

# Use of R & Sweave for Verification

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# What is Sweave; R?

- R is a free, open source statistical package — GPL
- Sweave is a *package* in the standard R distribution
- Sweave allows R commands to be imbedded within *LaTeX*
- *LaTeX* is a free open source document processing language/system (included in the AWIPS baseline)



# Why R & Sweave?

- *Supplement* to existing verification software
- Automated monthly statistical reports that are fully self-documenting
- Easily shell scriptable and put into *cron*, if desired



# Sweave \*.Rnw file

```
\documentclass{article}
\title{Preliminary Sweave Automated Verification Example}
\author{Thomas Adams}
\begin{document}
\maketitle
<<echo=false,results=hide>>=
library(verification)
library(lattice)
library(xtable)
@
In this document we embed examples from the
\texttt{boxplot} and \texttt{lattice} R graphics packages, which are shown in the
figures below, into a \LaTeX{} document. The first graphic is Figure~\ref{fig:box},
which shows Boxplots of Mean Absolute Error for each Forecast Group
for the period 2001 -- 2005.
<<>>=
dat<-read.table("verification_summary_20051024_table.txt",sep="\t",header=TRUE)
@
\begin{figure}
  \centering
  <<fig=TRUE,height=10,echo=FALSE>>=
  par(las=1)
  boxplot(dat$MAE ~ dat$BASINID,horizontal=TRUE,col="skyblue")
  abline(v=1,col="red")
  abline(v=0.5,col="green")
@
  \caption{Boxplots of Mean Absolute Error for each Forecast Group.}
  \label{fig:box}
\end{figure}
```

} *Imbedded R*



# Sweave \*.Rnw file (cont.)

We next display a summary of Mean Error (ME) by year and lead-time for each Forecast Group in Figure~\ref{fig:lat}.

```
\begin{figure}
  \centering
  <<fig=TRUE,echo=FALSE>>=
  print(xyplot(dat$ME ~ dat$YEAR | dat$BASINID,groups=dat$LEADTIME,auto.key=T,xlab="Year",ylab="Mean Error, ME (ft)"))
  @
  \caption{Mean Error for each Forecast Group by year \& lead-time.}
  \label{fig:lat}
\end{figure}
```

Later on, we will demonstrate an analysis for all forecast points within the Forecast Group, \emph{KTY}, with a \texttt{scatterplot}.

```
<<>>=
```

```
dat_kty<-read.table("kty_20040101_20041231_pairs_24_1.txt",sep="|",skip=23,header=TRUE)
A<-verify(dat_kty$Obs_Value,dat_kty$Fcst_Value,fcst.type="cont",obs.type="cont")
@
Figure~\ref{fig:kty_scat}, below shows an example of scatterplots for all \emph{KTY} forecast points.
\begin{figure}
  \centering
  <<fig=TRUE,echo=FALSE>>=
  print(xyplot(dat_kty$Fcst_Value ~ dat_kty$Obs_Value | dat_kty$LID,xlab="Observed",ylab="Forecast"))
  @
  \caption{Scatterplot showing Observed vs Forecast for KTY forecast points.}
  \label{fig:kty_scat}
\end{figure}
\begin{center}
\end{center}
\end{document}
```



# Generating a pdf

```
echo 'Sweave("test.Rnw")' | R --vanilla --quiet  
latex test  
dvips -Ppdf test.dvi  
ps2pdf test.ps
```



# The resulting *pdf* file

## Preliminary Sweave Automated Verification Example

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In this document we embed examples from the `boxplot` and `lattice` R graphics packages, which are shown in the figures below, into a  $\text{\LaTeX}$  document. The first graphic is Figure 1, which shows Boxplots of Mean Absolute Error for each Forecast Group for the period 2001 – 2005.

```
> dat <- read.table("verification_summary_20051024_table.txt",  
+   sep = "\t", header = TRUE)
```

We next display a summary of Mean Error (ME) by year and lead-time for each Forecast Group in Figure 2. Later on, we will demonstrate an analysis for all forecast points within the Forecast Group, *KTY*, with a `scatterplot`.

```
> dat_kty <- read.table("kty_20040101_20041231_pairs_24_1.txt",  
+   sep = "|", skip = 23, header = TRUE)  
> A <- verify(dat_kty$Obs_Value, dat_kty$Fcst_Value, frcst.type = "cont",  
+   obs.type = "cont")
```

Figure 3, below shows an example of scatterplots for all *KTY* forecast points.



# pdf — Page 2

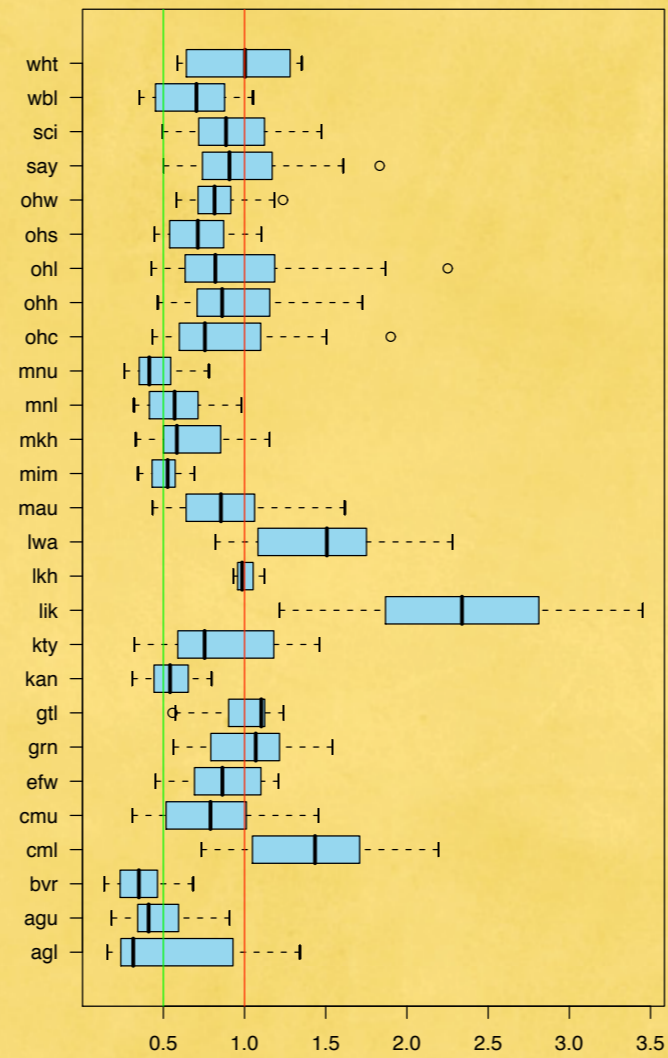


Figure 1: Boxplots of Mean Absolute Error for each Forecast Group.



# pdf — Page 3

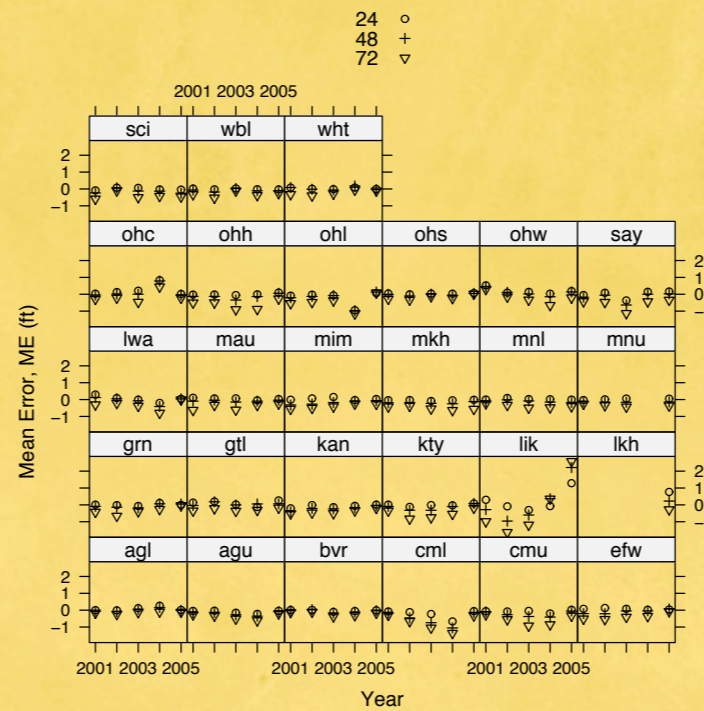


Figure 2: Mean Error for each Forecast Group by year & lead-time.



# pdf — Page 4

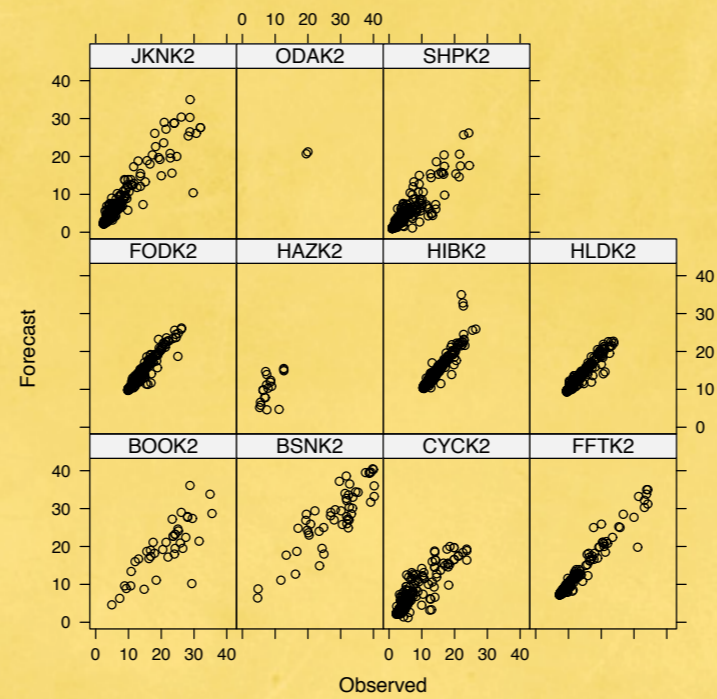


Figure 3: Scatterplot showing Observed vs Forecast for KTY forecast points.



# pdf — Page 5

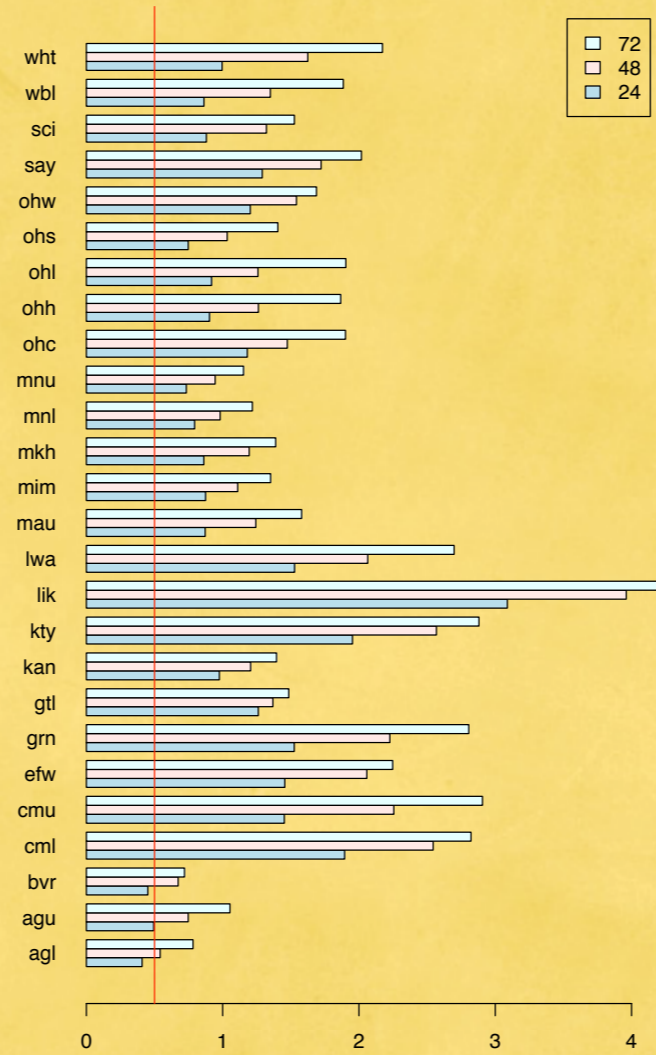


Figure 4: Barplot of RMSE for each Forecast Group.



Questions?