Processing of U and V-WIND maps from the Arpege model

Introduction.

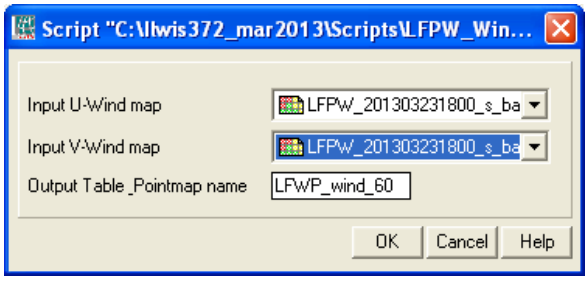
As output from various numerical weather prediction models, like those from ECMWF (in the Meteorological Data Dissemination Service) and from the Arpege model (Meteo France) a U and V wind map, at different pressure levels, is provided. The U-component represents the east-west component of the wind, while the V-component represents the north-south wind component.

The script transforms the various U and V-wind components from the Arpege model into wind direction and wind speed. Here 0.5 degree maps are assumed.

Running the script.

Download the ZIP file and copy the "LFPW_winds.Zip" file into the ILWIS subdirectory \Scripts and then Unzip the file. Copy the files LFPW.csy and LFPW.grf into the ILWIS sub-directory \System. Start ILWIS and from the main menu, select the option "*Operations*" >> "*Script*" and select the script "*LFPW_winds*". From the pop-up script input window specify the input U and V wind maps and the output name for the point map and table, see figure 1.

Figure 1: input layers needed to calculate wind direction – speed point map and table



Script listing.

```
// Calculation of wind vectors (direction and speed)

// Input is processed layers from Arpege NWP model Meteo France

// The U and V Wind maps are required


//Calculation wind direction and speed

direction_rad:=atan2(%1,%2)

direction_degree:=raddeg(direction_rad)

wind_speed:=sqrt((POW(%1,2))+(POW(%2,2)))
```

```
wind_speed.mpp:=PointMapFromRas(wind_speed)

direction_degree.mpp:=PointMapFromRas(direction_degree)


copy '%ILWIS_LOCATION%\script\'mpp2table.exe *


!mpp2table.exe wind_speed.mpp wind_speed.tbt

!mpp2table.exe direction_degree.mpp direction_degree.tbt



copy '%ILWIS_LOCATION%\script\'LFPW_wind.dom *


windspeed.tbt:=TableChangeDomain(wind_speed.tbt,LFPW_wind.dom)

%3.tbt:=TableChangeDomain(direction_degree.tbt,LFPW_wind.dom)



tabcalc %3.tbt WindDirection:=name;

tabcalc %3.tbt WindSpeed:=ColumnJoin(windspeed.tbt,name);

calc %3.tbt;

tabcalc %3.tbt Scale_Speed:=WindSpeed*0.5;

delcol %3.tbt.name;

%3.mpp:=PointMapFromTable(%3,Coordinate)


del mpp2table.exe -force

del direction_rad.mpr -force

del direction_degree.mpr -force

del wind_speed.mpp -force
```

del wind_speed.mpr -force

del direction_degree.mpp -force

del direction_degree.tbt -force

del windspeed.tbt -force

del windspeed.tbt -force

del wind_speed.tbt –force

Note: the files “LFPW_winds.dom” and “mpp2tables.exe” should be available in the ILWIS sub-directory \scripts! Furthermore note that here an “ID” domain has been created for the LFPW maps, assuming a map dimension of 221 lines by 265 columns (58565 ID’s). In case there is another map dimension, create a new “ID” domain with the required number of entries!

Output.

When calculation has completed, two files have been created, a table and point map. Display the table, your result should resemble the one in figure 2. A column “Scale_speed” has been computed which can be used for visualization, in case of high wind speed.

Figure 2: final output table

Table "_ben" - TableChangeDomain(direction_degree,LFPW_wind) - ILWIS

File Edit Columns Records View Help

	Coordinate	WindDirection	WindSpeed	Scale_Speed
nr 58551	45°00'00.0"S, 95°00'00.00"E	61.04	7.011	3.5056
nr 58552	45°00'00.0"S, 95°30'00.00"E	59.60	6.461	3.2303
nr 58553	45°00'00.0"S, 96°00'00.00"E	54.17	6.333	3.1665
nr 58554	45°00'00.0"S, 96°30'00.00"E	46.37	7.094	3.5469
nr 58555	45°00'00.0"S, 97°00'00.00"E	40.94	8.217	4.1086
nr 58556	45°00'00.0"S, 97°30'00.00"E	39.06	9.041	4.5203
nr 58557	45°00'00.0"S, 98°00'00.00"E	39.05	9.441	4.7204
nr 58558	45°00'00.0"S, 98°30'00.00"E	38.92	9.665	4.8326
nr 58559	45°00'00.0"S, 99°00'00.00"E	38.80	9.890	4.9448
nr 58560	45°00'00.0"S, 99°30'00.00"E	38.63	10.026	5.0131
nr 58561	45°00'00.0"S,100°00'00.00"E	38.19	10.124	5.0621
nr 58562	45°00'00.0"S,100°30'00.00"E	37.82	10.310	5.1552
nr 58563	45°00'00.0"S,101°00'00.00"E	37.46	10.497	5.2485
nr 58564	45°00'00.0"S,101°30'00.00"E	37.38	10.722	5.3609
nr 58565	45°00'00.0"S,102°00'00.00"E	37.24	10.859	5.4296
Min		0.05	0.022	0.0109
Max		359.71	19.230	9.6152
Avg		189.50	4.927	2.4634
StD		107.76	3.614	1.8071
Sum		11098261.63	288535.298	144267.6557

Show record nr 58552 in record view

To display the point map, double click the point map created and enter the settings as specified in figure 3, note that with the ID-domain used you can visualize the points using an arrow symbol and these can be scaled (for this purpose the column 'WindSpeed' or 'Scale_Speed' is used). The resulting map is given in figure 4 showing winds at 10 mtr – 60 hr forecast, using a vector file with the country boundaries for geographical reference.

Figure 3: Point map options using table attributes

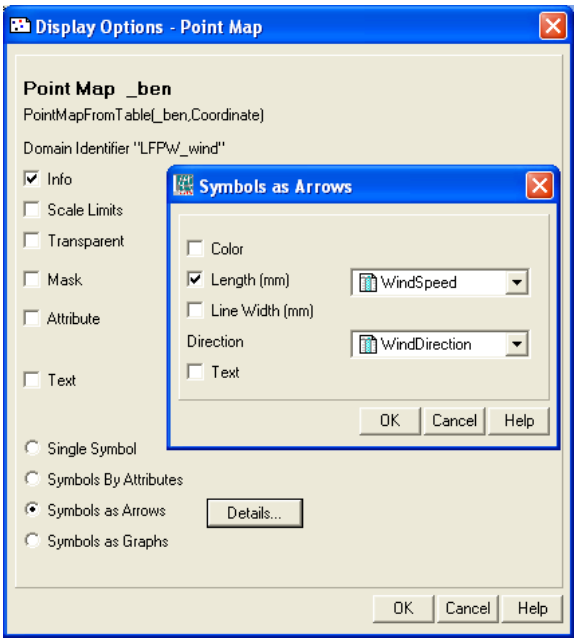


Figure 4: Resulting point map visualization