MATLAB
1- and 2-dimensional data

Data dimensions

- For a geophysical dataset, the dimensions refer to space (x, y, z) and time.
- In an oceanographic context, x is typically longitude, y is latitude and z is depth.
- The number of dimensions of a dataset refer to how many directions in which the data vary.

1-dimensional data

Data which vary in the in the x- or y-directions may be called “space series”; in the z-direction, “profiles”.

In Matlab these are 1-d vectors, e.g.

\[
data1 = [1 \ 4 \ 5 \ 2 \ 3];
\]

2-dimensional data

Vary in two of the 4-dimensions (x,y,z,t).

If data vary in the x and y directions, they are “maps”.

In Matlab, they are 2-d matrices, e.g.

\[
data2 = [1 \ 2; 3 \ 4];
\]

1-dimensional data

For a time series, the value of the data are in some other units, like degrees C, rather than a longitude or a time.

In a line plot, the value is represented by the y-axis. Higher values are above lower values.

In Excel, these data would be represented by two columns: the time column and the value column, e.g. SST.

In Matlab, they may be given by two variables, which are referred to by name, e.g. time1 and sst1.

2-dimensional data

In a horizontal (x, y or diagonal) direction and z, they are “sections”; In a spatial direction and time, they are “hovmueller diagrams”.

For a map, the values may be some oceanographic quantity, like SST.

In a spatial plot, where the magnitude of the value is represented by color: (E.g., red is warm and blue is cool).
1. 1-dimensional vectors are used to represent time series and profiles.

2. 2-dimensional matrices represent maps \((x,y)\), sections \((x,z)\) or \((y,z)\), or Hovmueller diagrams \((x,t)\).