Package: ss3diags (via r-universe)

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Title Stock Synthesis Model Diagnostics for Intergated Stock Assessments

Version 2.2.0

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Description Compilation of diagnostic functions for Stock Synthesis models, which developed for the manuscript ``Using Model Diagnostics in Integrated Stock Assessments''.

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URL https://github.com/PIFSCstockassessments/ss3diags

BugReports https://github.com/PIFSCstockassessments/ss3diags/issues

Depends R (>= 3.5)

Imports dplyr, gplots, lifecycle, magrittr, mvtnorm, r4ss (>= 1.46.1), randtests, reshape2, rlang

Suggests knitr, markdown, rmarkdown, testthat (>= 3.0.0)

Remotes r4ss/r4ss@main

Encoding UTF-8

LazyData True

LazyDataCompression gzip

Roxygen list(markdown = TRUE)

RoxygenNote 7.3.1

Repository https://ices-tools-prod.r-universe.dev

RemoteUrl https://github.com/PIFSCstockassessments/ss3diags

RemoteRef HEAD

RemoteSha 98ea41e0b96a9a16c34404a49b8540539951fbd8

Contents

`SScompsTA1.8` *Francis Weighting for compositional data*

Description

TA1.8 Francis function modified from r4ss::SSMethod.TA1.8 and r4ss::SSMethod.Cond.TA1.8 apply Francis weighting method TA1.8 to length-, age-, generalized size-composition data, or conditional age-at-length data from a Stock Synthesis model. For conditional age-at-length data, the mean age by year is calculated based on recommendations by Punt (2015). The main purpose is to create a dataframe of the annual observed and expected mean length or age for each fleet that is used to calculate residuals for testing model fit. This function is used in SSplotRunstest and SSplotJABBAres.

Usage

```
SScompsTA1.8(
  ss3rep,
  type = c("len", "age", "size", "con"),
  fleet = NULL,
  seas = NULL,
  plotit = FALSE,
  maxpanel = 1000
)
```

Arguments

ss3rep	Stock Synthesis output as read by r4SS function SS_output
type	string of either 'len' (for length composition data), 'size' (for generalized size composition data), 'age' (for age composition data), or 'con' (for conditional age at length data)
fleet	vector of one or more fleet numbers whose data are to be analysed simultaneously, if NULL, all fleets will be analysed
seas	string indicating how to treat data from multiple seasons 'comb' - combine seasonal data for each year and plot against Yr 'sep' - treat season separately, plotting against Yr.S. If is.null(seas), it is assumed that there is only one season and option 'comb' is used.
plotit	if TRUE, make an illustrative plot like one or more panels of Fig. 4 in Francis (2011).
maxpanel	maximum number of panels within a plot, default 1000

Value

ss_out data.frame of observed, predicted mean length/age and 95% confidence intervals based on stage 1 and stage 2 weighting

runs_dat data.frame of observed and predicted mean length or age for each year/fleet.

Author(s)

Chris Francis, Andre Punt, Ian Taylor (modified by Henning Winker and Meg Oshima)

References

Francis, R.I.C.C. (2011). Data weighting in statistical fisheries stock assessment models. Canadian Journal of Fisheries and Aquatic Sciences 68: 1124-1138.

#' Punt, A.E. (2015). Some insights into data weighting in integrated stock assessments. Fish. Res. <http://dx.doi.org/10.1016/j.fishres.2015.12.006

SSdeltaMVLN *Joint Distributions for Stock Status Ratios*

Description

A function to generate joint distributions for stock status ratios (SSB/SSBref and F/Fref where ref can be MSY, SSB40, F40, etc.) using a Multivariate Log-Normal Distribution. The function produces a Kobe plot, maximum likelihood estimates and the MVLN Monte-Carlo distributions of the Kobe values which can be input into SSplotEnsemble().

Usage

```
SSdeltaMVLN(
  ss3rep,
  Fref = NULL,
  years = NULL,
  mc = 5000,
  weight = 1,
  run = "MVLN",
  plot = TRUE,
  addprj = FALSE,
  ymax = NULL,
  xmax = NULL,
  legendcex = 1,
  verbose = TRUE,
  variance_method = "ww2019",
  bias_correct_mean = FALSE
)
```

Arguments

ss3rep	from r4ss::SS_output
Fref	Choice of Fratio c("MSY","Btgt"), correponding to F_MSY and F_Btgt
years	single year or vector of years for mvln
mc	number of monte-carlo simulations
weight	weighting option for model ensembles weight*mc
run	qualifier for model run
plot	option to show plot
addprj	include forecast years
ymax	ylim maximum
xmax	xlim maximum
legendcex	Allows to adjust legend cex
verbose	Report progress to R GUI?
variance_method	Specify method for approximating the variance and covariance of the multivariate lognormal distribution ***ww2019*** Use the approximation from Walter and Winker 2019 (Default for backwards compatibility). ***2T*** Use the delta-method and a 2nd order Taylor series approximation.
bias_correct_mean	Specify if the Stock Synthesis MLE estimates should be bias corrected when used to specify the mean of the multivariate lognormal distribution ***FALSE*** Do not apply bias correction (Default for backwards compatibility). ***TRUE*** Apply bias correction.

Value

output list of maximum likelihood estimates and the MVLN Monte-Carlo distributions of the Kobe values, and kobe plot

Author(s)

Henning Winker (JRC-EC)

Nicholas Ducharme-Barth (PIFSC)

`SSdeltaMVLN_old` *Joint Distributions for Stock Status Ratios*

Description

A function to generate kobe pdfs from a Multivariate Log-Normal Distribution including plotting option. This version is used for older versions of Stock Synthesis. For newer versions (v3.24 and newer), use SSdeltaMVLN().

Usage

```
SSdeltaMVLN_old(
  ss3rep,
  status = c("Bratio", "F"),
  quants = c("SSB", "Recr"),
  Fref = c("MSY", "Ftrg"),
  years = NULL,
  mc = 5000,
  weight = 1,
  run = "MVLN",
  plot = TRUE,
  addtrj = TRUE,
  ymax = NULL,
  xmax = NULL,
  legendcex = 1,
  verbose = TRUE
)
```

Arguments

`ss3rep`	from r4ss::SSgetoutput()$replist1
`status`	covarying stock status quantaties to extract from Hessian
`quants`	additional stock quantaties to extract from Hessian
`Fref`	Choice of reference point for stock SSB/XFref=c("MSY","Ftrg"),only if F_report_basis: 0 or 3
`years`	single year or vector of years for mvln

mc	number of monte-carlo simulations
weight	weighting option for model ensembles weight*mc
run	qualifier for model run
plot	option to show plot
addtrj	TRUE/FALSE add trajectory of years. Default is TRUE
ymax	ylim maximum
xmax	xlim maximum
legendcex	Allows to adjust legend cex
verbose	Report progress to R GUI?

Value

output list of kobe objects and mle's

Author(s)

Henning Winker (JRC-EC)

`SSdiagsMCMC` *MCMC Joint Distributions*

Description

A function to generate joint distributions for stock status ratios (SSB/SSBref and F/Fref where ref can be MSY, SSB40, F40, etc.) using MCMC. The function produces a Kobe plot, maximum likelihood estimates and the MVLN Monte-Carlo distributions of the Kobe values which can be input into SSplotEnsemble().

Usage

```
SSdiagsMCMC(
  mcmc,
  ss3rep,
  Fref = NULL,
  years = NULL,
  run = "MCMC",
  thin = 1,
  plot = TRUE,
  addprj = FALSE,
  ymax = NULL,
  xmax = NULL,
  legendcex = 1,
  verbose = TRUE
)
```

Arguments

mcmc	file path for folder with the derived_posteriors.sso file
ss3rep	from r4ss::SS_output
Fref	Choice of Fratio c("MSY","Btgt), correponding to F_MSY and F_Btgt
years	single year or vector of years for mvln
run	qualifier for model run
thin	option to use additional thinning
plot	option to show plot
addprj	include forecast years
ymax	ylim maximum
xmax	xlim maximum
legendcex	Allows to adjust legend cex
verbose	Report progress to R GUI?

Value

output list maximum likelihood estimates and the MCMC posterier distributions of the Kobe values and a Kobe plot

Author(s)

Henning Winker (JRC-EC), Massimiliano and Laurence Kell (Sea++)

See Also

SSdeltaMVLN(), SSplotEnsemble(), SSplotKobe()

SSdiagsMCMC_ancient *MCMC Joint Distributions*

Description

A function to generate joint distributions for stock status ratios (SSB/SSBref and F/Fref where ref can be MSY, SSB40, F40, etc.) using MCMC. The function produces a Kobe plot, maximum likelihood estimates and the MVLN Monte-Carlo distributions of the Kobe values which can be input into SSplotEnsemble(). Use for Stock Synthesis models older than 3.24, for later versions use SSdiagsMCMC().

Usage

```
SSdiagsMCMC_ancient(
  mcmc,
  ss3rep,
  Fref = NULL,
  years = NULL,
  run = "MCMC",
  thin = 1,
  plot = TRUE,
  addprj = FALSE,
  ymax = NULL,
  xmax = NULL,
  legendcex = 1,
  verbose = TRUE
)
```

Arguments

mcmc	file path for folder with the derived_posteriors.sso file
ss3rep	from r4ss::SS_output
Fref	Choice of Fratio c("MSY","Btgt), correponding to F_MSY and F_Btgt
years	single year or vector of years for mvln
run	qualifier for model run
thin	option to use additional thinning
plot	option to show plot
addprj	include forecast years
ymax	ylim maximum
xmax	xlim maximum
legendcex	Allows to adjust legend cex
verbose	Report progress to R GUI?

Value

output list maximum likelihood estimates and the MCMC posterier distributions of the Kobe values and a Kobe plot

Author(s)

Henning Winker (JRC-EC), Massimiliano and Laurence Kell (Sea++)

SShcbias *Mohn's Rho and Forecast Bias*

Description

This function produces the statistics from retrospective analysis (Mohn's rho and forecast bias). To visualize the retrospective forecasts from a Stock Synthesis model, use SSplotRetro().

Usage

```
SShcbias(
  summaryoutput,
  quants = c("SSB", "F"),
  models = "all",
  endyrvec = "default",
  verbose = TRUE
)
```

Arguments

summaryoutput	List created by r4ss::SSsummarize()
quants	SSB or F quantity
models	Optional subset of the models described in r4ss function summaryoutput(). Either "all" or a vector of numbers indicating columns in summary tables.
endyrvec	Optional single year or vector of years representing the final year of values to show for each model. By default it is set to the ending year specified in each model.
verbose	Report progress to R GUI?

Author(s)

Henning Winker (JRC-EC) and Laurance Kell (Sea++)

See Also

SSplotRetro()

SSmase *Mean Absolute Scaled Error*

Description

MASE for one-step ahead hindcasting cross-validations and computes MASE from prediction residuals of indices. MASE is calculated the average ratio of mean absolute error (MAE) of prediction residuals (MAE.PR) and Naive Predictions (MAE.base) MASE.adj sets the MAE.base to a minimum MAE.base.adj (default=0.1) MASE.adj allow passing (MASE<1) if MAE.PE < 0.1 and thus accurate, when obs show extremely little variation

Usage

```
SSmase(
  retroSummary,
  quants = c("cpue", "len", "age", "con"),
  Season = "default",
  models = "all",
  endyrvec = "default",
  indexselect = NULL,
  MAE.base.adj = 0.1,
  residuals = FALSE,
  verbose = FALSE,
  indexfleets = 1
)
```

Arguments

retroSummary	raw list of retrospective runs created by r4ss::SSgetoutput(). Depending on the type of data, the function will call r4ss::SSsummarize or ss3diags:SSretroComps to summarize the list.
quants	data type, either "cpue" for index data, "len" for length composition data, or "age" for age composition data. Note, if using "age" or "len", SSretroComps() will be used to extract and summarize the composition data first.
Season	option to specify Season as an integer of value 1-4 - Default uses first available, i.e. usual Seas = 1
models	Optional subset of the models described in r4ss function summaryoutput(). Either "all" or a vector of numbers indicating columns in summary tables.
endyrvec	Optional single year or vector of years representing the final year of values to show for each model. By default it is set to the ending year specified in each model.
indexselect	Vector of fleet numbers for each model for which to compare
MAE.base.adj	minimum MASE demoninator (naive predictions) for MASE.adj (default = 0.1)
residuals	If true, includes a dataframe in the output of the prediction residuals and naive prediction residuals. Default is FALSE.

verbose	Report progress to R GUI?
indexfleets	Single value or vector of length n = number of models in summary object of the fleet number(s) for the index to compare.

Value

MASE and hcxval statistic

Author(s)

Henning Winker (JRC-EC) and Laurence Kell (Sea++)

See Also

SSretroComps() r4ss::SSsummarize()

Examples

```
## Not run:
# calculate MASE for CPUE indices only for fleets 1 and 2
SSmase(retro.sma, quant = "cpue", indexselect = c(1:2))

## End(Not run)
```

SSplotEnsemble *Model ensemble plots*

Description

Plots model ensembles and forecasts with uncertainty represented by MVLN or MCMC posteriors

Usage

```
SSplotEnsemble(
  kb,
  subplots = c("stock", "harvest", "SSB", "F", "Recr", "Catch"),
  models = "all",
  quantiles = list(c(0.025, 0.975)),
  ylabs = NULL,
  endyrvec = "default",
  plot = TRUE,
  print = deprecated(),
  print_plot = FALSE,
  png = deprecated(),
  use_png = print_plot,
  pdf = FALSE,
  use_pdf = FALSE,
```

```
  col = NULL,
  pch = NULL,
  lty = 1,
  lwd = 2,
  tickEndYr = FALSE,
  xlim = NULL,
  ylimAdj = 1.05,
  xaxs = "i",
  yaxs = "i",
  xylabs = TRUE,
  type = "l",
  uncertainty = TRUE,
  legend = TRUE,
  legendlabels = "default",
  legendloc = "topright",
  legendorder = "default",
  legendncol = 1,
  legendcex = 1,
  legendsp = 0.9,
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  plotdir = NULL,
  filenameprefix = "",
  par = list(mar = c(5, 4, 1, 1) + 0.1),
  verbose = TRUE,
  shadealpha = 0.3,
  new = TRUE,
  add = FALSE,
  mcmcVec = FALSE,
  indexQlabel = TRUE,
  indexQdigits = 4,
  legendindex = NULL
)
```

Arguments

kb	kb type output created by `SSdeltaMVLN()`
subplots	vector to create subplots with these options: • `"stock"` Fish Population • `"harvest"` Harvest Rate • `"SSB"` Spawning Stock Biomass • `"F"` Fishing Mortality • `"Recr"` Recruitment • `"Catch"` Total Catch

models	option to manually subset the models in kb[["run"]]
quantiles	quantiles for uncertainty in plots. Input as a list, default is the 95TH percentile: list(c(0.025, 0.975))
ylabs	y-axis labels for quants
endyrvec	Optional single year or vector of years representing the final year of values to show for each model. By "default" it is set to the ending year specified in each model.
plot	DEPRECATED. By default, TRUE, Plots (and subplots) are drawn to the plot device. The option to explicitly disable this option (FALSE), is not implemented. This option flag will be defunct in a future version
print	DEPRECATED, please use print_plot.
print_plot	Flag to enable plot graphic device to print to PNG or PNG files.
png	DEPRECATED. Please use use_png.
use_png	Enables plots to be generated to PNG files. Defaults to print value
pdf	DEPRECATED. Please use use_pdf.
use_pdf	Enables plots to be generated to pdf file.
col	Optional vector of colors to be used for lines. Input NULL
pch	Optional vector of plot character values
lty	Optional vector of line types
lwd	Optional vector of line widths
tickEndYr	Logical flag: set TRUE or FALSE to switch to turn on/off extra axis mark at final year in timeseries plots.
xlim	Optional, years to use for x-axis. Default value NULL (or "default"), uses all years available.
ylimAdj	Multiplier for ylim parameter. Allows additional white space.
xaxs	Choice of xaxs parameter See ?par for more info.
yaxs	Choice of yaxs parameter. See ?par for more info.
xylabs	Logical flag: set TRUE or FALSE to include x- and y-axis labels to the plot. Defaults to TRUE
type	The type of plot to be drawn. For more details, see plot.
uncertainty	Logical flag to enable plots with uncertainty intervals. Either a single TRUE/FALSE value, or a vector of TRUE/FALSE values around SSB or F estimated timeseries, or a set of integers corresponding to the choice of models.
legend	Flag to enable legend to plot. TRUE by default.
legendlabels	Optional vector of labels to include in legend.
legendloc	Location of legend. Either a string like "topleft" or a vector of two numeric values representing the fraction of the maximum in the x and y dimensions, respectively. See help("legend") for more info on the string options.
legendorder	Optional vector of model numbers that can be used to have the legend display the model names in an order that is different than that which is represented in the summary input object.

legendncol	Number of columns for the legend.
legendcex	Allows to adjust legend cex
legendsp	Space between legend labels
pwidth	Default width of plot printed to plot in units of punits
pheight	Height of plot printed to plot in units of punits
punits	Measurement units for pwidth and pheight. Default is "in". • "px" (pixels) • "in" (inches) • "cm" (centimeters) • "mm" (millimeters)
res	Resolution for plots printed to files.
ptsize	Point size for plotted text in plots printed in files. See help("png") for more details
cex.main	Character expansion for plot titles.
plotdir	Directory where output plot file will be written. By default, it will be the directory where the model was run.
filenameprefix	Additional text to append to output plot file name. It will be separated from default name by an underscore.
par	A numerical vector of the form c(bottom, left, top, right) which gives the number of lines of margin to be specified on the four sides of the plot,which is passed to par(). Entering NULL passes plot's default par() values (which depends on whether the main title is included or not)
verbose	Flag to print additional diagnostic messages to R console
shadealpha	Transparency adjustment used to make uncertainty regions, default is 0.3
new	Deprecated. New plot windows are created by default (TRUE), and the option to disable this, via FALSE, is unused.
add	suppresses par() to create multiplot figs
mcmcVec	Logical vector of TRUE/FALSE values (or single value) indicating whether input values are from MCMC or to use normal distribution around MLE.
indexQlabel	TRUE/FALSE include labels for indices. Default is TRUE (currently not used)
indexQdigits	Number of significant digits for catchability in legend. Default is 4
legendindex	Allows to add legend for selected indices (plots)

Author(s)

Mostly adopted from r4ss::SSplotComparisons by Taylor et al

Examples

```
## Not run:

mvln <- SSdeltaMVLN(simple, run = "Simple")
sspar(mfrow = c(3, 2), plot.cex = 0.7)
SSplotEnsemble(mvln[["kb"]], ylabs = mvln[["labels"]], add = T, verbose = F)

## End(Not run)
```

SSplotHCxval *Hindcasting Cross-Validations of Multiple Models*

Description

Plots one-step ahead hindcasting cross-validations and computes MASE from prediction residuals.MASE is calculated as the average ratio of mean absolute error (MAE) of prediction residuals (MAE.PR) and naive predictions (MAE.base). MASE.adj sets the MAE.base to a minimum MAE.base.adj (default=0.1). MASE.adj allow passing (MASE<1) if MAE.PE < 0.1 and thus accurate if obs show very little annual variation

Usage

```
SSplotHCxval(
  retroSummary,
  subplots = c("cpue", "len", "age"),
  Season = "default",
  print = deprecated(),
  print_plot = FALSE,
  png = deprecated(),
  use_png = print_plot,
  pdf = deprecated(),
  use_pdf = FALSE,
  models = "all",
  endyrvec = "default",
  xmin = NULL,
  indexselect = NULL,
  MAE.base.adj = 0.1,
  show.mase.adj = TRUE,
  indexUncertainty = TRUE,
  col = NULL,
  pch = NULL,
  lty = 1,
  lwd = 2,
  tickEndYr = TRUE,
  xlim = "default",
  ylimAdj = 1.15,
  ylim = NULL,
```

```
  xaxs = "i",
  yaxs = "i",
  xylabs = TRUE,
  type = "o",
  uncertainty = TRUE,
  legend = TRUE,
  legendlabels = "default",
  legendloc = "topright",
  legendorder = "default",
  legendncol = 1,
  legendcex = 1,
  legendsp = 0.9,
  legendindex = NULL,
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  plotdir = NULL,
  filenameprefix = "",
  par = list(mar = c(5, 4, 1, 1) + 0.1),
  verbose = TRUE,
  shadecol = grey(0.5, 0.4),
  shadecol2 = grey(0.5, 0.4),
  shadealpha = 0.3,
  new = TRUE,
  add = FALSE,
  mcmcVec = FALSE,
  indexQlabel = TRUE,
  indexQdigits = 4,
  indexfleets = 1,
  plot = TRUE,
  shadecol1 = grey(0.5, 0.4)
)
```

Arguments

retroSummary	List created by r4ss::SSsummarize() or SSretroComps()
subplots	optional use of the following: • "cpue" Index of abundance data • "len" Length-composition data • "age" Age-composition data
Season	option to specify Season as an integer of value 1-4. Default uses first available, i.e. usual Seas = 1
print	DEPRECATED, please use print_plot.
print_plot	Flag to enable plot graphic device to print to PNG or PNG files.

png	DEPRECATED. Please use use_png.
use_png	Enables plots to be generated to PNG files. Defaults to print value
pdf	DEPRECATED. Please use use_pdf.
use_pdf	Enables plots to be generated to pdf file.
models	Optional subset of the models of summaryoutput (or a similar field with a different name): a list created by the function r4ss::SSsummarize. Either "all" or a vector of numbers indicating columns in summary tables.
endyrvec	Optional single year or vector of years representing the final year of values to show for each model. By default it is set to the ending year specified in each model.
xmin	optional number first year shown in plot (if available)
indexselect	Vector of fleet numbers for each model for which to compare
MAE.base.adj	minimum MASE denominator (naive predictions) for MASE.adj (default = 0.1)
show.mase.adj	if TRUE, it show mase.adj in plot
indexUncertainty	Show fixed uncertainty intervals on index (not estimated)
col	Optional vector of colors to be used for lines. Input NULL
pch	Optional vector of plot character values
lty	Optional vector of line types
lwd	Optional vector of line widths
tickEndYr	Logical flag: set TRUE or FALSE to switch to turn on/off extra axis mark at final year in timeseries plots.
xlim	Optional, years to use for x-axis. Default value NULL (or "default"), uses all years available.
ylimAdj	Multiplier for ylim parameter. Allows additional white space.
ylim	will over-write ylimAdj if specified
xaxs	Choice of xaxs parameter See ?par for more info.
yaxs	Choice of yaxs parameter. See ?par for more info.
xylabs	Logical flag: set TRUE or FALSE to include x- and y-axis labels to the plot. Defaults to TRUE
type	The type of plot to be drawn. For more details, see plot.
uncertainty	Logical flag to enable plots with uncertainty intervals. Either a single TRUE/FALSE value, or a vector of TRUE/FALSE values around SSB or F estimated timeseries, or a set of integers corresponding to the choice of models.
legend	Flag to enable legend to plot. TRUE by default.
legendlabels	Optional vector of labels to include in legend.
legendloc	Location of legend. Either a string like "topleft" or a vector of two numeric values representing the fraction of the maximum in the x and y dimensions, respectively. See help("legend") for more info on the string options.

legendorder	Optional vector of model numbers that can be used to have the legend display the model names in an order that is different than that which is represented in the summary input object.
legendncol	Number of columns for the legend.
legendcex	Allows to adjust legend cex
legendsp	Space between legend labels
legendindex	Allows to add legend for selected indices (plots)
pwidth	Default width of plot printed to plot in units of punits
pheight	Height of plot printed to plot in units of punits
punits	Measurement units for pwidth and pheight. Default is "in". • "px" (pixels) • "in" (inches) • "cm" (centimeters) • "mm" (millimeters)
res	Resolution for plots printed to files.
ptsize	Point size for plotted text in plots printed in files. See help("png") for more details
cex.main	Character expansion for plot titles.
plotdir	Directory where output plot file will be written. By default, it will be the directory where the model was run.
filenameprefix	Additional text to append to output plot file name. It will be separated from default name by an underscore.
par	A numerical vector of the form c(bottom, left, top, right) which gives the number of lines of margin to be specified on the four sides of the plot,which is passed to par(). Entering NULL passes plot's default par() values (which depends on whether the main title is included or not)
verbose	Flag to print additional diagnostic messages to R console
shadecol	uncertainty shading of hcxval horizon
shadecol2	color for uncertainty in early years not affected by hindcast
shadealpha	Transparency adjustment used to make default shadecol. (currently not used)
new	Deprecated. New plot windows are created by default (TRUE), and the option to disable this, via FALSE, is unused.
add	suppresses par() to create multiplot figs
mcmcVec	Logical vector of TRUE/FALSE values (or single value) indicating whether input values are from MCMC or to use normal distribution around MLE.
indexQlabel	Logical flag to add catchability to legend in plot of index fits.
indexQdigits	Number of significant digits for catchability in legend
indexfleets	Fleet numbers for each model to compare indices of abundance. Can take different forms: • integer: (default) create a single comparison plot for the chosen index

- NULL: create a separate plot for each index as long as the fleet numbering is the same across all models.
- vector of length equal to number of models: a single fleet number for each model to be compared in a single plot
- list: list of fleet numbers associated with indices within each model to be compared, where the list elements are each a vector of the same length but the names of the list elements don't matter and can be absent.

`plot` DEPRECATED. By default, TRUE, Plots (and subplots) are drawn to the plot device. The option to explicitly disable this option (FALSE), is not implemented. This option flag will be defunct in a future version

`shadecol1` uncertainty shading of early years not affected by hindcast (currently not used)

Author(s)

Henning Winker (JRC-EC) and Laurence Kell (Sea++)

`SSplotJABBAres` *Residual plot*

Description

Plots residuals for all indices as boxplot (color coded by fleet) with a loess showing systematic trends over time. This function is from the package JABBA (Just Another Bayesian Biomass Assessment).

Usage

```
SSplotJABBAres(
  ss3rep,
  subplots = c("cpue", "len", "age", "size", "con")[1],
  seas = NULL,
  plot = TRUE,
  print = lifecycle::deprecated(),
  print_plot = FALSE,
  png = lifecycle::deprecated(),
  use_png = print_plot,
  pdf = lifecycle::deprecated(),
  use_pdf = FALSE,
  indexselect = NULL,
  miny = 3,
  col = NULL,
  pch = 21,
  lty = 1,
  lwd = 2,
  tickEndYr = TRUE,
  xlim = "default",
```

```
  ylim = "default",
  ylimAdj = 1.1,
  xaxs = "i",
  yaxs = "i",
  xylabs = TRUE,
  type = "o",
  legend = TRUE,
  legendlabels = "default",
  legendloc = "bottomleft",
  legendorder = "default",
  legendncol = 1,
  legendcex = 1,
  legendsp = 0.9,
  legendindex = NULL,
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  plotdir = NULL,
  filenameprefix = "",
  par = list(mar = c(5, 4, 1, 1) + 0.1),
  verbose = TRUE,
  boxcol = grey(0.8, 0.5),
  new = TRUE,
  add = FALSE
)
```

Arguments

ss3rep	Stock Synthesis output as read by `r4ss::SS_output()`
subplots	string of type of data to plot: • `"cpue"` Index of abundance data • `"len"` Length-composition data • `"age"` Age-composition data • `"size"` Generalized size composition data • `"con"` Conditional age-at-length data.
seas	string indicating how to treat data from multiple seasons: • `"comb"` Combine seasonal data for each year and plot against Yr • `"sep"` Treat season separately, plotting against `Yr.S`. • `NULL` If NULL, it is assumed that there is only one season and option `"comb"` is used.
plot	DEPRECATED. By default, TRUE, Plots (and subplots) are drawn to the plot device. The option to explicitly disable this option (FALSE), is not implemented. This option flag will be defunct in a future version

print	DEPRECATED, please use print_plot.
print_plot	Flag to enable plot graphic device to print to PNG or PNG files.
png	DEPRECATED. Please use use_png.
use_png	Enables plots to be generated to PNG files. Defaults to print value
pdf	DEPRECATED. Please use use_pdf.
use_pdf	Enables plots to be generated to pdf file.
indexselect	Vector of fleet numbers for each model for which to compare
miny	minimum abs values of ylim
col	Optional vector of colors to be used for lines. Input NULL
pch	Optional vector of plot character values
lty	Optional vector of line types
lwd	Optional vector of line widths
tickEndYr	Logical flag: set TRUE or FALSE to switch to turn on/off extra axis mark at final year in timeseries plots.
xlim	Optional, years to use for x-axis. Default value NULL (or "default"), uses all years available.
ylim	Optional, min and max values for the ylim to override the "default" value (-0.7, 0.5)
ylimAdj	Multiplier for ylim parameter. Allows additional white space.
xaxs	Choice of xaxs parameter See ?par for more info.
yaxs	Choice of yaxs parameter. See ?par for more info.
xylabs	Logical flag. Enables x- and y-axis labels.
type	The type of plot to be drawn. For more details, see plot.
legend	Flag to enable legend to plot. TRUE by default.
legendlabels	Optional vector of labels to include in legend.
legendloc	Location of legend. Either a string like "topleft" or a vector of two numeric values representing the fraction of the maximum in the x and y dimensions, respectively. See help("legend") for more info on the string options.
legendorder	Optional vector of model numbers that can be used to have the legend display the model names in an order that is different than that which is represented in the summary input object.
legendncol	Number of columns for the legend.
legendcex	Allows to adjust legend cex
legendsp	Space between legend labels
legendindex	Allows to add legend for selected indices (plots)
pwidth	Default width of plot printed to plot in units of punits
pheight	Height of plot printed to plot in units of punits
punits	Measurement units for pwidth and pheight. Default is "in".

- "px" (pixels)

- "in" (inches)
- "cm" (centimeters)
- "mm" (millimeters)

res	Resolution for plots printed to files.
ptsize	Point size for plotted text in plots printed in files. See help("png") for more details
cex.main	Character expansion for plot titles.
plotdir	Directory where output plot file will be written. By default, it will be the directory where the model was run.
filenameprefix	Additional text to append to output plot file name. It will be separated from default name by an underscore.
par	A numerical vector of the form c(bottom, left, top, right) which gives the number of lines of margin to be specified on the four sides of the plot,which is passed to par(). Entering NULL passes plot's default par() values (which depends on whether the main title is included or not)
verbose	Flag to print additional diagnostic messages to R console
boxcol	color boxes
new	Deprecated. New plot windows are created by default (TRUE), and the option to disable this, via FALSE, is unused.
add	suppresses par() to create multiplot figs

Author(s)

Henning Winker (JRC-EC)

SSplotKobe *KOBE phase plot*

Description

Generates a Kobe plot or phase plot illustrating the stock status uncertainty over SSB/SSBmsy and F/Fmsy

Usage

```
SSplotKobe(
  kb,
  joint = TRUE,
  year = NULL,
  posterior = c("points", "kernel"),
  xlab = expression(SSB/SSB[MSY]),
  ylab = expression(F/F[MSY]),
  ylim = NULL,
  xlim = NULL,
```

```
  fill = TRUE,
  showMedian = TRUE,
  legend = TRUE,
  legendpos = "right",
  legendcex = 0.7,
  legendruns = TRUE,
  yr.label = TRUE,
  yr.int = 5,
  verbose = TRUE
)
```

Arguments

kb	output from SSdeltaMVLN()$kb
joint	option FALSE shows individual runs
year	option to choose year for kobe, last year is default
posterior	visualization of posterior c("points","kernel")
xlab	graphic parameter
ylab	graphic parameter
ylim	graphic parameter
xlim	graphic parameter
fill	shows color-coded quadrants
showMedian	option for median trajectory. TRUE by default
legend	option for legend. TRUE by default.
legendpos	legend position
legendcex	legend size
legendruns	show legend for run labels
yr.label	show year along trajectory
yr.int	year intervals along trajectory
verbose	Output to R console. Default is TRUE

Value

Kobe Quadrant percentages

SSplotModelcomp *Compare Multiple SS Model Estimates*

Description

A function to plot SSB, B-ratio, F, Recruits, and/or Index of Abundance fits from multiple SS models. This function uses an object of multiple SS models summarized with `r4ss::SSsummarize()`.

Usage

```
SSplotModelcomp(
  summaryoutput,
  plot = TRUE,
  print = deprecated(),
  print_plot = FALSE,
  png = deprecated(),
  use_png = print_plot,
  pdf = deprecated(),
  use_pdf = FALSE,
  models = "all",
  subplots = c("SSB", "Bratio", "Fvalue", "Recruits", "Index", "RecDevs"),
  brp = c("msy", "btargs"),
  fmsy = TRUE,
  ylabs = c("SSB (t)", expression(SSB/SSB[MSY]), "Fishing mortality F",
    "Recruits ('000s)", "Index", "Recruitment Deviations"),
  endyrvec = "default",
  xmin = NULL,
  indexselect = NULL,
  indexUncertainty = TRUE,
  col = NULL,
  pch = NULL,
  lty = 1,
  lwd = 2,
  tickEndYr = FALSE,
  xlim = "default",
  ylimAdj = 1.05,
  xaxs = "i",
  yaxs = "i",
  xylabs = TRUE,
  type = "l",
  uncertainty = TRUE,
  legend = TRUE,
  legendlabels = "default",
  legendloc = "topright",
  legendorder = "default",
  legendncol = 1,
  legendcex = 1,
```

```
  legendsp = 0.9,
  legendindex = NULL,
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  plotdir = NULL,
  filenameprefix = "",
  par = list(mar = c(5, 4, 1, 1) + 0.1),
  verbose = TRUE,
  shadecol = NULL,
  shadealpha = 0.3,
  new = TRUE,
  add = FALSE,
  mcmcVec = FALSE,
  indexQlabel = TRUE,
  indexQdigits = 4,
  indexfleets = 1
)
```

Arguments

summaryoutput	List created by r4ss::SSsummarize()
plot	DEPRECATED. By default, TRUE, Plots (and subplots) are drawn to the plot device. The option to explicitly disable this option (FALSE), is not implemented. This option flag will be defunct in a future version
print	DEPRECATED, please use print_plot.
print_plot	Flag to enable plot graphic device to print to PNG or PNG files.
png	DEPRECATED. Please use use_png.
use_png	Enables plots to be generated to PNG files. Defaults to print value
pdf	DEPRECATED. Please use use_pdf.
use_pdf	Enables plots to be generated to pdf file.
models	Optional subset of the models of summaryoutput (or a similar field with a different name): a list created by the function r4ss::SSsummarize. Either "all" or a vector of numbers indicating columns in summary tables.
subplots	option to "SSB","Bratio","Fvalue","Recruits","Index" • "SSB" Spawning Stock Biomass • "Bratio" Stock Biomass relative to biomass reference point • "Fvalue" Fishing Mortality • "Recruits" Age-0 Recruits • "Index" Index of abundance • "RecDev" Recruitment Deviations
brp	option to set reference point c("msy","btargs")

fmsy	to specify Fvalue as F/Fmsy if so in starter file setting
ylabs	yaxis labels for quants final year of values to show for each model. By default it is set to the
endyrvec	Optional single year or vector of years representing the final year of values to show for each model. By "default" it is set to the ending year specified in each model.
xmin	NULL optional number first year shown in plot (if available)
indexselect	Vector of fleet numbers for each model for which to compare
indexUncertainty	Show fixed uncertainty intervals on index (not estimated)
col	Optional vector of colors to be used for lines. Input NULL
pch	Optional vector of plot character values
lty	Optional vector of line types
lwd	Optional vector of line widths
tickEndYr	Logical flag: set TRUE or FALSE to switch to turn on/off extra axis mark at final year in timeseries plots.
xlim	Optional, years to use for x-axis. Default value NULL (or "default"), uses all years available.
ylimAdj	Multiplier for ylim parameter. Allows additional white space.
xaxs	Choice of xaxs parameter See ?par for more info.
yaxs	Choice of yaxs parameter. See ?par for more info.
xylabs	Logical flag: set TRUE or FALSE to include x- and y-axis labels to the plot. Defaults to TRUE
type	The type of plot to be drawn. For more details, see plot.
uncertainty	Logical flag to enable plots with uncertainty intervals. Either a single TRUE/FALSE value, or a vector of TRUE/FALSE values around SSB or F estimated timeseries, or a set of integers corresponding to the choice of models.
legend	Flag to enable legend to plot. TRUE by default.
legendlabels	Optional vector of labels to include in legend.
legendloc	Location of legend. Either a string like "topleft" or a vector of two numeric values representing the fraction of the maximum in the x and y dimensions, respectively. See help("legend") for more info on the string options.
legendorder	Optional vector of model numbers that can be used to have the legend display the model names in an order that is different than that which is represented in the summary input object.
legendncol	Number of columns for the legend.
legendcex	Allows to adjust legend cex
legendsp	Space between legend labels
legendindex	Allows to add legend for selected indices (plots)
pwidth	Default width of plot printed to plot in units of punits

pheight	Height of plot printed to plot in units of punits
punits	Measurement units for pwidth and pheight. Default is "in". • "px" (pixels) • "in" (inches) • "cm" (centimeters) • "mm" (millimeters)
res	Resolution for plots printed to files.
ptsize	Point size for plotted text in plots printed in files. See help("png") for more details
cex.main	Character expansion for plot titles.
plotdir	Directory where output plot file will be written. By default, it will be the directory where the model was run.
filenameprefix	Additional text to append to output plot file name. It will be separated from default name by an underscore.
par	A numerical vector of the form c(bottom, left, top, right) which gives the number of lines of margin to be specified on the four sides of the plot,which is passed to par(). Entering NULL passes plot's default par() values (which depends on whether the main title is included or not)
verbose	Flag to print additional diagnostic messages to R console
shadecol	uncertainty shading of hcxval horizon
shadealpha	Transparency adjustment used to make default shadecol
new	Deprecated. New plot windows are created by default (TRUE), and the option to disable this, via FALSE, is unused.
add	suppresses par() to create multiplot figs
mcmcVec	Logical vector of TRUE/FALSE values (or single value) indicating whether input values are from MCMC or to use normal distribution around MLE.
indexQlabel	Logical. If TRUE add catchability to legend in plot of index fits (currently not used)
indexQdigits	Number of significant digits for catchability in legend
indexfleets	Fleet numbers for each model to compare indices of abundance. Can take different forms: • integer (default): create a single comparison plot for the chosen index • NULL: create a separate plot for each index as long as the fleet numbering is the same across all models. • vector of length equal to number of models: a single fleet number for each model to be compared in a single plot • list: list of fleet numbers associated with indices within each model to be compared, where the list elements are each a vector of the same length but the names of the list elements don't matter and can be absent.

Author(s)

Mostly adopted from r4ss::SSplotComparisons by Taylor et al

SSplotRetro *Retrospective-Forecast with One-Step Ahead Hindcasting*

Description

Plots retrospective pattern, including (optional) one-step ahead forecast and computes Mohn's Rho

Usage

```
SSplotRetro(
  summaryoutput,
  subplots = c("SSB", "F"),
  plot = TRUE,
  print = deprecated(),
  print_plot = FALSE,
  png = deprecated(),
  use_png = print_plot,
  pdf = deprecated(),
  use_pdf = FALSE,
  models = "all",
  endyrvec = "default",
  xlim = NULL,
  xmin = NULL,
  labels = NULL,
  ylim = NULL,
  forecast = TRUE,
  forecastrho = TRUE,
  showrho = TRUE,
  col = NULL,
  pch = NULL,
  lty = 1,
  lwd = 2,
  tickEndYr = TRUE,
  ylimAdj = 1.05,
  xaxs = "i",
  yaxs = "i",
  xylabs = TRUE,
  type = "o",
  uncertainty = TRUE,
  legend = TRUE,
  legendlabels = "default",
  legendloc = "topright",
  legendorder = "default",
  legendncol = 1,
  legendcex = 1,
  legendsp = 0.7,
  legendindex = NULL,
```

```
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  plotdir = NULL,
  filenameprefix = "",
  par = list(mar = c(5, 4, 1, 1) + 0.1),
  verbose = TRUE,
  shadecol = grey(0.4, 0.6),
  new = TRUE,
  add = FALSE,
  mcmcVec = FALSE,
  shadecol1 = grey(0.5, 0.4),
  indexQlabel = TRUE,
  indexQdigits = 4,
  shadealpha = 0.3
)
```

Arguments

summaryoutput	List created by r4ss::SSsummarize()
subplots	Optional vector of subplots to be created: • "SSB" Spawning Stock Biomass • "F" Fishing Mortality
plot	DEPRECATED. By default, TRUE, Plots (and subplots) are drawn to the plot device. The option to explicitly disable this option (FALSE), is not implemented. This option flag will be defunct in a future version
print	DEPRECATED, please use print_plot.
print_plot	Flag to enable plot graphic device to print to PNG or PNG files.
png	DEPRECATED. Please use use_png.
use_png	Enables plots to be generated to PNG files. Defaults to print value
pdf	DEPRECATED. Please use use_pdf.
use_pdf	Enables plots to be generated to pdf file.
models	Optional subset of the models of summaryoutput (or a similar field with a different name): a list created by the function r4ss::SSsummarize. Either "all" or a vector of numbers indicating columns in summary tables.
endyrvec	Optional single year or vector of years representing the final year of values to show for each model. By default it is set to the ending year specified in each model.
xlim	Optional, years to use for x-axis. Default value NULL (or "default"), uses all years available.
xmin	optional minimum year shown in plot (default first yr)

labels	yaxis label for biomass (bony fish and sharks)
ylim	option to specify ylim range
forecast	Logical. If TRUE, one-step ahead forecasts are shown in plot
forecastrho	Logical. If TRUE, one-step ahead forecast rho value is denoted in plot
showrho	Logical flag to include Mohn's rho value. Defaults to TRUE
col	Optional vector of colors to be used for lines. Input NULL
pch	Optional vector of plot character values
lty	Optional vector of line types
lwd	Optional vector of line widths
tickEndYr	Logical flag: set TRUE or FALSE to switch to turn on/off extra axis mark at final year in timeseries plots.
ylimAdj	Multiplier for ylim parameter. Allows additional white space.
xaxs	Choice of xaxs parameter See ?par for more info.
yaxs	Choice of yaxs parameter. See ?par for more info.
xylabs	Logical flag: set TRUE or FALSE to include x- and y-axis labels to the plot. Defaults to TRUE
type	The type of plot to be drawn. For more details, see plot.
uncertainty	Logical flag to enable plots with uncertainty intervals. Either a single TRUE/FALSE value, or a vector of TRUE/FALSE values around SSB or F estimated timeseries, or a set of integers corresponding to the choice of models.
legend	Flag to enable legend to plot. TRUE by default.
legendlabels	Optional vector of labels to include in legend.
legendloc	Location of legend. Either a string like "topleft" or a vector of two numeric values representing the fraction of the maximum in the x and y dimensions, respectively. See help("legend") for more info on the string options.
legendorder	Optional vector of model numbers that can be used to have the legend display the model names in an order that is different than that which is represented in the summary input object.
legendncol	Number of columns for the legend.
legendcex	Allows to adjust legend cex
legendsp	Space between legend labels
legendindex	Allows to add legend for selected indices (plots)
pwidth	Default width of plot printed to plot in units of punits
pheight	Height of plot printed to plot in units of punits
punits	Measurement units for pwidth and pheight. Default is "in". • "px" (pixels) • "in" (inches) • "cm" (centimeters) • "mm" (millimeters)

res	Resolution for plots printed to files.
ptsize	Point size for plotted text in plots printed in files. See help("png") for more details
cex.main	Character expansion for plot titles.
plotdir	Directory where output plot file will be written. By default, it will be the directory where the model was run.
filenameprefix	Additional text to append to output plot file name. It will be separated from default name by an underscore.
par	A numerical vector of the form c(bottom, left, top, right) which gives the number of lines of margin to be specified on the four sides of the plot,which is passed to par(). Entering NULL passes plot's default par() values (which depends on whether the main title is included or not)
verbose	Flag to print additional diagnostic messages to R console
shadecol	uncertainty shading of hcxval horizon
new	Deprecated. New plot windows are created by default (TRUE), and the option to disable this, via FALSE, is unused.
add	suppresses par() to create multiplot figs
mcmcVec	Logical vector of TRUE/FALSE values (or single value) indicating whether input values are from MCMC or to use normal distribution around MLE.
shadecol1	uncertainty shading of early years not affected by hindcast
indexQlabel	Logical. If TRUE, add catchability to legend in plot of index fits (currently not used)
indexQdigits	Number of significant digits for catchability in legend
shadealpha	set the transparency level (alpha) of the area of uncertainty. Defaults to 0.3 (currently not used)

Author(s)

Henning Winker (JRC-EC) and Laurance Kell (Sea++)

SSplotRunstest *Residual Diagnostics*

Description

Function for residual diagnostics. Plots residuals and 3x sigma limits for indices or mean age or length and outputs a runs test table. Note, if you do not want to plot the residuals, use SSrunstest().

Usage

```
SSplotRunstest(
  ss3rep,
  mixing = "less",
  subplots = c("cpue", "len", "age", "size", "con")[1],
  plot = TRUE,
  print = deprecated(),
  print_plot = FALSE,
  png = deprecated(),
  use_png = print_plot,
  pdf = deprecated(),
  use_pdf = FALSE,
  indexselect = NULL,
  miny = 1,
  col = NULL,
  pch = 21,
  lty = 1,
  lwd = 2,
  tickEndYr = FALSE,
  xlim = "default",
  ylim = "default",
  ylimAdj = 1.4,
  xaxs = "i",
  yaxs = "i",
  xylabs = TRUE,
  type = "o",
  legend = TRUE,
  legendloc = "top",
  legendcex = 1,
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  plotdir = NULL,
  filenameprefix = "",
  par = list(mar = c(5, 4, 1, 1) + 0.1),
  verbose = TRUE,
  new = TRUE,
  add = FALSE
)
```

Arguments

ss3rep	Stock Synthesis output as read by `r4ss::SS_output()`
mixing	`c("less","greater","two.sided")`. Default less is checking for positive autocorrelation only

subplots	optional flag for: • "cpue" Index of abundance data • "len" Length composition data • "size" Generalized size composition data • "age" Age composition data • "con" Conditional age-at-length data
plot	DEPRECATED. By default, TRUE, Plots (and subplots) are drawn to the plot device. The option to explicitly disable this option (FALSE), is not implemented. This option flag will be defunct in a future version
print	DEPRECATED, please use print_plot.
print_plot	Flag to enable plot graphic device to print to PNG or PNG files.
png	DEPRECATED. Please use use_png.
use_png	Enables plots to be generated to PNG files. Defaults to print value
pdf	DEPRECATED. Please use use_pdf.
use_pdf	Enables plots to be generated to pdf file.
indexselect	Vector of fleet numbers for each model for which to compare
miny	the absolute value of the min and max value for ylim. Default is 1
col	Optional vector of colors to be used for lines. Input NULL
pch	Optional vector of plot character values
lty	Optional vector of line types
lwd	Optional vector of line widths
tickEndYr	Logical flag: set TRUE or FALSE to switch to turn on/off extra axis mark at final year in timeseries plots.
xlim	Optional, years to use for x-axis. Default value NULL (or "default"), uses all years available.
ylim	Optional, values for y-axis range to display on plot. The default: "default", will range from -1 to 1.
ylimAdj	Multiplier for ylim parameter. Allows additional white space.
xaxs	Choice of xaxs parameter See ?par for more info.
yaxs	Choice of yaxs parameter. See ?par for more info.
xylabs	Logical flag: set TRUE or FALSE to include x- and y-axis labels to the plot. Defaults to TRUE
type	The type of plot to be drawn. For more details, see plot.
legend	Flag to enable legend to plot. TRUE by default.
legendloc	Location of legend. Either a string like "topleft" or a vector of two numeric values representing the fraction of the maximum in the x and y dimensions, respectively. See help("legend") for more info on the string options.
legendcex	Allows to adjust legend cex
pwidth	Default width of plot printed to plot in units of punits
pheight	Height of plot printed to plot in units of punits

punits	Measurement units for pwidth and pheight. Default is "in". • "px" (pixels) • "in" (inches) • "cm" (centimeters) • "mm" (millimeters)
res	Resolution for plots printed to files.
ptsize	Point size for plotted text in plots printed in files. See help("png") for more details
cex.main	Character expansion for plot titles.
plotdir	Directory where output plot file will be written. By default, it will be the directory where the model was run.
filenameprefix	Additional text to append to output plot file name. It will be separated from default name by an underscore.
par	A numerical vector of the form c(bottom, left, top, right) which gives the number of lines of margin to be specified on the four sides of the plot,which is passed to par(). Entering NULL passes plot's default par() values (which depends on whether the main title is included or not)
verbose	Flag to print additional diagnostic messages to R console
new	Deprecated. New plot windows are created by default (TRUE), and the option to disable this, via FALSE, is unused.
add	suppresses par() to create multiplot figs

Value

a dataframe with runs test p-value, if the test has passed or failed, 3x sigma high and low limits, and the type of data used. Rows are for each fleet. Note, runs test passed if p-value > 0.05 (residuals are random) and failed if p-value < 0.5 (residuals are not random)

Author(s)

Henning Winker (JRC-EC) and Laurance Kell (Sea++)

SSreadMCMC *Read SS MCMC*

Description

A function to read mcmc file outputs from a Stock Synthesis model

Usage

```
SSreadMCMC(mcmcdir)
```

Arguments

mcmcdir	file path for folder with the derived_posteriors.sso file

Value

Stock Synthesis mcmc output file

Author(s)

Henning Winker (JRC-EC) & Laurence Kell (Sea++)

SSretroComps *Retrieve Composition Data from Multiple SS Models*

Description

Wrapper to get observed and expected mean length/age from multiple Stock Synthesis models.

Usage

```
SSretroComps(retroModels)
```

Arguments

retroModels	object list of replists from r4ss::SSgetoutput()

Value

list of observed and expected mean Length/age comps (c.f. `ss3rep[["cpue"]]`)

Author(s)

Henning Winker

SSrmse *Function for calculating RMSE used for* SSplotJABBAres()

Description

Function for calculating RMSE used for SSplotJABBAres()

Usage

```
SSrmse(
  ss3rep,
  quants = c("cpue", "len", "age", "con"),
  seas = NULL,
  indexselect = NULL
)
```

Arguments

ss3rep	output from SS_output()
quants	the dataset to calculate RMSE for. "cpue" for index of abundance, "len" for length comp, "age" for age composition, and "con" for conditional age-at-length.
seas	string indicating how to treat data from multiple seasons 'comb' - combine seasonal data for each year and plot against Yr 'sep' - treat season separately, plotting against Yr.S. If is.null(seas), it is assumed that there is only one season and option 'comb' is used.
indexselect	Vector of fleet numbers for each model for which to compare

Value

returns a list that includes the RMSE table output (by fleet and combined) and the dataframe of residuals which can be used for creating the SSplotJABBAres() plot

SSrunstest *Residual Diagnostics Plot*

Description

Function for residual diagnostics. Outputs a runs test table that gives runs test p-values, if the runs test passed (p-value > 0.05, residuals are random) or failed (p-value < 0.05, residuals are not random), the 3x sigma limits for indices or mean age or length and the type of input data (cpue, length comp, age comp, size comp, or conditional age-at-length).

Usage

```
SSrunstest(
  ss3rep,
  mixing = "less",
  quants = c("cpue", "len", "age", "con")[1],
  indexselect = NULL,
  verbose = TRUE
)
```

Arguments

ss3rep	Stock Synthesis output as read by r4ss::SS_output()
mixing	c("less","greater","two.sided"). Default less is checking for positive autocorrelation only
quants	optional use of c("cpue","len","age","con"), default uses "cpue". • "cpue" Index of abundance data • "len" Length composition data • "age" Age composition data • "con" Conditional age-at-length data
indexselect	Vector of fleet numbers for each model for which to compare
verbose	Report progress to R GUI?

Value

a dataframe with runs test p-value, if the test has passed or failed, 3x sigma high and low limits, and the type of data used. Rows are for each fleet. Note, runs test passed if p-value > 0.05 (residuals are random) and failed if p-value < 0.5 (residuals are not random)

Author(s)

Henning Winker (JRC-EC) and Laurance Kell (Sea++)

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ssruns_sig3 *Runs Test for Residuals*

Description

This function uses randtests::runs.test to do perform a runs test on residuals to determine if they are randomly distributed. It also calculates the 3 x sigma limits

Usage

```
ssruns_sig3(x, type = NULL, mixing = "less")
```

Arguments

x	residuals from CPUE fits
type	only c("resid","observations")
mixing	c("less","greater","two.sided"). Default less is checking for positive autocorrelation only

Details

runs test is conducted with library(randtests)

Value

runs p value and 3 x sigma limits

Author(s)

Henning Winker (JRC-EC) and Laurence Kell (Sea++)

SSsettingsBratioF *Get Stock Status Settings*

Description

A function to get Bratio and F settings

Usage

```
SSsettingsBratioF(ss3rep, status = c("Bratio", "F"), verbose = TRUE)
```

Arguments

ss3rep	from r4ss::SSgetoutput()
status	covarying stock status quantaties to extract from Hessian
verbose	Report progress to R GUI?

Value

output list with Bratio and F settings

Author(s)

Henning Winker (JRC-EC)

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