Python Working with Data Introduction

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National Centre for Atmospheric Science

NATURAL ENVIRONMENT RESEARCH COUNCIL

What we are covering

- **High-Level Libraries (main focus):**
  - **xarray**: Powerful, flexible and widely used in environmental science communities
  - **cf-python**: CF-compliant, domain-specific and great for standardized workflows

- **Low-Level Libraries (supporting tools):**
  - **numpy**: The foundation of numerical computing in Python
  - **matplotlib**: Customizable plotting for scientific visuals
  - **netCDF4**: Direct access to NetCDF files and metadata

Xarray vs cf-python

- Both libraries help you work with multidimensional data
- They offer similar functionality: slicing, aggregating, plotting, metadata handling
- Why we teach both:
  - Different communities prefer different tools
  - Best practice often depends on your collaborators and data standards
  - You get to choose what fits your workflow best

Why learn the low-level tools?

- These libraries power the high-level tools behind the scenes
- You'll rarely use them directly but it's useful to know about them for:
  - Customising plots beyond default settings
  - Debugging or extending functionality
  - Understanding performance and data formats
- Knowing what's underneath helps you:
  - Find better help online
  - Understand errors
  - Build more flexible workflows