Time series topic 2: Decomposition

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Objectives for the session (3:30-4:15)

- What and why time series decomposition
- Functions in SWMPr, other resources
- Application to NERRS data
  - Data prep
  - Execution
  - Interpretation

Interactive portion

Follow along as we go:

- flash drive
- online: swmprats.net 2016 workshop tab

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You will run examples whenever you see this guy:

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library(SWMPr)
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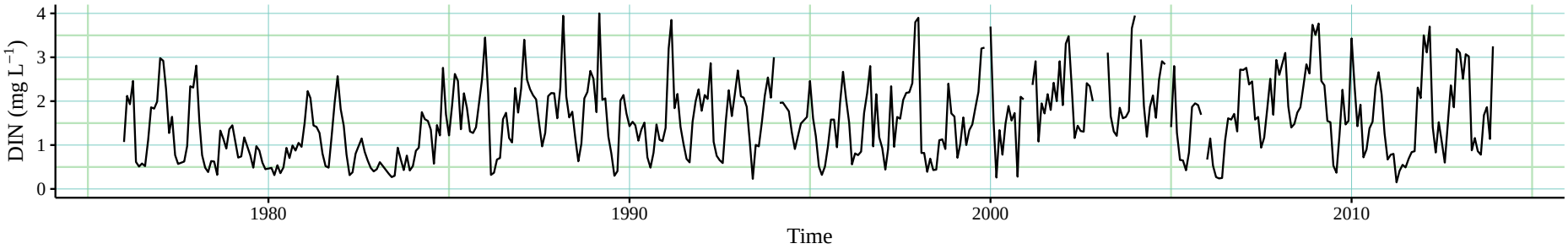
Option 2, install the source file from the flash drive:

```
# change as needed
path_to_file <- 'C:/Users/mbeck/Desktop/SWMPr-v2.1.7.9000.tar.gz'

# install, load
install.packages(path_to_file, repos = NULL, type="source")
library(SWMPr)
```

Theory and background

Observed data represents effects of many processes



Climate	***Local***	***Regional/historical***
precipitation	light/turbidity	watershed inputs
temperature	residence time	point sources
wind events	invasive species	management actions
ENSO effects	trophic effects	flow changes

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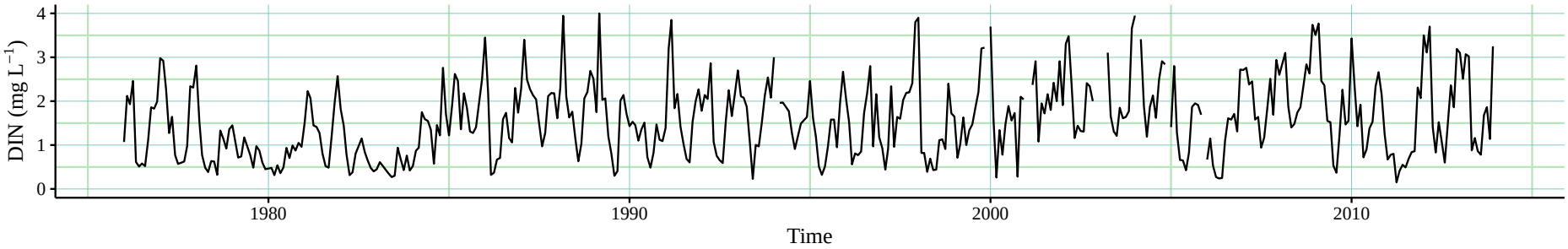

Models should describe components to evaluate effects

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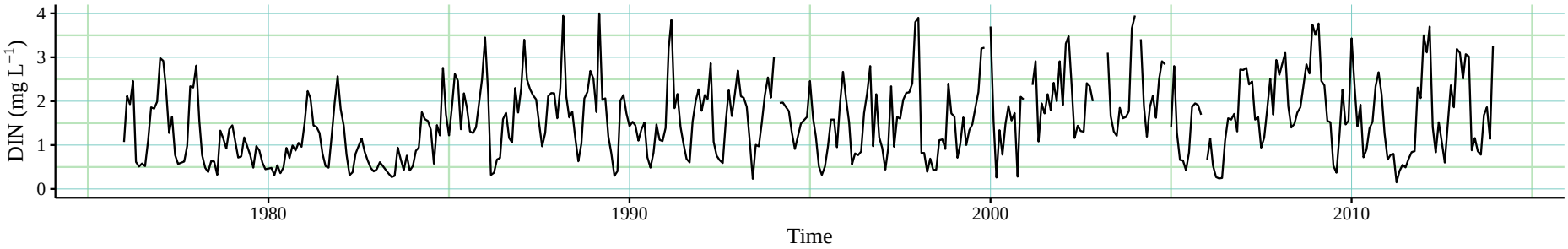

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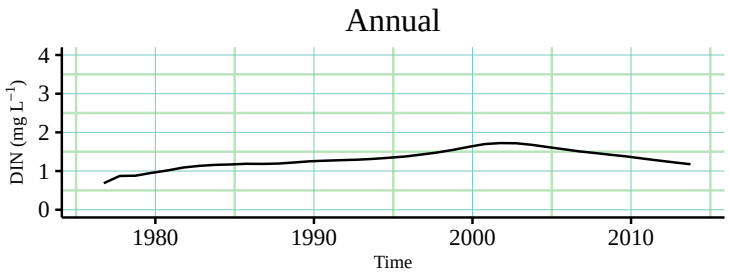

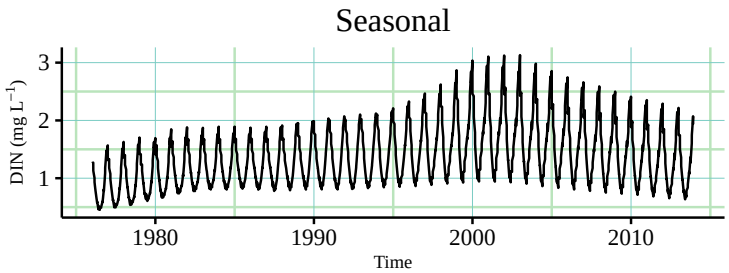

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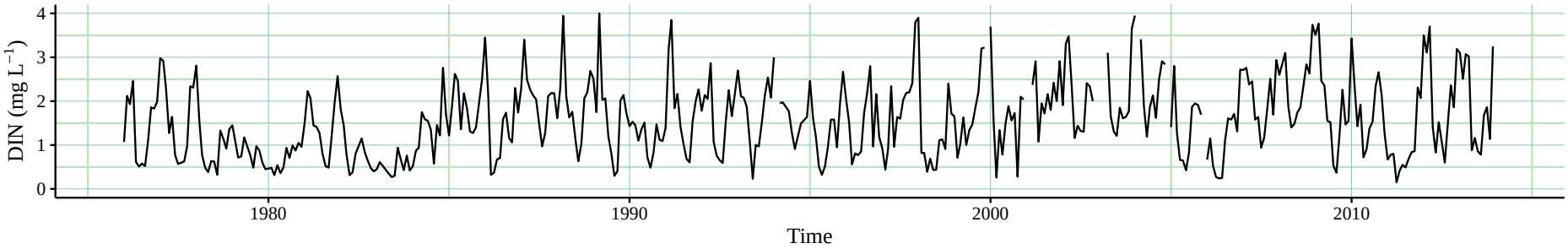

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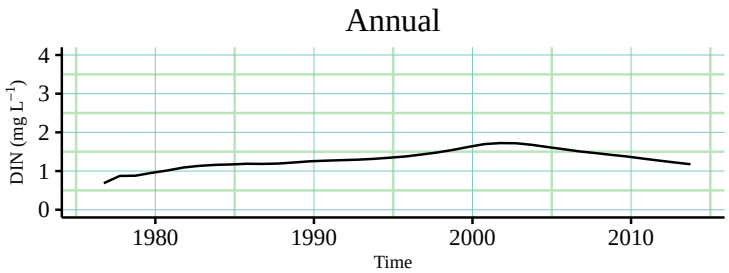

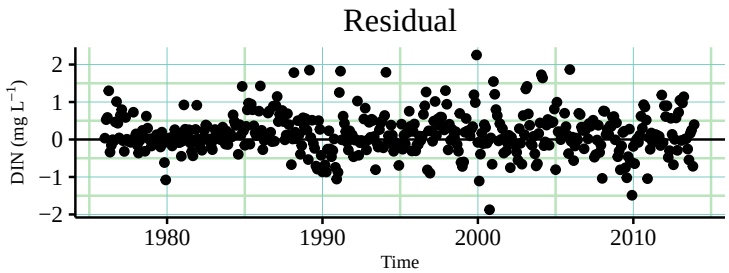

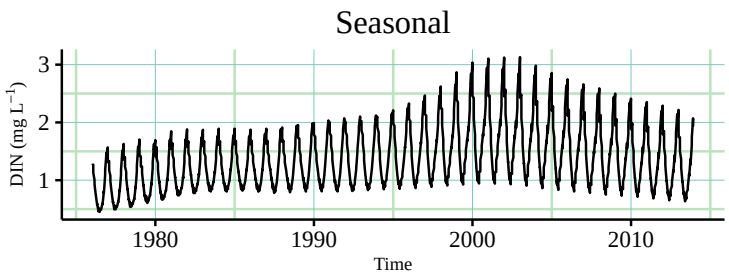

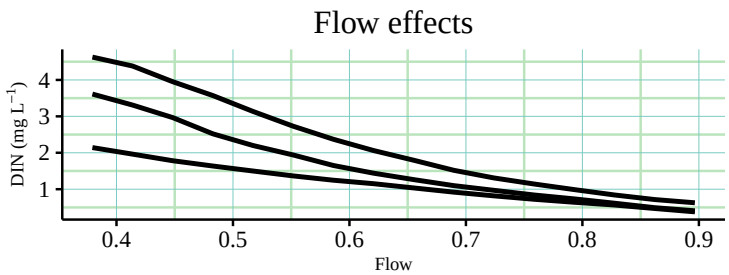

Theory and background

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- There are more generic and simpler approaches
- Objective is to isolate (or remove) a ***known*** component in a time series
- But be warned... just because you can doesn't mean you should

Theory and background

Two very general decomposition methods are provided in SWMPr: `decomp()`, and `decomp_cj`)

These are not new methods, they just make it easy to decompose NERRS data

Theory and background

Time series decomposition summary

Things to ask before decomposition:

- What is the time step? Is it regular? Does it need be standardized?
- How do I deal with missing data?
- Is there any expected cyclical variation? If so, what is the period (e.g., seasonal, daily)?
- Is stationarity a reasonable expectation?

Up next... Time Series Topic 3: Seasonal Kendall

Questions??

References