TIGGE Implementation Meeting - Report

ECMWF 9-10 November 2005

Participants

- **Richard Swinbank** richard.swinbank@metoffice.gov.uk
- **Simon Thompson** simon.thompson@metoffice.gov.uk
- **Tan Le** t.le@bom.gov.au
- **Peiliang Shi** shipl@cma.gov.cn
- **Jean Nicolau** jean.nicolau@meteo.fr
- **Waldenio Almeida** gambi@cptec.inpe.br
- **Yves Pelletier** yves.pelletier@ec.gc.ca
- **David Burridge** d.m.burridge@btinternet.com
- **Horst Boettger** horst.boettger@ecmwf.int
- **Baudouin Raoult** baudouin.raoult@ecmwf.int
- **Manuel Fuentes** manuel.fuentes@ecmwf.int
- **David Richardson** david.richardson@ecmwf.int
- **Walter Zwieflhofer** walter.zwieflhofer@ecmwf.int
- **Philippe Bougeault** philippe.bougeault@ecmwf.int

Overview

- 1st TIGGE Workshop was held at ECMWF 1-3 March 2005 (report available from www.wmo.int/thorpex)
- Working Group on archiving (representatives from the three archive centres - CMA, ECMWF, NCAR) met at ECMWF 19-21 September 2005 (report and summary slides available from ECMWF)
- Implementation Meeting at ECMWF 9-10 November 2005 held to address technical issues raised by the two preceding meetings. Participants from archive centres and data providers
- These slides constitute the report of this implementation meeting

Definition of TIGGE database

- **List of products**
  - **Reviewed the list of products (parameters, levels, steps) from the March Workshop**
  - **Data Providers (those present) agreed that they would aim to supply these products to the Archive Centres. This would require changes in the post-processing by the Data Providers. Noting possible operational constraints, it was understood that there may be omissions from the list**
  - **No core dataset (compulsory list) was defined since enough overlap will exist between Data Providers**

Definition of TIGGE database

- **The following details were agreed:**
  - **All accumulations to start from the beginning of the forecast**
  - **Geopotential Height to be used rather than Geopotential**
  - **Temperature extremes (max/min) to be provided over 6 hour intervals**
  - **Specific humidity to be provided in the free atmosphere**
  - **“2 metre temperature” to be used to refer to near surface temperature parameters**
  - **All fields to use units as defined in GRIB Edition 2**
  - **Orography and Land-sea mask to be provided for the Control for each output time-step. CMC to check whether this meets the requirement for their system. Orography to be provided as geopotential height.**

List of products: single level

Parameter	Level	Unit	Output frequency	Comment
Mean sea level pressure	MSL	Pa	6h	instantaneous
Surface Pressure	surface	Pa	6h	inst
10m U-velocity	10m	m s**-1	6h	inst
10m V-velocity	10m	m s**-1	6h	inst
2m temperature	2m	K	6h	inst
2m dew point temperature	2m	K	6h	inst
2m max temperature	2m	K	6h	6_h
2m min temperature	2m	K	6h	6_h
Total precipitation (liquid + frozen)	surface	m	6h	acc_st
Snow fall	surface	m of water equivalent	6h	acc_st
Snow depth	surface	m of water equivalent	6h	inst

- **6_h: accumulated over previous 6 hours**
- **acc_st: accumulated from start of forecast**

List of products: single level fields

Parameter	Level	Unit	Output frequency	Comment
Total cloud cover	surface	0-100%	6h	instantaneous
Total column water	surface	kg m**-2	6h	inst
Surface latent heat flux	surface	W m**-2 s	6h	acc_st
Surface sensible heat flux	surface	W m**-2 s	6h	acc_st
Surface solar radiation	surface	W m**-2 s	6h	acc_st
Surface thermal radiation	surface	W m**-2 s	6h	acc_st
Sunshine duration	surface	s	6h	acc_st
Convective available potential energy	surface	J kg**-1	6h	inst
Orography (Geopotential height at the surface)	surface	m		inst
Land-sea mask	surface	0-1		inst

- **acc_st: accumulated from start of forecast**
- **Orography and Land-sea mask to be provided for the Control for each output step**

List of products: upper air fields

Parameter	Unit	Output frequency	Comments
Temperature	K	6h	instantaneous
Geopotential height	m	6h	inst
U-velocity	m s**-1	6h	inst
V-velocity	m s**-1	6h	inst
Specific Humidity	kg kg**-1	6h	inst

- **5 parameters on 9 pressure levels, i.e. 45 fields.**
- **The 9 levels are 1000, 925, 850, 700, 600, 500, 300, 250 and 200 hPa.**

Definition of TIGGE database: remaining issues to be addressed by GIFS/TIGGE WG

- **Products defining the initial conditions to evaluate the various perturbation systems (more levels). This may eventually require additional data out to 48 hours**
- **Requirement for 3-hourly post-processing for a limited number of parameters for e.g. hydrological studies. Operational constraints may make this difficult to implement, especially for the full range of the forecast**
- **Investigation of the requirements for additional sea-ice, land snow/ice and soil parameters**

Definition of TIGGE database (homogeneity)

- **Common terminology: naming of products**
  - **Agree to use the same names (implications for existing applications)**
  - **To be used for cataloguing and searching and requesting data**
  - **Aliases to be used to accommodate differences in local naming conventions**

Definition of TIGGE database (homogeneity)

- **Common data format**
  - **Agree to use the same format: GRIB Edition 2**
  - **Preserve native grids and resolutions**
  - **Data Providers to supply interpolation routines for conversion to regular lat-lon grids and for point extraction**
  - **Archive Centres to specify interfaces for interpolation routines**
  - **Archive Centres may endeavour to return data in regular grids using these interpolation routines**

Technical aspects of data exchange

- **Data flow**
  - ➔ **NCAR to complete study of IDD/LDM, including security requirements. IDD/LDM has all the tools that are required for TIGGE, ie, statistics, monitoring, re-transmission, network checksum**
  - ➔ **BoM noted different costs for pushing vs pulling.**

Data formats: GRIB2 issues

- **Proposals to WMO expert team on codes:**
  - **Missing TIGGE parameters**
  - **Support for checksum**
  - **New production status of data: THORPEX or TIGGE**
  - **Some Centres may require additions for encoding their native grids**
- **If GRIB2 cannot accommodate all TIGGE requirements, eg checksum, a TIGGE local extension (section 2) understood by all partners may be needed.**

Data Formats: GRIB2 issues

- **Noted the need for a version of the data for testing purposes (0001 for production data)**
- **Guidelines on GRIB 2 usage (best practise) to ensure common coding will be drafted and circulated for comments**

File structure

- **Agreed on the proposed file structure and naming convention**
- **Archive Centres will use the file structure to validate the contents of the file**
- **Propose to WMO expert group to change the extension to .grib2 instead of .bin**

Organisation of data exchange

- **Completeness of data**
  - **Missing data is unavoidable. Dummy fields will not be archived instead.**
  - **Data will be considered late after 24 hours (timeliness). Archive Centres will take action to investigate missing data.**
- **Procedures and control mechanisms**
  - **Agreed that Archive Centres are technical coordinators**
  - **ECMWF offered to host a Website and mailing lists**
  - **All TIGGE Data Providers and Archive Centres to nominate contact points**

User access: Registration

- **Data Providers to supply their products to the Archive Centres under an agreed set of rules, which will include re-distribution rights**
- **Access to be provided for Research & Education through a simple electronic registration process, with valid e-mail address and acknowledgment of conditions of supply**
- **Under the simple registration process, access to be given with a delay (48 hours) after initial time of the forecast (reference time of data in GRIB2)**
- **Registration for real-time access to be handled via the THORPEX IPO**

User access: Data retrieval

- **It is unavoidable that in Phase 1 each Archive Centre will provide data through a different user interface**
- **Feedback is required to check if the field order proposed is sufficient to meet most user requirements**

Implementation plan : Data transport

- **Test transfer rates between Archive Centres: NCAR, ECMWF and CMA. Find best buffer sizes.**
- **Investigate other candidates for data transport: IDD/LDM, AFD, sftp**
- **Test transfer rates between Data Providers (e.g. CMC) and Archive Centres: NCAR, ECMWF and CMA.**
- **Results of these tests to be provided on the TIGGE Website**

Implementation plan : GRIB2

- **ECMWF to consult with NAEFS and WMO Expert Team on Data Representation and Codes (ET-DRC) to make sure that there is agreement on the proper encoding of the fields in GRIB2**
- **ECMWF to provide sample model output to the Data Providers**
- **ECMWF to provide a series of example programs to create these files**
  - ➔ **These tools may have to be adapted by Data Providers in order to handle their own data and metadata mapping**

Implementation plan

- **Establish archive management communications:**
  - ➔ **Mailing lists, web sites and collaborative tools**
  - ➔ **Collect list of contact points from Data Providers and Archive Centres**
- **Start filling the TIGGE database with data from participating Data Providers after initiating the data exchange through the THORPEX IPO**