

1 Norwegian Snow Depth

1.1 problem description

For a variety of practical reasons (water resources, power planning, etc.) Norwegian meteorologists have recorded the snow depth (cm) daily at several stations. The data are available to registered users at www.eklima.no; the files from the ten stations provided (www.stat.ncsu.edu/people/monahan/courses/st590g/snow) were compiled by Anita Dyrrdal and span several decades in some cases.

The snow depth grows approximately linearly during the winter season and decays linearly during the spring thaw. By summarizing the pattern for a season in terms of the four parameters of the two lines, we can then analyze the changes in these parameters across time to detect effects of climate change.

The analysis can be divided into two parts:

1. Read in the data, handle dates, break into seasons, check the quality of the data for each season through sample plots and sample statistics of depth and missing/zeros.
2. Fit lines for each season, compile across seasons, plot and analyze parameters across time.

The target audience for the first part is undergraduates, and advanced undergraduates or masters students for the second part.

1.2 learning objectives

- checking data quality
- breaking problem into subtasks
- compiling results from subtasks
- handling dates

1.3 computational tools

In general:

1. handling date variables, plot by season, means by season
2. nonlinear regression by variable, handling error codes, compiling coefficients, time plots

In SAS:

1. date formats and functions, proc with by variable, means with class
2. proc nlin, ods, multiple records to one, merge by

In R: (I can't do it in R.)

John Monahan, 15 July 2009