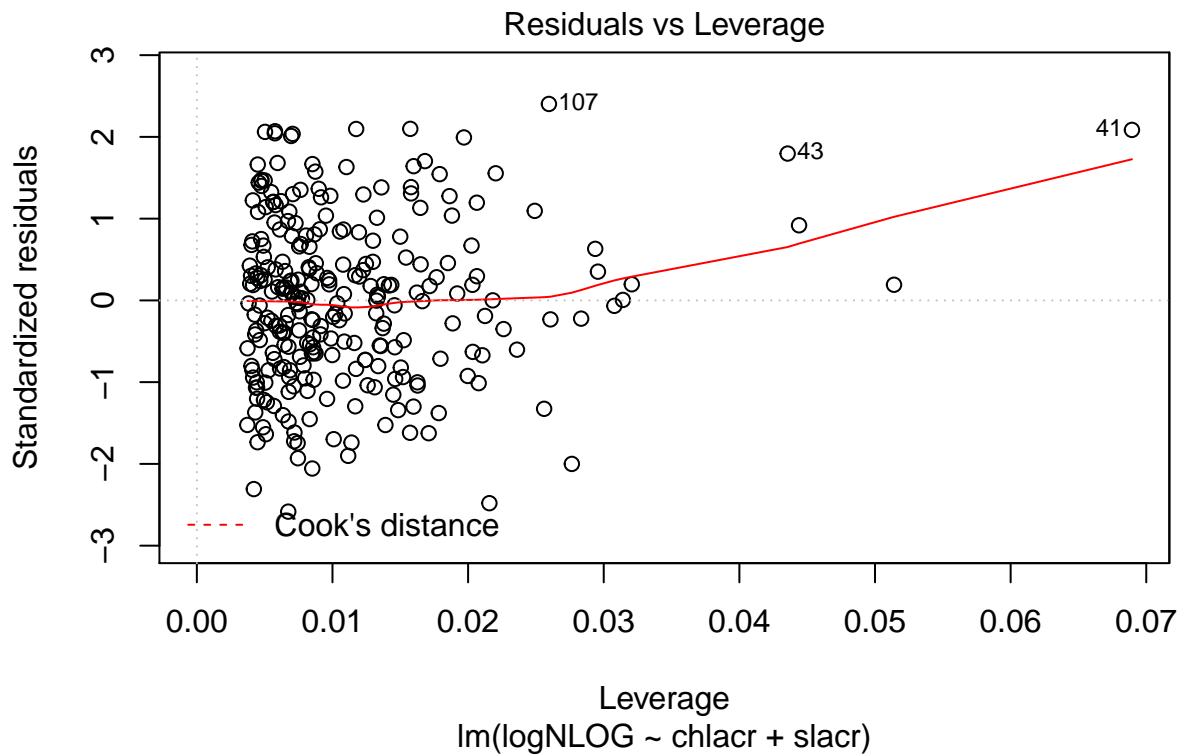
## 7 Figure 5 : Diagnostic plots of models

```
plot(LM4_North_chla)
```

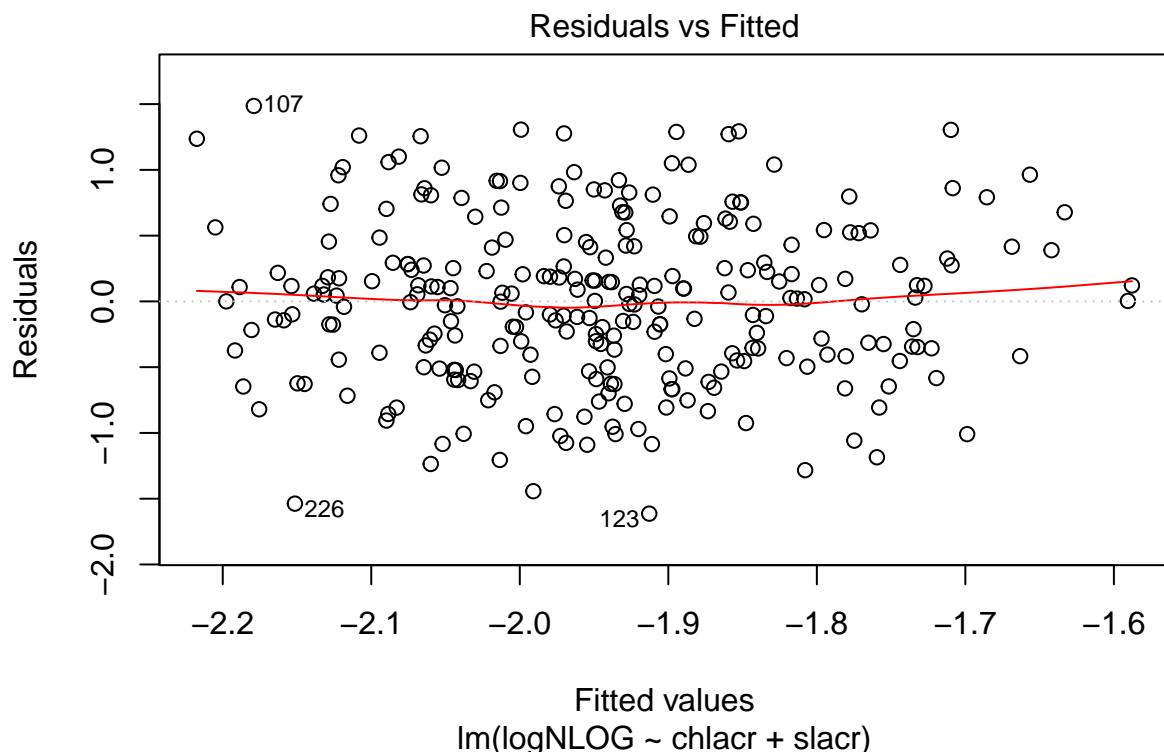


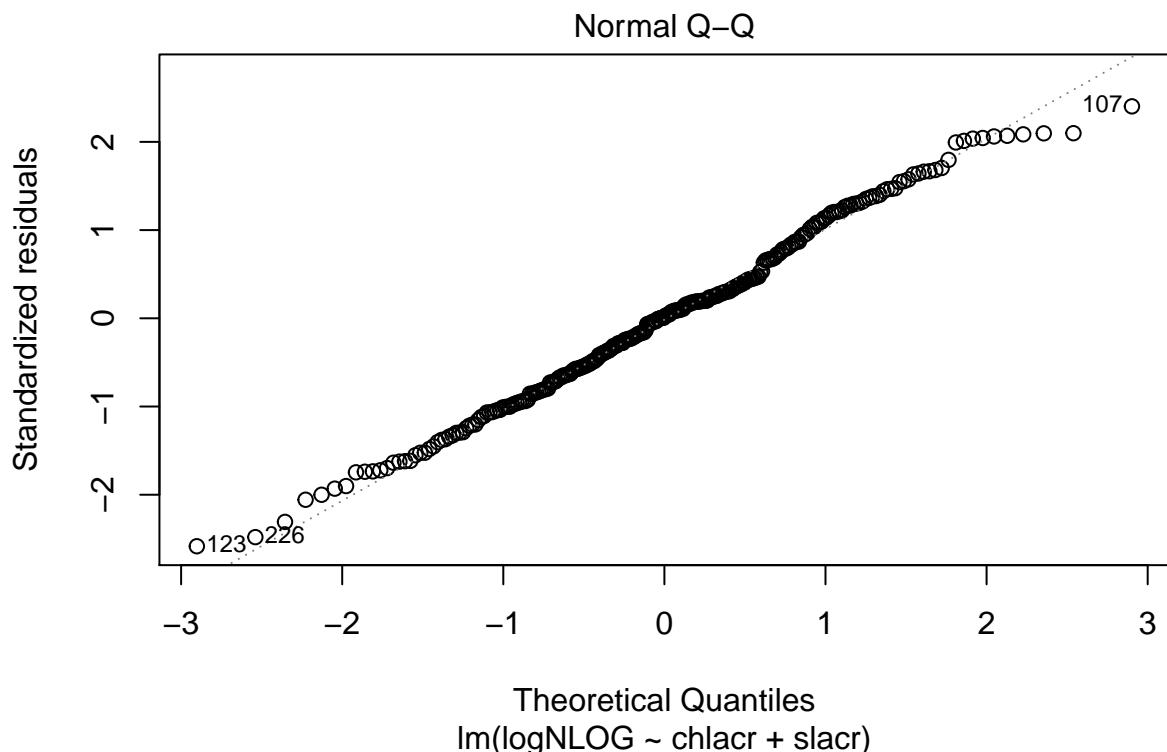


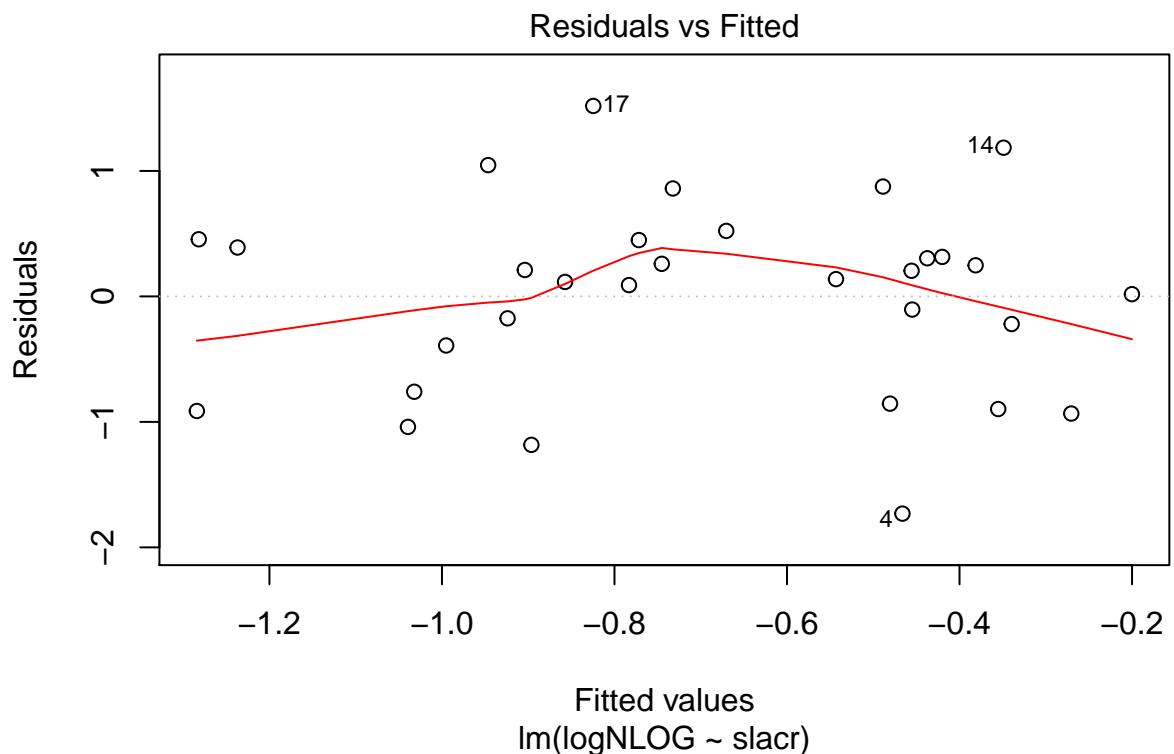


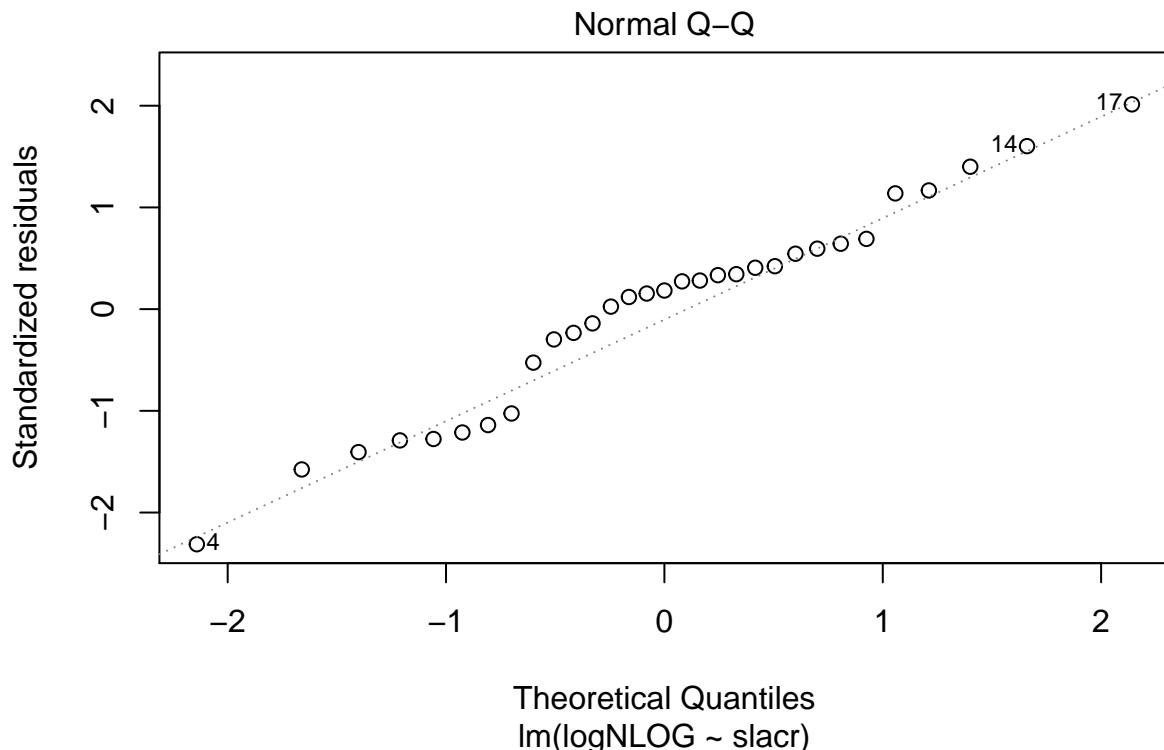


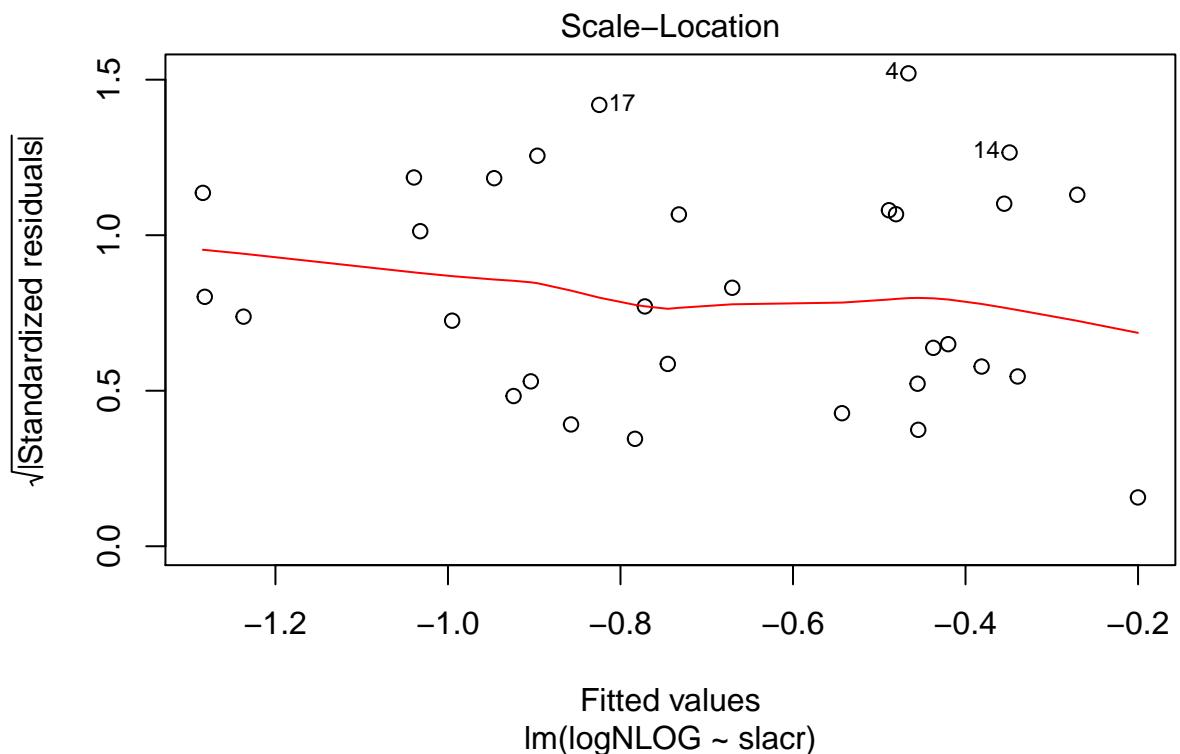
```
plot(LM4_North_chla, which=c(1,2))
```

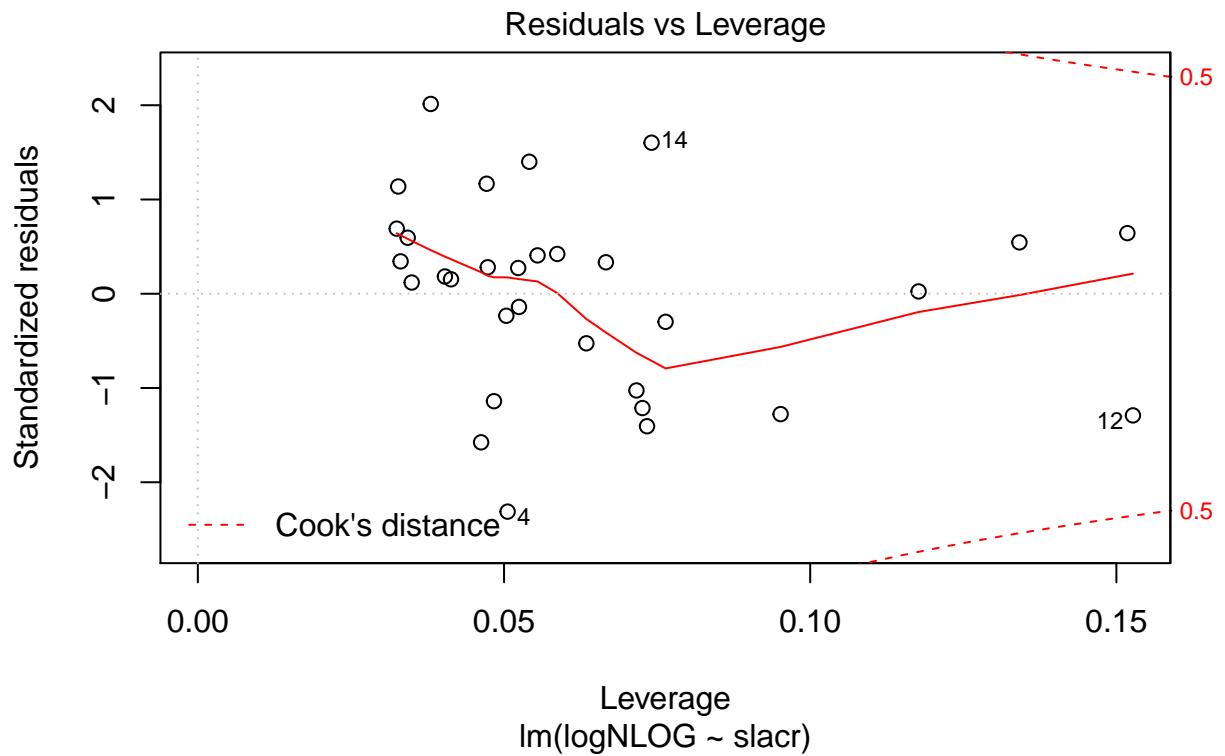




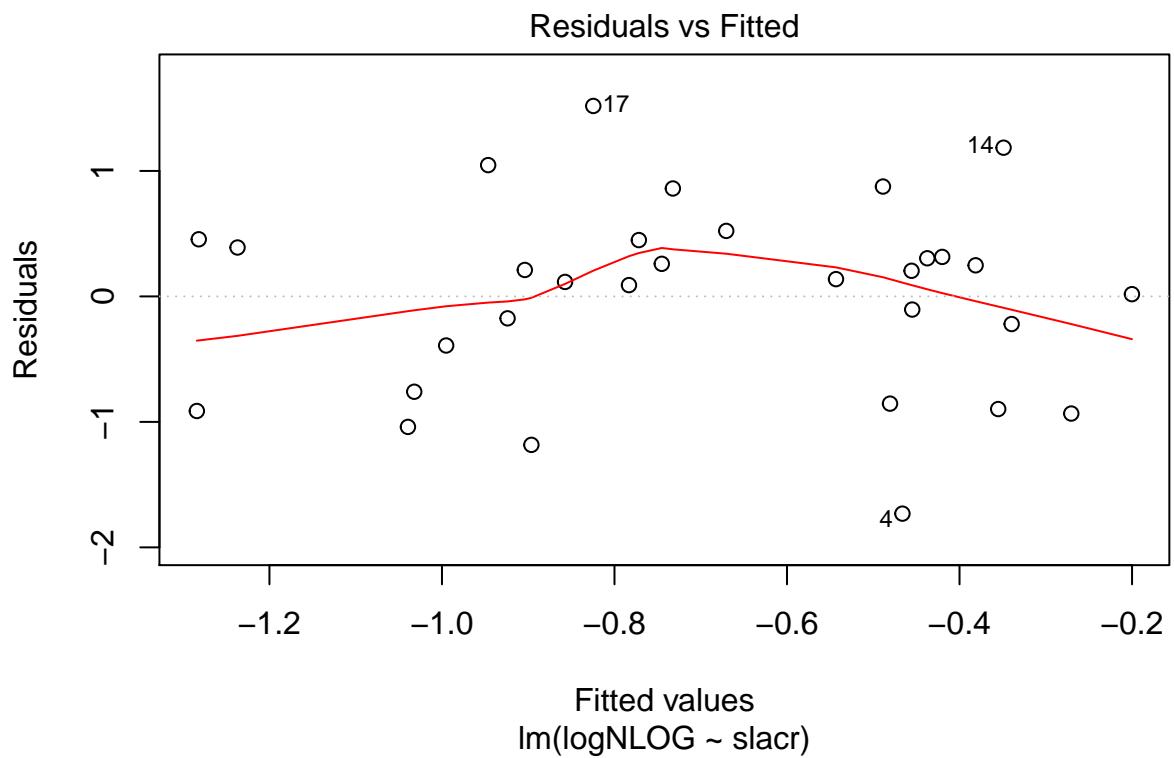


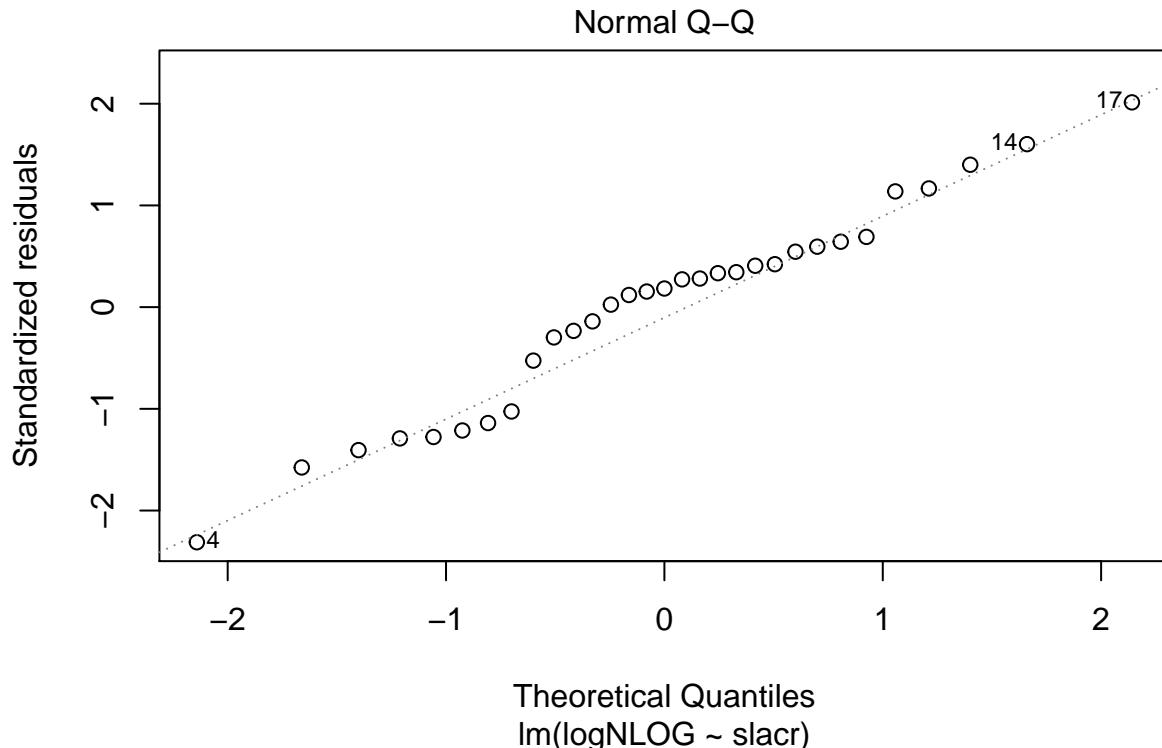






```
plot(LM5_Moz_chla, which=c(1,2))
```





#### 7.0.0.1 APPENDICES FIGURES

## 8 Appendix A1 : Distribution of the NLOG abundance index

### 8.1 Before log transformation

```
#Before
f.bef <- ggplot()+
  geom_histogram(data = NLOG_VE_sup_zero, aes(x = NLOG_stand), binwidth = 0.1)+
  scale_x_continuous(breaks=c(0,0.5,1,1.5,2,2.5,3))+
  scale_y_continuous(breaks=c(0,25,50,75,100,125,150))+
  xlab("NLOG abundance index  

  (Number per observation effort)")+
  ylab("Frequency (%)")+
  theme(text = element_text(size = 20))+
  theme(axis.text.x = element_text(size = 20))+
  theme(axis.text.y = element_text(size = 20))
```

## 8.2 After log transformation

```
#After
f.aft <- ggplot()+
  geom_histogram(data = NLOG_VE_sup_zero, aes(x = logNLOG), binwidth = 0.25) +
  scale_x_continuous(breaks=c(-4,-3,-2,-1,0,1,2)) +
  scale_y_continuous(breaks=c(0,5,10,15,20,25,30,35,40,45,50)) +
  xlab("NLOG abundance index  
(Number per observation effort)") +
  ylab("Frequency (%)") +
  theme(text = element_text(size = 20)) +
  theme(axis.text.x = element_text(size = 20)) +
  theme(axis.text.y = element_text(size = 20))
```

```
##Combine plots
```

```
ApxA1 <- ggarrange(f.bef, f.aft +
  rremove("ylab"),
  labels = c("(a)", "(b)"),
  font.label = list(size = 20),
  label.x = 0.85,
  label.y = 0.95,
  ncol = 2, nrow = 1)
```

## 8.3 Save plots

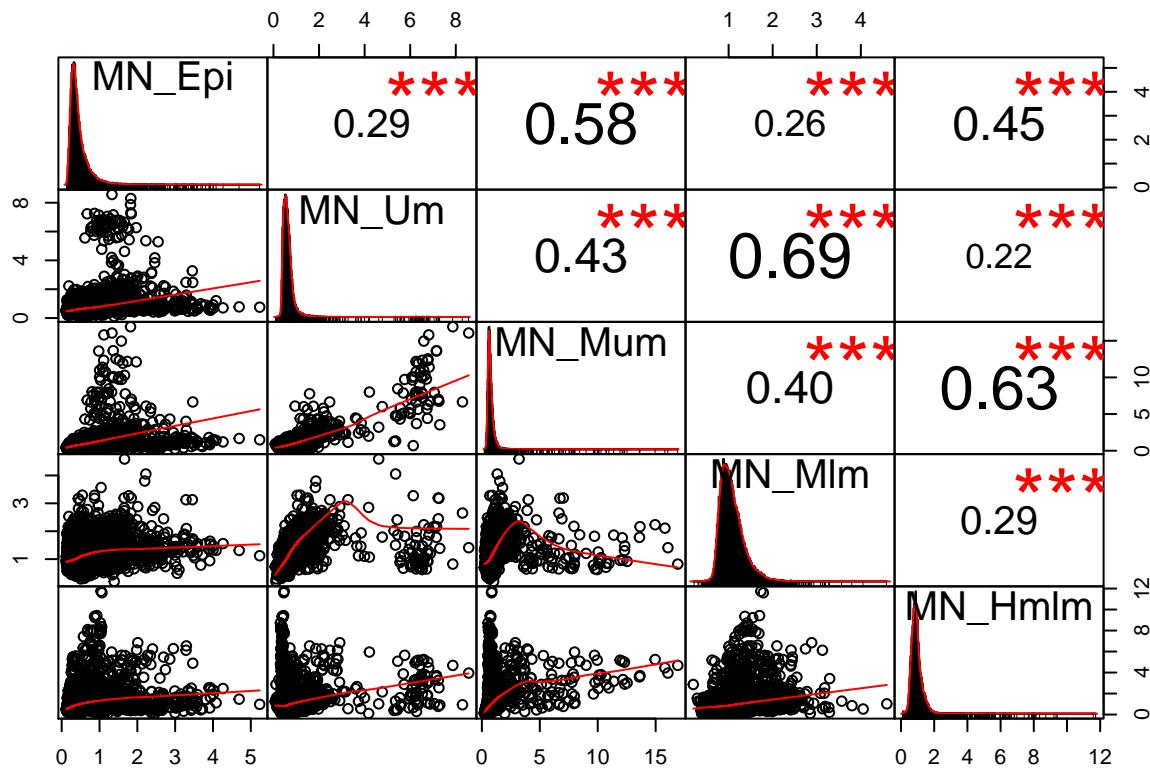
```
ggsave(file=file.path(PATH FIG, "Appendix_A1_Aim distribution.png"), ApxA1, width = 30, height = 15, unit = "cm")
ggsave(file=file.path(PATH FIG, "Appendix_A1_Aim distribution.eps"), ApxA1, width = 30, height = 15, unit = "cm")
```

## 9 Appendix A2 : correlation matrix of micronekton types

```
my_list <- list(dfMN_epi, dfMN_u, dfMN_mu, dfMN_ml, dfMN_hml)
df <- Reduce(function(x, y) merge(x, y, by=c("lat_grid", "lon_grid", "year", "month")), my_list)
names(df)

## [1] "lat_grid"          "lon_grid"          "year"
## [4] "month"             "micronec_epi"       "micronec_episd"
## [7] "micronec_umeso"    "micronec_umesosd"   "micronec_mumeso"
## [10] "micronec_mumesosd" "micronec_mlmeso"     "micronec_mlmesosd"
## [13] "micronec_hmlmeso"  "micronec_hmlmesosd"

my_data_mn <- df %>% dplyr::select(micronec_epi, micronec_umeso, micronec_mumeso, micronec_mlmeso, micronec_hmlmeso)
colnames(my_data_mn) <- c("MN_Epi", "MN_Um", "MN_Mum", "MN_Mlm", "MN_Hmlm")
chart.Correlation(my_data_mn, histogram=TRUE, pch=20, method = "kendall")
```

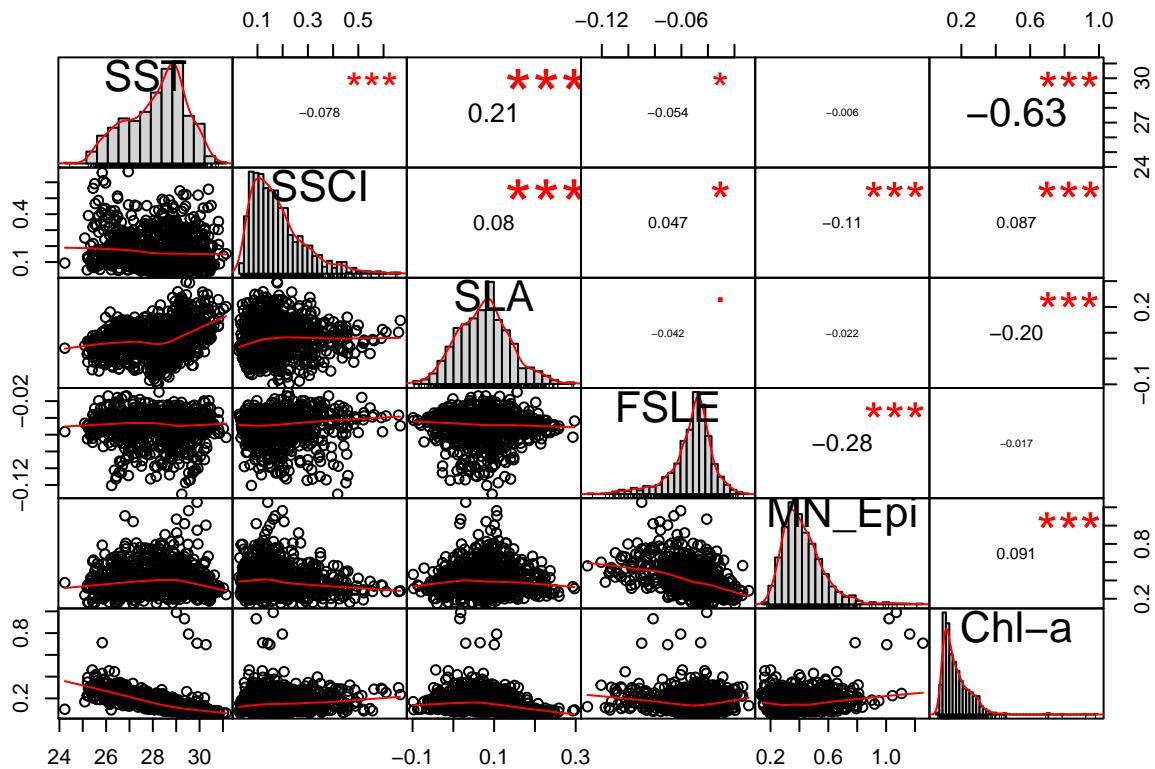


## 10 Appendix A3 : correlation matrix of Environmental variables (VE)

```
names(NLOG_VE)
```

```
## [1] "lat_grid"    "lon_grid"    "year"        "month"       "NumNLOG"
## [6] "NumOBS"      "NLOG_stand"   "chlamean"    "chlasd"     "sstmean"
## [11] "sstsd"       "slamean"     "slasd"       "FSLEmean"   "FSLEsd"
## [16] "SSCImean"    "SSCIsd"      "MNmean"      "MNs"        "Zone"
## [21] "Season"

my_data_ve <- NLOG_VE %>% dplyr::select(sstmean, SSCImean, slamean, FSLEmean, MNmean, chlamean)
colnames(my_data_ve) <- c("SST", "SSCI", "SLA", "FSLE", "MN_Epi", "Chl-a")
chart.Correlation(my_data_ve, histogram=TRUE, pch=20, method = "kendall")
```



## 11 Appendix A4 : Predicted vs Observed Aim values

### 11.1 North

```
#North
pred.north <- predict(LM4_North_chla)
NLOG_VE_sup_zero_North$pred<-pred.north
A4.north <- ggplot(NLOG_VE_sup_zero_North, aes(x = logNLOG, y = pred))+
  geom_point()+
  xlim(min(NLOG_VE_sup_zero_North$logNLOG),max(NLOG_VE_sup_zero_North$logNLOG))+ 
  ylim(min(NLOG_VE_sup_zero_North$logNLOG),max(NLOG_VE_sup_zero_North$logNLOG))+ 
  geom_abline(slope = 1, intercept = 0) +
  xlab("Observed NLOG abundance index")+
  ylab("Predicted NLOG abundance index")+
  theme(text = element_text(size = 15))+
  theme(axis.text.x = element_text(size = 20))+
  theme(axis.text.y = element_text(size = 20))
```

### 11.2 Moz

```

#Moz
pred.moz <- predict(LM5_Moz_chla)
NLOG_VE_sup_zero_Moz$pred<-pred.moz
A4.moz <- ggplot(NLOG_VE_sup_zero_Moz, aes(x = logNLOG, y = pred))+ 
  geom_point()+
  xlim(min(NLOG_VE_sup_zero_Moz$logNLOG),max(NLOG_VE_sup_zero_Moz$logNLOG))+ 
  ylim(min(NLOG_VE_sup_zero_Moz$logNLOG),max(NLOG_VE_sup_zero_Moz$logNLOG))+ 
  geom_abline(slope = 1, intercept = 0)+ 
  xlab("Observed NLOG abundance index")+
  ylab("Predicted NLOG abundance index")+
  theme(text = element_text(size = 15))+ 
  theme(axis.text.x = element_text(size = 20))+ 
  theme(axis.text.y = element_text(size = 20))

```

##Combine plots

```

ApxA4 <- ggarrange(A4.north, A4.moz+
  rremove("ylab"),
  labels = c("(a)", "(b)"),
  font.label = list(size = 20),
  label.x = 0.1,
  label.y = 0.95,
  ncol = 2, nrow = 1)

```

### 11.3 Save plots

```

ggsave(file=file.path(PATH FIG, "Appendix_A4_pred vs obs.png"), ApxA4, width = 35, height = 10, units =
ggsave(file=file.path(PATH FIG, "Appendix_A4_pred vs obs.eps"), ApxA4, width = 35, height = 10, units =

```

## 12 Appendix B1 : Distribution of the environmental variables according to used data or random data

### 12.1 SSCI - Moz

```

## SSCI
#Moz
B1.ssci.moz <- ggplot()+
  geom_histogram(stat = 'bin', aes(x=SSCImean, y = ..density.., fill = "Data used"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff[df_eff$threshold=="Fisheries" & df_eff$Zone=="Moz",], alpha=0.5)+
  geom_histogram(stat = 'bin', aes(x=SSCImean, y = ..density.., fill = "Random data"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff_new[df_eff_new$Zone=="Moz",], alpha=0.5)+
  scale_fill_manual(name = "Data used vs Random data",
                    values = c("Random data" = "yellow1", "Data used" = "steelblue"))+
  xlab("Mean SSCI (m.s-1)")+
  ylab("Frequency (%)")+

```

```

ggtitle("< 10°S")+
  theme(text = element_text(size = 20))+
  theme(plot.title = element_text(hjust = 0.5))+
  theme(text = element_text(size = 20))+
  theme(axis.text.x = element_text(size = 20))+
  theme(axis.text.y = element_text(size = 20))+
  theme(legend.text = element_text(size=20))+
  theme(legend.title = element_text(size=20))+
  theme(plot.margin = grid::unit(c(0,0.75,0,0), "cm"))

```

## 12.2 SSCI - North

```

## SSCI
#North
B1.ssci.north <- ggplot()+
  geom_histogram(stat = 'bin', aes(x=SSCImean, y = ..density.., fill = "Data used"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff[df_eff$threshold=="Fisheries" & df_eff$Zone=="Above_10S",], alpha=0.5)+
  geom_histogram(stat = 'bin', aes(x=SSCImean, y = ..density.., fill = "Random data"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff_new[df_eff_new$Zone=="Above_10S",], alpha=0.5)+
  scale_fill_manual(name = "Data used vs Random data",
                    values = c("Random data" = "yellow1", "Data used" = "steelblue"))+
  xlab("Mean SSCI (m.s-1)")+
  ylab("Frequency (%)")+
  ggtitle("\U2265 10°S") #\U2265 is the code for the >= symbol
  theme(text = element_text(size = 20))+
  theme(plot.title = element_text(hjust = 0.5))+
  theme(axis.text.x = element_text(size = 20))+
  theme(axis.text.y = element_text(size = 20))+
  theme(legend.text = element_text(size=20))+
  theme(legend.title = element_text(size=20))+
  theme(plot.margin = grid::unit(c(0,0.75,0,0), "cm"))

```

## 12.3 SLA - Moz

```

## SLA
#Moz
B1.sla.moz <- ggplot()+
  geom_histogram(stat = 'bin', aes(x=slamean, y = ..density.., fill = "Data used"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff[df_eff$threshold=="Fisheries" & df_eff$Zone=="Moz",], alpha=0.5)+
  geom_histogram(stat = 'bin', aes(x=slamean, y = ..density.., fill = "Random data"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff_new[df_eff_new$Zone=="Moz",], alpha=0.5)+
  scale_fill_manual(name = "Data used vs Random data",
                    values = c("Random data" = "yellow1", "Data used" = "steelblue"))+
  xlab("Mean SLA (m)")+
  ylab("Frequency (%)")+

```

```

ggtitle(" ")+
theme(text = element_text(size = 20))+
theme(axis.text.x = element_text(size = 20))+
theme(axis.text.y = element_text(size = 20))+
theme(legend.text = element_text(size=20))+
theme(legend.title = element_text(size=20))+
theme(plot.margin = grid::unit(c(0,0.75,0,0), "cm"))

```

## 12.4 SLA - North

```

## SLA
#North
B1.sla.north <- ggplot()+
  geom_histogram(stat = 'bin', aes(x=slamean, y = ..density.., fill = "Data used"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff[df_eff$threshold=="Fisheries" & df_eff$Zone=="Above_10S",], alpha=0.5)+
  geom_histogram(stat = 'bin', aes(x=slamean, y = ..density.., fill = "Random data"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff_new[df_eff_new$Zone=="Above_10S",], alpha=0.5)+
  scale_fill_manual(name = "Data used vs Random data",
                    values = c("Random data" = "yellow1", "Data used" = "steelblue"))+
  xlab("Mean SLA (m)")+
  ylab("Frequency (%)")+
  ggtitle(" ")+
  theme(text = element_text(size = 20))+
  theme(axis.text.x = element_text(size = 20))+
  theme(axis.text.y = element_text(size = 20))+
  theme(legend.text = element_text(size=20))+
  theme(legend.title = element_text(size=20))+
  theme(plot.margin = grid::unit(c(0,0.75,0,0), "cm"))

```

## 12.5 FSLE - Moz

```

## FSLE
#Moz
B1.fsle.moz <- ggplot()+
  geom_histogram(stat = 'bin', aes(x=FSLEmean, y = ..density.., fill = "Data used"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff[df_eff$threshold=="Fisheries" & df_eff$Zone=="Moz",], alpha=0.5)+
  geom_histogram(stat = 'bin', aes(x=FSLEmean, y = ..density.., fill = "Random data"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff_new[df_eff_new$Zone=="Moz",], alpha=0.5)+
  scale_fill_manual(name = "Data used vs Random data",
                    values = c("Random data" = "yellow1", "Data used" = "steelblue"))+
  xlab("Mean FSLE (days-1)")+
  ylab("Frequency (%)")+
  ggtitle(" ")+
  theme(text = element_text(size = 20))+
  theme(axis.text.x = element_text(size = 20))+

```

```

theme(axis.text.y = element_text(size = 20))+  

theme(legend.text = element_text(size=20))+  

theme(legend.title = element_text(size=20))+  

theme(plot.margin = grid::unit(c(0,0.75,0,0), "cm"))

```

## 12.6 FSLE - North

```

## FSLE  

#North  

B1.fsle.north <- ggplot() +  

  geom_histogram(stat = 'bin', aes(x=FSLEmean, y = ..density.., fill = "Data used"),  

                 binwidth = 0.02, bins = 30, size = 1,  

                 data = df_eff[df_eff$threshold=="Fisheries" & df_eff$Zone=="Above_10S",], alpha=0.5) +  

  geom_histogram(stat = 'bin', aes(x=FSLEmean, y = ..density.., fill = "Random data"),  

                 binwidth = 0.02, bins = 30, size = 1,  

                 data = df_eff_new[df_eff_new$Zone=="Above_10S",], alpha=0.5) +  

  scale_fill_manual(name = "Data used vs Random data",  

                    values = c("Random data" = "yellow1", "Data used" = "steelblue")) +  

  xlab("Mean FSLE (days-1)") +  

  ylab("Frequency (%)") +  

  ggtitle(" ") +  

  theme(text = element_text(size = 20)) +  

  theme(axis.text.x = element_text(size = 20)) +  

  theme(axis.text.y = element_text(size = 20)) +  

  theme(legend.text = element_text(size=20)) +  

  theme(legend.title = element_text(size=20)) +  

  theme(plot.margin = grid::unit(c(0,0.75,0,0), "cm"))

```

## 12.7 MN\_Epi - Moz

```

## MN_Epi  

#Moz  

B1.mn.moz <- ggplot() +  

  geom_histogram(stat = 'bin', aes(x=micronec_epi, y = ..density.., fill = "Data used"),  

                 binwidth = 0.04, bins = 30, size = 1,  

                 data = df_eff[df_eff$threshold=="Fisheries" & df_eff$Zone=="Moz",], alpha=0.5) +  

  geom_histogram(stat = 'bin', aes(x=micronec_epi, y = ..density.., fill = "Random data"),  

                 binwidth = 0.04, bins = 30, size = 1,  

                 data = df_eff_new[df_eff_new$Zone=="Moz",], alpha=0.5) +  

  scale_fill_manual(name = "Data used vs Random data",  

                    values = c("Random data" = "yellow1", "Data used" = "steelblue")) +  

  xlab("Mean MN_Epi (g.m-2)") +  

  ylab("Frequency (%)") +  

  ggtitle(" ") +  

  theme(text = element_text(size = 20)) +  

  theme(axis.text.x = element_text(size = 20)) +  

  theme(axis.text.y = element_text(size = 20)) +  

  theme(legend.text = element_text(size=20)) +  

  theme(legend.title = element_text(size=20)) +  

  theme(plot.margin = grid::unit(c(0,0.75,0,0), "cm"))

```

## 12.8 MN\_Epi - North

```
## MN_Epi
#North
B1.mn.north <- ggplot()+
  geom_histogram(stat = 'bin', aes(x=micronec_epi, y = ..density.., fill = "Data used"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff[df_eff$threshold=="Fisheries" & df_eff$Zone=="Above_10S",], alpha=0.5)+
  geom_histogram(stat = 'bin', aes(x=micronec_epi, y = ..density.., fill = "Random data"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff_new[df_eff_new$Zone=="Above_10S",], alpha=0.5)+
  scale_fill_manual(name = "Data used vs Random data",
                    values = c("Random data" = "yellow1", "Data used" = "steelblue"))+
  xlab("Mean MN_Epi (g.m-2)")+
  ylab("Frequency (%)")+
  ggtitle(" ")+
  theme(text = element_text(size = 20))+
  theme(axis.text.x = element_text(size = 20))+
  theme(axis.text.y = element_text(size = 20))+
  theme(legend.text = element_text(size=20))+
  theme(legend.title = element_text(size=20))+
  theme(plot.margin = grid::unit(c(0,0.75,0,0), "cm"))
```

## 12.9 Chla - Moz

```
## Chla
#Moz
B1.chla.moz <- ggplot()+
  geom_histogram(stat = 'bin', aes(x=chlamean, y = ..density.., fill = "Data used"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff[df_eff$threshold=="Fisheries" & df_eff$Zone=="Moz",], alpha=0.5)+
  geom_histogram(stat = 'bin', aes(x=chlamean, y = ..density.., fill = "Random data"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff_new[df_eff_new$Zone=="Moz",], alpha=0.5)+
  scale_fill_manual(name = "Data used vs Random data",
                    values = c("Random data" = "yellow1", "Data used" = "steelblue"))+
  xlab("Mean Chl-a (mg.m-3)")+
  ylab("Frequency (%)")+
  ggtitle(" ")+
  theme(text = element_text(size = 20))+
  theme(axis.text.x = element_text(size = 20))+
  theme(axis.text.y = element_text(size = 20))+
  theme(legend.text = element_text(size=20))+
  theme(legend.title = element_text(size=20))+
  theme(plot.margin = grid::unit(c(0,0.75,0,0), "cm"))
```

## 12.10 Chla - North

```

## Chla
#North
B1.chla.north <- ggplot()+
  geom_histogram(stat = 'bin', aes(x=chlamean, y = ..density.., fill = "Data used"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff[df_eff$threshold=="Fisheries" & df_eff$Zone=="Above_10S",], alpha=0.5)+
  geom_histogram(stat = 'bin', aes(x=chlamean, y = ..density.., fill = "Random data"),
                 binwidth = 0.02, bins = 30, size = 1,
                 data = df_eff_new[df_eff_new$Zone=="Above_10S",], alpha=0.5)+
  scale_fill_manual(name = "Data used vs Random data",
                    values = c("Random data" = "yellow1", "Data used" = "steelblue"))+
  xlab("Mean Chl-a (mg.m-3)")+
  ylab("Frequency (%)")+
  ggtitle(" ")+
  theme(text = element_text(size = 20))+
  theme(axis.text.x = element_text(size = 20))+
  theme(axis.text.y = element_text(size = 20))+
  theme(legend.text = element_text(size=20))+
  theme(legend.title = element_text(size=20))+
  theme(plot.margin = grid::unit(c(0,0.75,0,0), "cm"))

```

##Combine plots

```

ApxB1 <- ggarrange(B1.ssci.moz, B1.ssci.north + rremove("ylab"),
                     B1.sla.moz, B1.sla.north + rremove("ylab"),
                     B1.fsle.moz, B1.fsle.north + rremove("ylab"),
                     B1.mn.moz, B1.mn.north + rremove("ylab"),
                     B1.chla.moz, B1.chla.north + rremove("ylab"),
                     labels = c("(a)", "(b)", "(c)", "(d)", "(e)", "(f)", "(g)", "(h)", "(i)", "(j)"),
                     font.label = list(size = 20),
                     label.x = 0.85,
                     label.y = 0.90,
                     ncol = 2, nrow = 5,
                     common.legend = TRUE, legend = "bottom",
                     widths = c(1, 1),
                     heights = c(1, 1))

```

## 12.11 Save plots

```

ggsave(file=file.path(PATH FIG, "Appendix_B1_sampling bias.png"), ApxB1, width = 35, height = 50, units =
ggsave(file=file.path(PATH FIG, "Appendix_B1_sampling bias.eps"), ApxB1, width = 35, height = 50, units =

```