

**Annual WWW Technical Progress Report**  
**On the Global Data Processing and Forecasting System 2006**

**IRELAND**

**1. Summary of highlights**

Met Éireann runs the Hirlam numerical weather prediction system, operationally, four times per day. Forecasts are produced out to 48-hours. Hirlam is an international co-operative project and details may be obtained from the Hirlam web site [<http://www..hirlam.org>] or from papers by Lynch et al. [2000] and by Undén et al. [2003].

We have been running Hirlam on an IBM RS/6000 SP since 2001. However, in 2004 we started to experiment with running Hirlam on a small Linux cluster based on Intel Xeon hardware. Results with the cluster have been very promising. (See Hamilton [2004]). We plan to replace the IBM mainframe in 2007 [probably by outsourcing] and to use the cluster as a backup system.

**2. Equipment in use**

The operational Hirlam system is run on an IBM RS/6000 SP with 9-nodes each with 4 cpu's [i.e. a total of 36 cpu's]. The experimental version runs on a 9-node dual Xeon cluster [i.e. a total of 18 cpu's].

**3. Data from GTS in use**

SYNOP, SHIP, BUOY, AIREP, AMDAR, ACARS, TEMP, TEMPSHIP, PILOT, SATOB and SATEM observations are used. The data are packed into BUFR format both for storage and for input to Hirlam.

**4. Forecasting System**

**4.1 System Run Schedule and Forecast Ranges**

Met Éireann runs the Hirlam system 4 times per day [starting from the analyses of 00UTC, 06UTC, 12UTC and 18UTC]. The forecast length is 48-hours.

**4.2 Medium Range Forecasting System**

Met Eireann does not run a medium range forecasting system.

**4.3 Short Range Forecasting System**

*4.3.1 Data assimilation, objective analysis and initialisation*

#### 4.3.1.1

Analysis : Hirlam 3D-Var [3-dimensional variational assimilation]. The analysis runs on 31 hybrid [eta] levels. Upper-air observational data is accepted on all standard and significant levels (10 hPa to 1000 hPa) and interpolated to eta levels. Assimilation Cycle : Three-hour cycle using the forecast from the previous cycle as a first-guess. [It is also possible to use an ECMWF forecast as a first-guess].

Initialisation : Digital Filter

#### 4.3.1.2

No current research in this area

#### 4.3.2 *Model*

##### 4.3.2.1

Forecast Model : Hirlam 5.0.1 reference system grid point model.

##### 4.3.2.2

No current research in this area

#### 4.3.3 *Operationally Available NWP Products*

Upper-air products [such as temperature and wind] are available in GRIB code on standard levels. A variety of surface products [such as rainfall] are also produced.

#### 4.3.4 *Operational Techniques*

##### 4.3.4.1

MOS is used to predict some surface parameters

##### 4.3.4.2

No current research in this area

#### 4.3.5 *Ensemble Prediction System*

None

### **4.4 Nowcasting and Very Short Range Forecasting System**

#### 4.4.1 *Nowcasting System*

##### 4.4.1.1

Short range forecasts [based on Hirlam] are run operationally on a one-hour cycle [out to 6 hours] with a short cut-off time.

##### 4.4.1.2

No current research in this area

#### 4.4.2 *Models for Very-Short Range Forecasting*

##### 4.4.2.1

None

##### 4.4.2.2

None

### **4.5 Specialised Numerical Predictions**

#### 4.5.1 *Assimilation of Specific Data*

##### 4.5.1.1

None

##### 4.5.1.2

None

#### *4.5.2 Specific Models*

##### 4.5.2.1

WAM wave model

Dispersion model for foot and mouth disease

Air quality forecasting

##### 4.5.2.2

None

### **4.6 Extended Range Forecasts**

None

### **4.7 Long-Range Forecasts**

None

## **5 Verification of Prognostic Products**

### **5.1 Annual Verification Summary**

We do not carry out verification on the areas suggested.

### **5.2 Research performed in this field**

None

## **6. Plans for the future**

Replace the IBM mainframe by a large machine. This is likely to be an out-sourced machine. Upgrade Hirlam from version 5 to version 7. Keep the cluster as a backup system. Include ATOVS (EARS) data in the Hirlam 3-dimensional variational assimilation.

## **References**

Hamilton, J (2004). Running the Hirlam NWP model on a 6 x dual-Xeon cluster at Met Éireann, 11th Workshop on High-Performance computing in Meteorology, ECMWF.

Lynch, P., Gustafsson, N., Sass, B., and Cats, G. (2000). Final report of the hirlam 4 project, 1997-1999. HIRLAM 4 Project Report, 59 pp.

Undén, P., Rontu, L., Järvinen, H., Lynch, P., Calvo, J., Cats, G., Cuxart, J., Eerola, K., Fortelius, C., Garcia-Moya, J. A., Jones, C., Lenderlink, G., McDonald, A., McGrath, R., Navascues, B., Nielsen, N. W., Ødegaard, V., Rodriguez, E., Rummukainen, M., Room, R., Sattler, K., Sass, B. H., Savijärvi, H., Schreuer, B. W., Sigg, R., The, H., and Tijm, A. (2003). HIRLAM-5 scientific documentation. Hirlam scientific report.