The uniform MOLTS-format in netCDF and some examples of data comparisons

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network **C**ommon **D**ata **F**orm

Climate and Forecast (CF) Metadata Convention

General main principle of the convention:

Data should be self-describing

– no external tables needed to interpret it

Information (as missing_value,…) is generally provided per-variable, not per-file

Files contain: Global attributes

Basic **metadata** concerning e.g. origin of the data

For GCM-Molts and RefSite-Data we have following structure in *.nc-files:

conventions	CF-1.0
conventionsURL	http://www.unidata.ucar.edu/software/netcdf/conventions.html
institution	UK Met Office
source	Global Unified Model, 0.83x0.56 degree (MOSES2 as Veg. des. scheme used)
history	download of data from CERA: Fri Nov 18 13:56:24 MET 2005 transformation to netCDF: Wed Dec 21 11:24:08 MET 2005
location	Lindenberg; Coordinates of RefSite: 52.17N 14.12E 73m

Files contain: Description of the data

variable name

standard_name

long_name

original_name

units

_FillValue

flag_value

flag_meanings

cell_methods

comments

File contains: Description of the data

variable name	**T_2M** (lon lat height_2m time)	**TOT_PREC** (lon lat time)	**FR_LAND** (lon lat)
standard_name	air_temperature		sea_ice_area_fraction
long_name	2m temperature		sea ice presence flag
original_name	SFST2M		
units	K		1
_FillValue	-1.e+20		
flag_value	-	-	0, 1
flag_meanings	-	-	unfrozen_sea_or_land_mass sea_ice
cell_methods	-	time: sum	
comments	data are 12h to 35 h forecasts		

Standard_names

Search facility for standard names at:

http://www.cgd.ucar.edu/cms/eaton/cf-metadata/

690 entries in standard-name-table (last update 2006-Feb-05)

e.g.

- eastward_wind
  - Unit : m s-1
  - "Eastward" indicates a vector component which is positive increasing eastward (negative westward). Wind is defined as a two-dimensional (horizontal) air velocity vector, with no vertical component. (Vertical motion in the atmosphere has the standard name upward_air_velocity.)
- air_pressure_at_cloud_top
- eastward_atmosphere_dry_static_energy_transport_across_unit_distance

Dimensions

- **Coordinates**: Lat, Lon
- **Height**:
  - model level,
  - pressure level,
  - cloud height (high, medium, low)
  - definition height of variable, e.g. 2m for 2m-temperature
- **Time**:
  - reference time (time of analysis), and
  - forecast time

    units: ‘minutes since 1970-01-01 00:00:00’

e.g.

T_2M(time,forecast,height_2m,lat,lon)

time = 17313120
forecast = 3
height_2m = 2m
lat = 13.87
lon = 52.16

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Bounds & Cell_methods

- **Bounds**
  - Time_bnds: begin and end of interval for mean/sum
  - Soil_bnds: upper and lower boundary of soil layer in case of e.g. moisture content of soil layer
  - Cloud_bnds: pressure boundaries for high, medium and low clouds

- **Cell_methods**
  - Time: mean
  - Time: maximum
  - Soil_depth: mean

Finally we should have two sets of GCM-Molts

1. .nc-files including all data given at CERA and at CEOP-www-site in different files (as GCM-lon, -lat and gridbox-height, vegetation type, albedo, LAI,…)
2. Same as 1. but difference in dimension of meteorological data:

   .nc-files include only as many forecast-data as necessary for continuous time series

   e.g.:

   •from ECMWF-data:

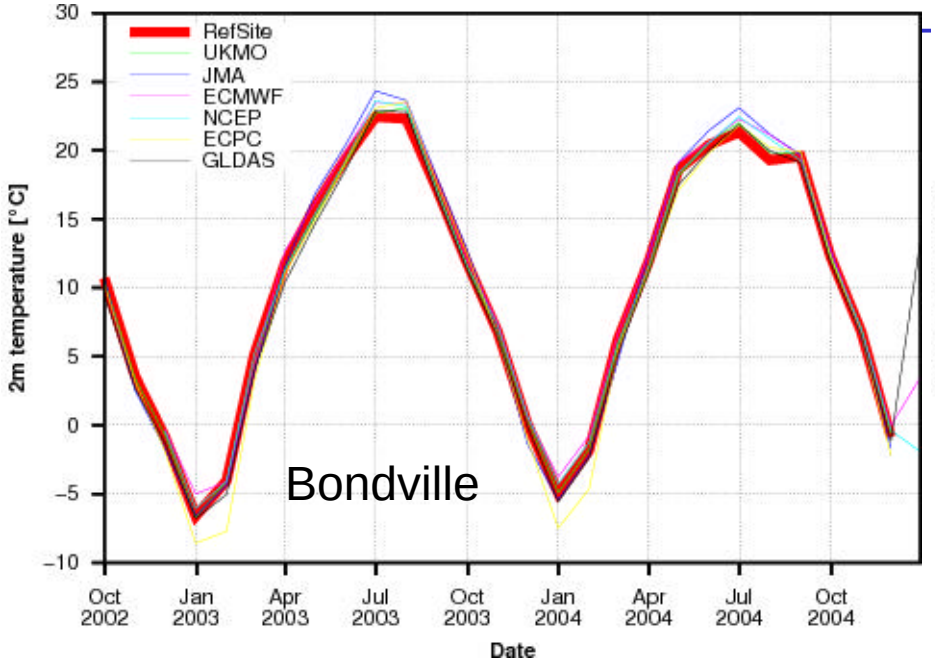
   as recommended forecast hours 12 to 35 from daily analysis

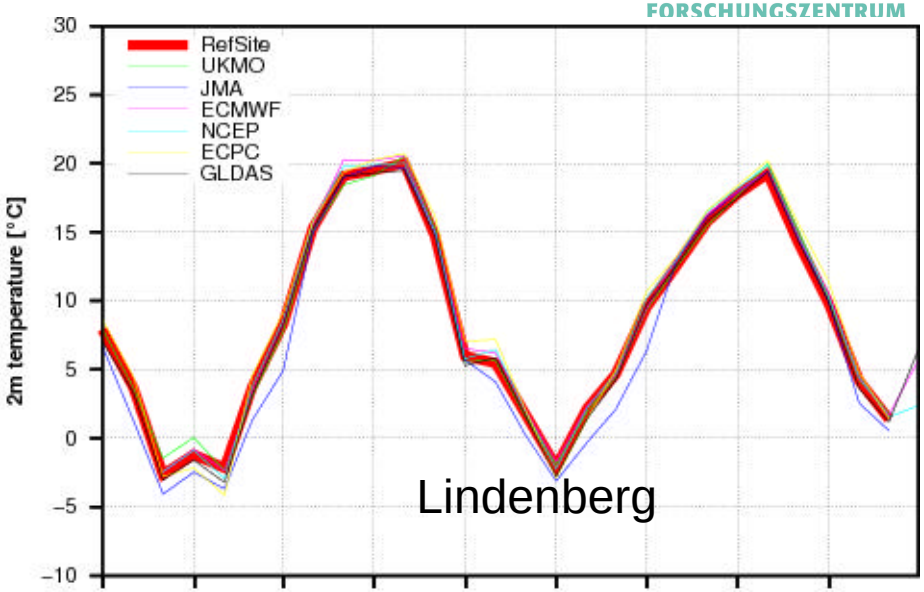
   •from ECPC-data:

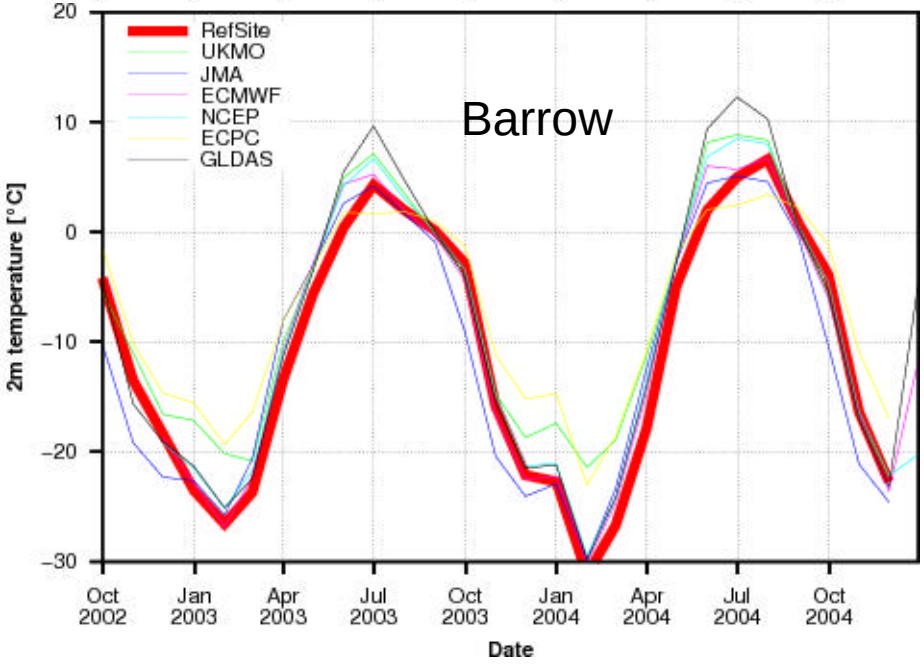
   analysis and 3h-forecast for instantaneous values and

   3h- and 6h-forecasts for means over last 3 hours

2m Temperature EOP3 + EOP4





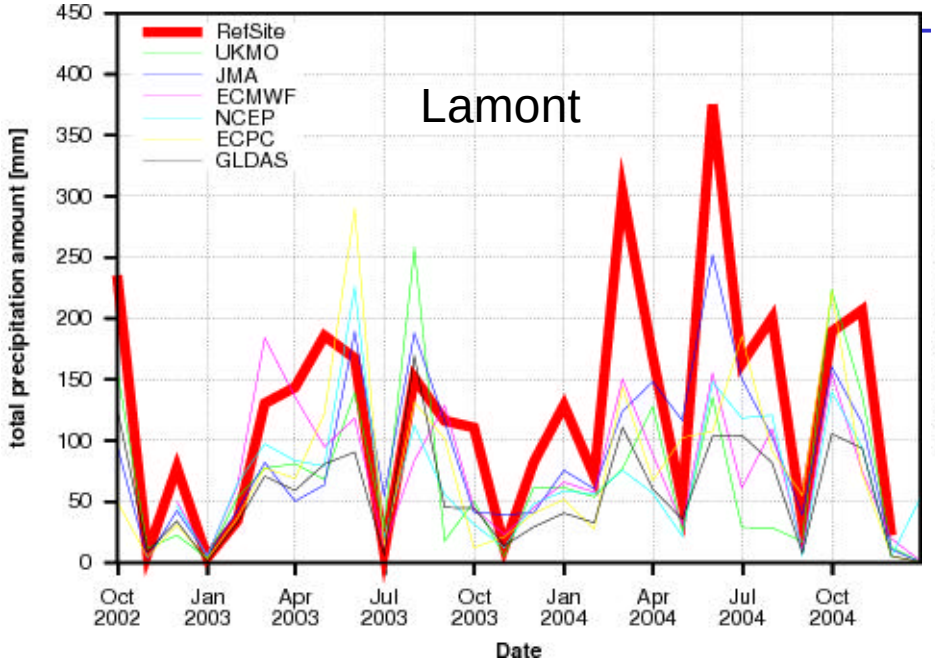


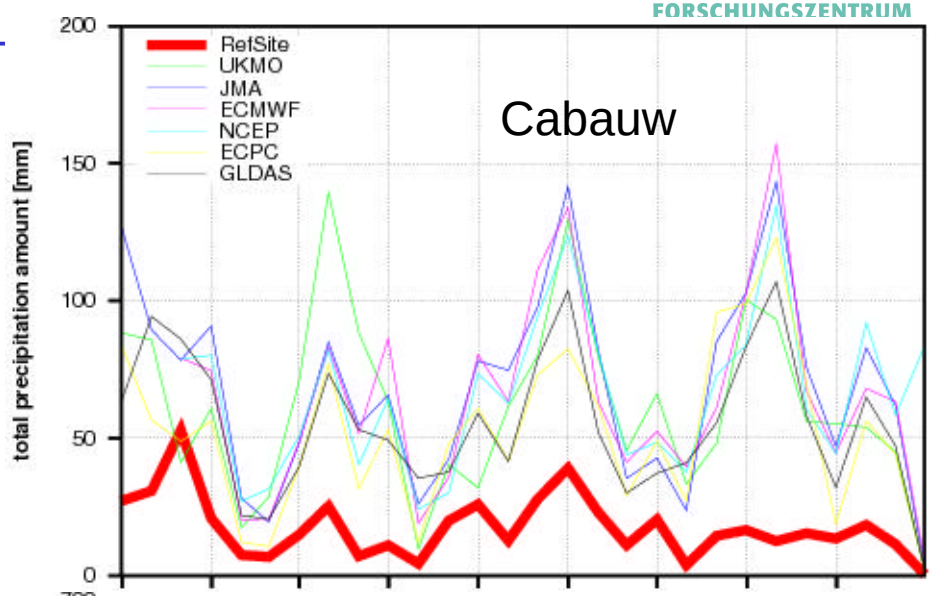
Height-Correction: 0.65K/100m

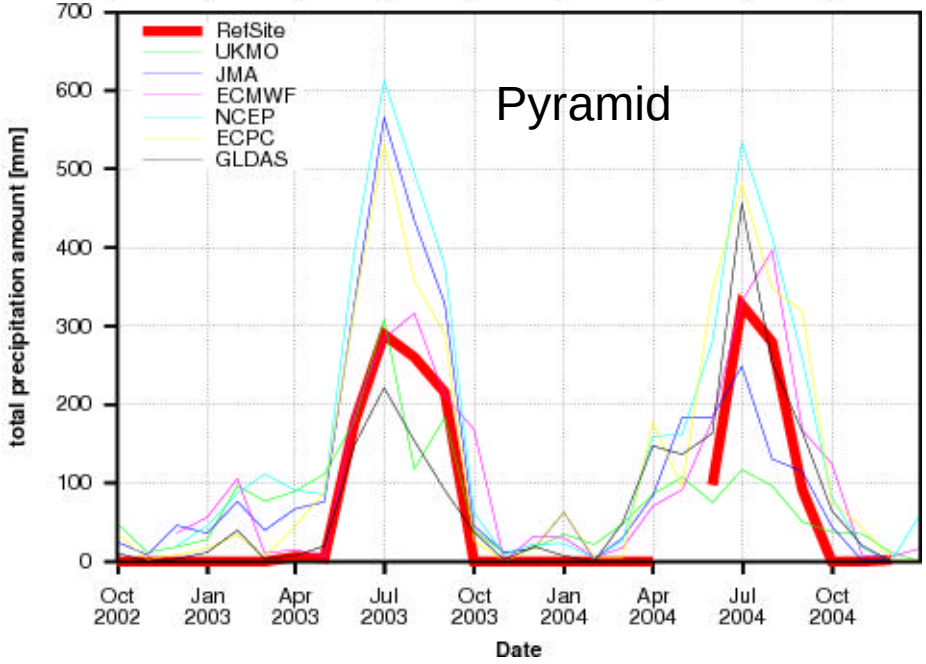
Not possible for Pyramid (5035m,Himalaya):

Model-heights vary from 2500m to 5050m

Total Precipitation EOP3 + EOP4







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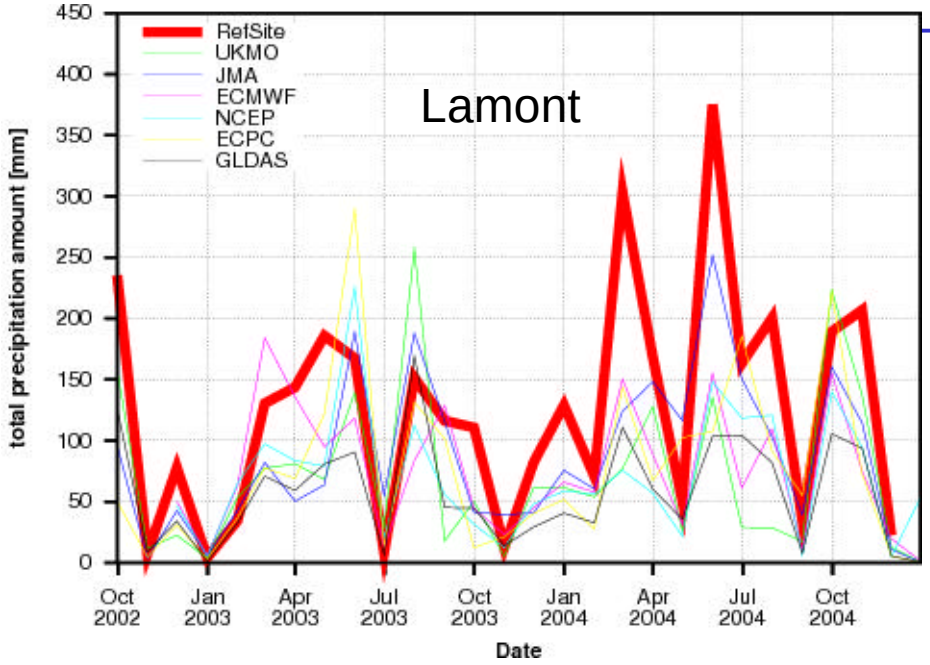
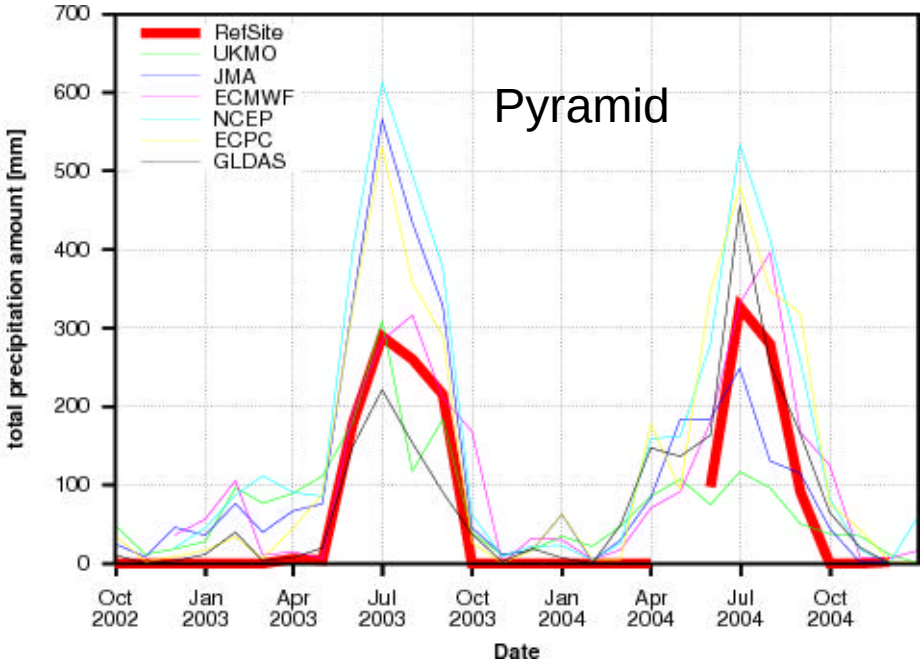
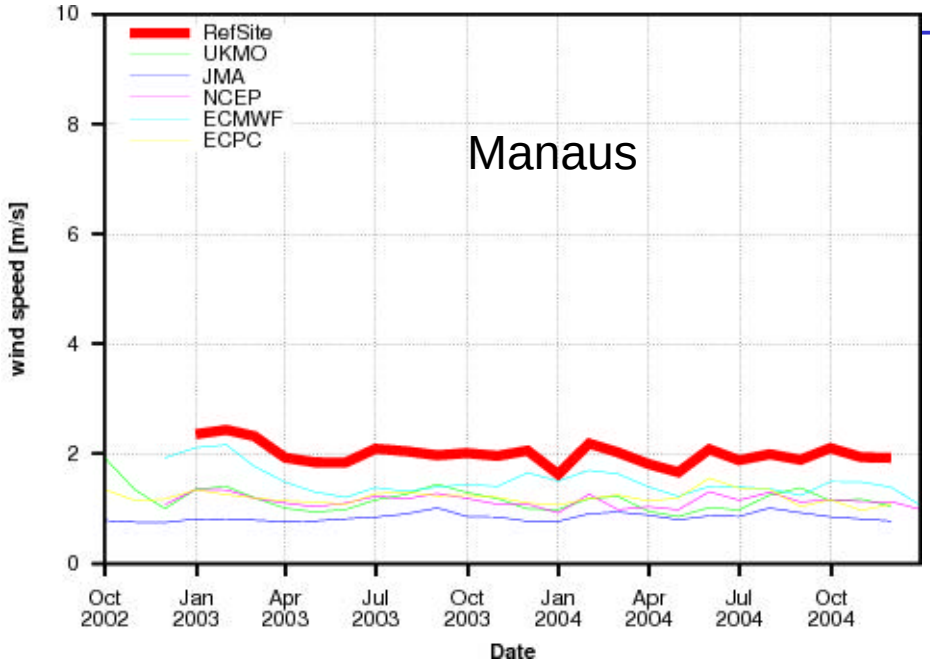
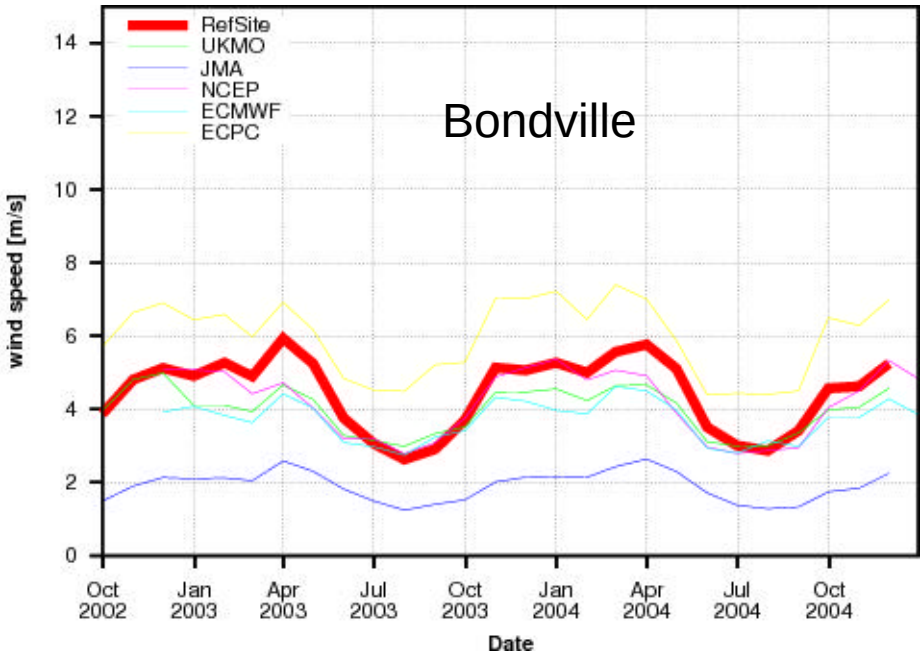




10m Wind Speed EOP3 + EOP4





Outlook

- Fill in the last gaps in standard name table of netCDF
- Specification of uncertainty of RefSite-Data in case of missing values
- Add information on uncertainty of measuring instruments to RefSite-Data, vegetation, soil_type,…

Thanks for your attention!