Memo

To
NOOS partners

Date	**Number of pages**	
14 August 2017	5	
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Subject
NOOS Exchange of wave forecasts

1 Introduction

Within NOOS, Deltares is responsible for the exchange of wave data. It was decided in the Annual Meeting 2015 to extend the wave exchange with forecasts. The aim is to make the wave observation data and forecasts available for all NOOS-partners, as part of the NOOS vision. Note that water level forecasts are already shared (http://noos.eurogoos.eu/model-results/water-level-fc/).

In October 2016, Deltares made a proposal for the exchange of wave forecasts and asked which of the NOOS partners would like to join. RBINS OD Nature, FCOO, DMI and UK MetOffice were positive and together with Deltares and RWS it was defined how to collect the forecasts and share them real time.

The forecasts of the following models are planned to be shared this year, including a multi-model plot:

UK MetOffice	NW European Shelf WaveWatch III model?
DMI	WAM cycle 4.5 in DMI implementation (North Sea-Baltic Sea model in 6-1 nautical mile resolution)
FCOO	WaveWatch III
RBINS/OD Nature	HYPAS and WAM
RWS	SWAN-North Sea

We now invite all NOOS partners to share their wave forecasts. This memo gives the specifications.

2 Locations

North Cormorant (UK)
Vaderoarna (Sweden)
A122
Nymindegab (Denmark)
Fino1 (Germany)

Platform K13 (the Netherlands)
Europlatform (the Netherlands)
Westhinder (Belgium)
Cherbourg (France)
Sleipner-A (Norway)
WMO buoy number 6400046 (UK),
WMO buoy number 6200092 ('M3', Ireland),
WMO buoy number 6200094 ('M5', Ireland)

3 Parameters

Hsig (units: m)
Tp or Tpsmooth [s]
Tm02 or Tz [s]
if possible: swellwaveheight_hm0 (this is the low frequency significant wave height for 0-0.1 Hz)

Since many of the measurements are based on the frequency domain up to 0.5 Hz, I suggest using 0.5 Hz for the high-frequency cut-off of the forecast wave parameters as well.

If possible, each forecast should be updated with epoch (forecast start) at 00h (UTC), and be available within 8 hours after the epoch.

4 Standard NOOS format

4.1 Introduction
This section –mainly taken from an older document by Martin Verlaan - describes the technical aspects of the data exchange of time-series between the NOOS partners (http://noos.eurogoos.eu). This exchange is carried out by means of FTP-boxes. Each participant that publishes data sets up an FTP-server where a number of files are put with the actual data. Other partners that want to collect the data can then visit all the servers with the data they require and download the data. The system is meant to be simple and easy to set up. Some more advanced topics such as automated handling of metadata are still missing but may be added later. The examples in this section refer mainly to water levels but are applicable for wave parameters too.

4.2 Publishing data
To make data available to others one would need to set up an ftp-server. The next step is to create a directory that will contain the data to be exchanged. As long as there is no formal metadata format this directory should contain an ASCII file with a general description of what is being published. Now one can periodically publish data in separate packages (TGZ-files see below). It is important to keep some of the older data for other partners to fill gaps after failures in the data transfer. The default period for NOOS is now 7 days. Older data should be removed from the server to avoid the risk of filling the available storage or risking problems in the

collecting processes with handling a large number of files. Many unix scripts e.g. allow only 1024 files as an argument to scripts.

4.3 Packaging

Files from one forecast or batch of observations are grouped together in a gzipped-tar-file. Both tar (tape-archive) and gzip (gnu zip) are open source software and can be obtained freely through the internet. Files can be unpacked with the command "tar -xzf <file>". Package files must adhere to a strict format to facilitate automatic processing of the files.

<time>.<insitute>.tgz
or
<time>.<insitute>_<source>.tgz

where
- <time> denotes the analysis time of a forecast or batch of observations. For data that becomes available daily the format is YYYYMMDD, e.g. 20051129. For hourly data hours are added, e.g. 2005112912 (november 29th 2005 12:00hours). For more frequent data also minutes can be added.

- <institute> denotes the originating institute, for instance: dmi, ukmo, bsh, fcoo, mumm, rws
- <source> This field is optional. Used so far are:
    - "obs" for observations
    - "kal" model forecast including data-assimilation with kalman filter

An example of some filenames is:

2005112418.dmi.tgz	2005112521.dnmi_obs.tgz	2005112700.knmi.tgz
2005112418.dnmi_obs.tgz	2005112522.dnmi_obs.tgz	2005112700.mumm.tgz
2005112418.knmi_kal.tgz	2005112523.dnmi_obs.tgz	2005112700.rmi.tgz
2005112418.knmi.tgz	2005112600.bsh.tgz	2005112701.dnmi_obs.tgz

4.4 File format

Each package can contain a number of files, each containing one time-series for one location. To facilitate automated processing of the data again strict formats apply.

4.5 Filenames

The filenames for each of the series has a name containing a number of fields separated by "." or "_" signs. The format is:

<location>.<parameter>_<source>

The fields are:
- <location> Name of the location. for instance:

1. North Cormorant		61.340238N	1.165698E
2. Vaderoarna	(Sweden)	58.48N	10.93E
3. A122		55.418031N	3.816828E
4. Nymindegab	(Denmark)	55.81N	7.941E
5. Fino1WR	(Germany)	54.01667N	6.58333E
6. Platform K13a	(NL)	53.218117N	3.219036E
7. Europlatform	(NL)	51.998767N	3.275201E
8. Westhinder	(Belgium)	51.389444N	2.439167E

9. Cherbourg	(France)	49.652222N	1.635556W
10. Sleipner-A	(Norway)	58.3711N	1.9091E
11. buoy_K7, station 64046 (UK)	(WMO 64046)	60.483N	4.167W
12. buoy_M3 (Ire)	(WMO 62092)	51.2166N	10.550 W
13. buoy_M5 (Ire)	(WMO 62094)	51.6900N	6.7040W

...

1-10.   coordinates taken from MATROOS
11.   http://www.ndbc.noaa.gov/station_page.php?station=64046&unit=M
          60.483 N 4.167 W (60°29'0" N 4°10'0" W)
12.   www.marine.ie 51.2166°N 10.5500°W
13   www.marine.ie 51.6900°N 06.7040°W

- <parameter> Parameter for this series. Names in use are
     - waveheight_hm0
     - waveperiod_tm02
     - waveperiod_tp
     - waveperiod_tz
     - swellwaveheight_hm0 (if possible; this is the low frequency significant wave height for 0-0.1 Hz)
     - …

- <source> denotes the source of the data. Names in use are:
     - obs for observed data
     - prd for model forecasts

An example for some filenames for series files is given below:

Aberdeen.tide_obs	Harlingen.sealev_obs	Meetpost-Noordwijk.windspeed_obs
AUK-Alpha.winddir_obs	Harlingen.sealev_prd	North.sealev_obs
AUK-Alpha.windspeed_obs	Harlingen.tide_obs	North.tide_obs
Cadzand.sealev_obs	HoekvanHolland.sealev_prd	Oosterschelde-11.sealev_prd

4.6   File contents

Each series file mentioned above contains the actual data in ASCII format. Data for each time are contained in a record separated by a newline character. Within each record there are a number of fields. So far only two fields are in use:
- 1) time field: times are given in lexical format, i.e. YYYYMMDDhhmm eg. 200511291210 to denote november 29th 2005 12:10 hours UTC. All times are in UTC or GMT time zone.
- 2) value field: value of the parameter for this time and parameter. Units are SI compliant where possible.

As an example consider the following records:
201605020000 2.5700
201605020010 2.8000
201605020020 2.9100
201605020030 2.9100
201605020040 2.6500
201605020050 2.4900
201605020100 2.3300

201605020110 2.6200
201605020120 2.6300
201605020130 2.6300
201605020140 2.4000
201605020150 2.7200
201605020200 2.7200

4.7 README.txt

Please, provide meta-data in a readme-file. The meta-data should include:
parameter names and units, location names and co-ordinates (lat, lon decimal degrees with
WGS84 ellipsoid), principal investigator (PI), model specifications like software, high frequency
cut-off fc and settings if you wish.