Extending external variables in CF
Implementation (CF-1.7)

```plaintext
netcdf parent {
  dimensions:
    Lat = 73 ;
    Lon = 96 ;
    Level = 20 ;
  variables:
    float temperature(level,lat,lon) ;
    temperature:cell_measures="area: areacella" ;
    temperature:standard_name="air_temperature" ;
    temperature:units="degC" ;
  // global attributes:
    :external_variables="areacella" ;
}

netcdf external {
  dimensions:
    Lat = 73 ;
    Lon = 96 ;
  variables:
    float areacella(lat,lon) ;
    areacella:units="m2" ;
}
```
• External variables could be extended to all geo-locating metadata variables (*CF data model constructs*)
  – Coordinate variables (*dimension coordinate constructs*)
  – Auxiliary coordinate variables (*auxiliary coordinate constructs*)
  – Cell measure variables (*cell measure constructs*)
  – Formula terms variables (*domain ancillary constructs*)
  – Grid mapping variables (*coordinate reference constructs*)
  – (CF-1.8) Geometry variables

• *CF could recommend* that external variables *should not be used unless* datasets are provided as part of a managed service for which guidance is provided and so the risk of disaster is minimized
• Is there a need for a “domain variable” that binds all of the geolocating variables together, in the absence of a data variable?
  – The CF data model already implies such a construct
Domain variable idea: connecting metadata without data

```
dimensions:
    lat = 73 ;
    lon = 96 ;
    z = 19 ;
variables:
    char domain1 ;
    domain1:cf_role = "domain" ;
    domain1:dimensions = "x y z" ;
    domain1:cell_measures="area: areacell" ;
    domain1:coordinates = "lat lon" ;
    domain1:grid_mapping = "transerse_mercator" ;
    char transerse_mercator ;
    float z(z) ;
    float y(y) ;
    float x(x) ;
    float lat(y, x) ;
    float lon(y, x) ;
```

- The domain variable can not be referenced from a data variable
  - No change in how metadata variables are linked to data variables
  - Preserve backwards compatibility
  - Maintain only one way to do it
Would this affect the data model?