

MATLAB

I- and 2-dimensional data

Tuesday, 1 October 13

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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.

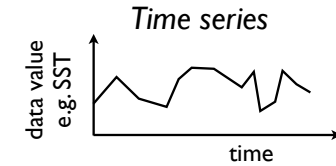
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I-dimensional data

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

Data which vary in the time-dimension are called "time series"



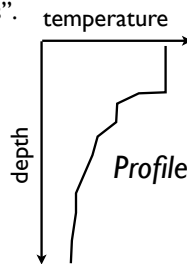
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I-dimensional data

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];`

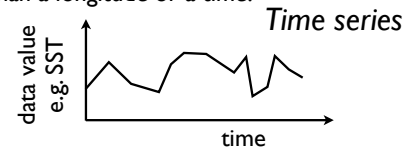


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I-dimensional data

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



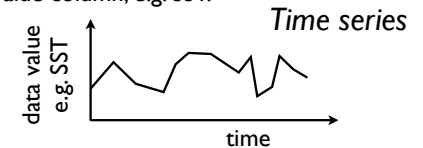
In a line plot, the value is represented by the y-axis. Higher values are above lower values.

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I-dimensional data

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`.

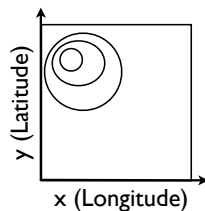
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2-dimensional data

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

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



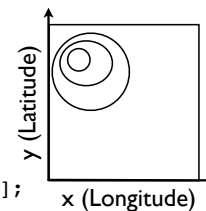
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2-dimensional data

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

In Matlab, they are 2-d matrices, e.g.
`data2=[1 2; 3 4];`



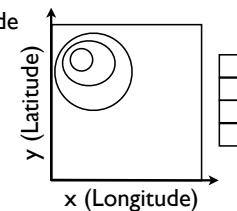
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2-dimensional data

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).



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Review

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) .