Tables of GAM results in paper

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```
# root dir
knitr::opts_knit$set(root.dir =
                       "C:/Users/rver4657/ownCloud/Virtual Experiments/VirtExp")
knitr::opts_chunk$set(echo = TRUE)
# LOAD REQUIRED PACKAGES # #####
library(pander)
library(tidyr)
library(xts)
library(zoo)
library(Kendall)
library(mgcv)
```

This rmarkdown document and the resulting pdf are stored on github. All directories (apart from the root working directory) refer to the directories in this repository.

Introduction

This document is related to the manuscript "Disentangling climate change trends in Australian streamflow" (vervoort et al.), submitted to Journal of Hydrology.

This document is a further component on the analysis of the streamflow data using Generalised Additive models (GAM) testing for a trend in the data , or testing for a trend in the residuals (part 3 of the series, 3.GAMmodelTests.pdf). This document, part 3A, only creates table 4, 5, 6 in the Manuscript and back transforms the trends. For the back transformation we : $BackTransformedTrend = exp(Trend) - 1$ see 3B.InterpretationOfSlopeExplantion.pdf The data for this document has been generated in document 3 and was stored in a temporary directory called **"../projectdata"**, so one directory up and then a directory called "projectdata". This directory is not included on github, as this data can be regenerated using document 3. Only the results using the precipitaion data from the rainfall stations is used here as the results from the gridded rainfall are not different.

Table 4

This table combines the results of model 1 and model 2, or the simple trend analysis for flow (Q) and precipitation (P).

```
# read in the flow data (a data frame called Store2)
load("../projectdata/Store2_TrendOnlyAnalysis.RData")

Flow <- do.call(rbind, lapply(1:length(Store2), function(i) rbind(Store2[[i]][[2]])))

# read in the Precipitation data (a data frame called Store_Rain)
load("../projectdata/StoreRain_TrendAnalysis.RData")
Rain <- do.call(rbind, lapply(1:length(Store_Rain),
                     function(i) rbind(Store_Rain[[i]][[2]])))
```

```r
# create a data frame that combines the relevant columns
# if p.value < 0.1 do not calculate the annual trend
Table4 <- data.frame(Station = Flow$Station,
                     Qtrend = Flow$Value, Qpvalue = Flow$p.value,
                     Q_mm_year = ifelse(Flow$p.value < 0.1,
                                        (exp(Flow$Value)-1)*52,NA),
                     Ptrend = Rain$Value, Ppvalue = Rain$p.value,
                     P_mm_year = ifelse(Rain$p.value < 0.1,
                                        (exp(Rain$Value)-1)*52,NA))
# now save the table as a csv file
write.csv(Table4, "../projectdata/Table4.csv", row.names=F)
# show table
pander(Table4, caption = "This is Table 4 in the manuscript")
```

Table 1: This is Table 4 in the manuscript

Station	Qtrend	Qpvalue	Q_mm_year	Ptrend	Ppvalue	P_mm_year
COTT	-0.0004162	0.1042	NA	-0.0001582	0.08666	-0.008226
RUTH	-0.0008201	1.807e-14	-0.04263	-0.0001829	0.01233	-0.009508
CORA	-0.0003858	0.008591	-0.02006	-0.0001492	0.03022	-0.007757
ELIZ	0.0001588	0.6635	NA	-0.0002914	0.0248	-0.01515
COCH	-0.000226	0.179	NA	-0.0002699	0.02808	-0.01403
COEN	0.0003334	0.3962	NA	-0.0005117	0.0007076	-0.0266
SCOT	-0.0003297	0.2604	NA	-5.494e-05	0.4506	NA
HELL	-0.0001752	0.2486	NA	-2.483e-05	0.64	NA
NIVE	-8.348e-05	0.7491	NA	-0.0001866	0.001392	-0.009701
MURR	-0.0002492	0.001871	-0.01296	-0.0001167	0.03638	-0.006069
SOUT	-0.0001727	0.007682	-0.008978	-0.0001749	0.0001713	-0.009093
YARR	-0.0003644	0.3426	NA	-0.0001297	0.1612	NA
DOMB	0.1383	1.086e-28	7.714	-5.514e-05	0.5136	NA

Table 5

This table combines the results of model 3, which is the GAMM analysis for flow (Q) taking into account the effect of precipitation (P). The AIC values are given to allow comparison with Table 6 in the manuscript.

```r
# read in the results of model 3 (a data frame called Store_Fwr)
load("../projectdata/StoreFwR_TrendAnalysis.RData")

Flow <- do.call(rbind, lapply(1:length(Store_FwR),
                              function(i) rbind(Store_FwR[[i]][[2]])))

# create a data frame that combines the relevant columns
# if p.value < 0.1 do not calculate the annual trend
Table5 <- data.frame(Station = Flow$Station, AIC = Flow$AIC,
                     Qtrend = Flow$Value, Qpvalue = Flow$p.value,
                     Q_mm_year = ifelse(Flow$p.value < 0.1,
                                        (exp(Flow$Value)-1)*52,NA))
# now save the table as a csv file
write.csv(Table5, "../projectdata/Table5.csv", row.names=F)
# show table
```

```
pander(Table5, caption = "This is Table 5 in the manuscript")
```

Table 2: This is Table 5 in the manuscript

Station	AIC	Qtrend	Qpvalue	Q_mm_year
COTT	1528	-0.0003577	0.1736	NA
RUTH	2368	-0.0007711	4.075e-10	-0.04008
CORA	5783	-0.0003373	0.01406	-0.01754
ELIZ	3291	0.0001586	0.6017	NA
COCH	1580	-0.0001283	0.4022	NA
COEN	6236	0.0003541	0.3042	NA
SCOT	4249	-0.0003011	0.2931	NA
HELL	2568	-0.0001535	0.2896	NA
NIVE	3683	-8.229e-05	0.7461	NA
MURR	94.89	-0.0002324	0.003982	-0.01208
SOUT	1255	-0.0001372	0.03013	-0.007135
YARR	4273	-0.0004208	0.2431	NA
DOMB	3964	-0.0005158	0.1562	NA

Table 6

This table combines the results of model 4 and 5, which is the GAMM analysis for flow (Q) taking into account the effect of precipitation (P) and actual ET via s(P,maxT). The AIC values are given to allow comparison with Table 5 in the manuscript.

```
# read in the results of model 4 (a data frame called Store_FwRE)
load("../projectdata/StoreFwRE_TrendAnalysis.RData")

Flow_m4 <- do.call(rbind, lapply(1:length(Store_FwRE),
                          function(i) rbind(Store_FwRE[[i]][[2]])))

# read in the results of model 5 (a data frame called Store_FwRE2)
load("../projectdata/StoreFwRE_Analysis.RData")

Flow_m5 <- do.call(rbind, lapply(1:length(Store_FwRE2),
                          function(i) rbind(Store_FwRE2[[i]][[2]])))
# load "real_df" with results Mann-Kendall for Model 5
load("../projectdata/MKResidGAM_MDPaper.Rdata")



# create a data frame that combines the relevant columns
# if p.value < 0.1 do not calculate the annual trend
Table6 <- data.frame(Station = Flow_m4$Station, AIC = Flow_m4$AIC,
                     Qtrend = Flow_m4$Value,
                     Qpvalue = Flow_m4$p.value,
                     Q_mm_year = ifelse(Flow_m4$p.value < 0.1,
                                 (exp(Flow_m4$Value)-1)*52,NA),
                     AIC_5 = Flow_m5$AIC,
                     MK_tau = real_df$tau,
                     MK_pvalue = real_df$pvalue)
```

```r
# now save the table as a csv file
write.csv(Table6, "../projectdata/Table6.csv", row.names=F)
# show table
pander(Table6, caption = "This is Table 6 in the manuscript")
```

Table 3: This is Table 6 in the manuscript

Station	AIC	Qtrend	Qpvalue	Q_mm_year	AIC_5	MK_tau	MK_pvalue
COTT	1479	-0.000308	0.2049	NA	1479	-0.05498	0.002852
RUTH	2330	-0.0007593	1.634e-10	-0.03947	2359	-0.1496	2.423e-23
CORA	5756	-0.0003322	0.01196	-0.01727	5761	-0.04802	0.001699
ELIZ	3270	0.0001874	0.5427	NA	3268	0.0111	0.5698
COCH	1516	-0.0001309	0.3519	NA	1515	-0.0242	0.1558
COEN	6142	0.000405	0.1687	NA	6142	0.0399	0.01142
SCOT	4101	-0.0002768	0.2074	NA	4100	-0.02944	0.0469
HELL	2395	-0.0001414	0.1907	NA	2395	-0.02918	0.06769
NIVE	3628	-6.918e-05	0.7618	NA	3626	-0.008038	0.5997
MURR	-122.2	-0.0002198	0.002485	-0.01143	-115.8	-0.05115	0.0004808
SOUT	1183	-0.0001262	0.01646	-0.006561	1187	-0.05113	0.0008428
YARR	4175	-0.0006134	0.0445	-0.03189	4177	-0.04507	0.02162
DOMB	3880	-0.0005318	0.06405	-0.02765	3881	-0.0808	9.382e-07