Available Saildocs Grib Data

(Updated 2022-12-14: HRRR sub-hourly files

"Grib" is short for "gridded binary", a data format originally used for computer forecast-model data but also used for forecaster-generated data (NDFD forecasts).

There are a number of forecast models available: The two leading global models are NOAA's GFS and the European ECMWF. GFS data is available, and limited ECMWF data is publicly available (see below). The ICON global model from Germany is also available, as is NAVGEM from the US Navy, and while not as highly regarded as GFS and ECMWF are useful for a "second opinion".

There are also a number of regional models available: Icon Europe, COAMPS and NAM for North America, and the hi-res HRRR forecast for US coastal waters (updated hourly). Wave data is available globally from the WW3 (GFSwave) model, and ocean current forecast data is available from NOAA"s RTOFS model. OSCAR provides average currents for the previous 5 days, see notes below.

For general information about requesting grib data via email from Saildocs, send a blank email to: gribinfo@saildocs.com or see the web at https://saildocs.com/gribinfo

Computer Forecast Models in Grib format:
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The primary source for Saildocs computer-model data is NOAA's "GFS" global model, requested by using the code "GFS:" (or "Grib:") in a grib-request. Data from other models is also available. Here are the details for the available models:

General notes:
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Forecast models are run periodically, and create forecasts from a zero-hour "synoptic time" (abbreviated as "HH"). NOAA's GFS model is run every 6 hours with synoptic times of 00z, 06z, 12z, 18z (UTC). Availability of the data is some hours after that: 4 to 5 hours for GS, 8 hours for the European ECMWF model. Obviously the earlier a forecast is available, the more useful it is.
And remember, all times are UTC-- weather is a global phenomena.

GFS:
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The most-often used model is NOAA/NCEP's Global Forecast System ("GFS") model. This model is run every 6 hours and generally available at HH+04:00 for 0-72 hours, HH+04:30 for 0-192 hours, and HH+05:00 for o-312 hours, where "HH" is the synoptic time of 00z, 06z, 12z, and 18z. The complete model run (0-384 hours) is usually complete by HH+05:20.

Remember that the accuracy of any model declines with increasing forecast times, and 5-7 days is usually considered a useful limit.

Use the same "GFS" code, Saildocs will select the appropriate data file. For example a request for 0-72 hours sent at 04:00 (or later) will be the current data, while a request for 0-120 hours at 04:00 will be data from the previous model-run. Subscriptions are handled similarly. The accompanying message will identify the cycle and time that the files were downloaded from the NOAA servers.

To summarize: If you want a 3-day forecast then time your request (or subscription) for 04:00 or later (or 10:00, etc). For 7 days, time it for a half-hour later, and for 12 days then time it for an hour later.

Currently available GFS parameters are:
PRMSL (PRessure/Mean Sea Level)
WIND (10 meters above surface)
GUST (at 10 meters)
AIRTMP (temperature 2 meters above surface)
SFCTMP (temp at surface)
RH (Relative Humidity 2m above surface)
LFTX (LiFTed indeX)
CAPE (Clear Air Potential Energy)
RAIN (Precip rate, mm/hr)
APCP (Accumulated precip)
REFC (Simulated radar reflectivity)
HGT500 (500mb height)
TMP500 (temperature at 500mb level)
WIND500 (Wind velocity at 500mb level)
ABSV (Absolute vorticity at 500mb)
CLOUDS (Total cloud cover)

Also WAVES (or HTSGW) can be added to include significant wave height from the WW3 model. (Additional wave data is available from the WW3 model, see below).

Data is currently available as follows:
0-120 hours every 3 hours on a 0.25 x 0.25-deg grid;
123-192 hours every 3 hours on a 0.5 x 0.5-deg grid;
198-240 hours every 6 hours on a 0.5 x 0.5-deg grid;
252-384 hours ever 12 hours on a 1.0 x 1.0-deg grid.
Note, however, that forecast accuracy becomes increasingly speculative after 4-6 days.

A typical request could be:
send GFS:26N,20N,114W,105W|0.25,0.25|0,6..72|WIND,PRMSL,WAVES

The "GRIB" code can also be used, the difference is that for "grib:" the forecast-times are always adjusted to provide forecast-times relative to 00z. Available parameters are PRMSL,WIND,HGT500,TEMP. Data is almost always available by HH+05:00 hours ("HH" being the synoptic-time), so by 05:00z for the 00z forecast cycle.

WW3 / GFSwave:
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This is NOAA's WW3 wave model, now run in conjunction with GFS on the same schedule and grid (see above) and re-labeled as "GFSwave". All of the primary WW3 data is available, the default parameter is "HTSGW" (height of significant waves, i.e. the average of the largest 1/3 of combined swell and wind-waves), "WAVES" means the same.

Parameters available from Saildocs are as follows:

HTSGW Significant Height of Combined Wind Waves and Swell [100]
DIRPW Direction of the Primary Wave (towards) [107]
PERPW Period of the Primary Wave [108]
WVHGT Wind Waves Significant Height [102]
WVDIR Wind Waves Direction (towards) [109]
WVPER Wind Waves Mean Period [110]
SWELL Swell Wave Sig. Height (primary swell) [105]
SWDIR Swell Wave Direction [104]
SWPER Swell Wave Mean Period [106]
WIND Wind from the GFS model (input to WW3)

A typical request could be:
send WW3:26N,20N,114W,105W|0.25,0.25|0,6..72|WIND,HTSGW,DIRPW,PERPW

Also, the "HTSGW" or "WAVES" parameter (plus other wave parameters) can be added to a GFS request (see above) and Saildocs will combine the files, adding wave data records to the same grib file on the same grid.

Note: The [] codes are grib1 codes used for the various parameters. There is some ambiguity in WW3 grib codes particularly for WVDIR and WVPER.

GFSwave also provides spectral data for three swell patterns but this creates compatibility issues for Grib1 coding, so Saildocs currently provides only the primary swell as SWELL, SWDIR, SWPER. Separate codes may be added in the future using layer-type 241 "Ordered Sequence of Data".

Also note that NOAA changed the model-code (the "Generating Process ID" code, byte 6 of the PDS section) from 88 ("NOAA Wave Watch III (NWW3) Ocean Wave Model") to 11 ("Global Multi-Grid Wave Model (Static Grids)"). This makes no difference to the model data, but causes zyGrib software to not display wave data. To avoid this issue Saildocs substitutes the previous NWW3 code.

Regional WW3 models are now redundant with GFSwave and are discontinued. The exception is the WW3 European regional model which includes the Black Sea, which the global GFSwave/WW3 model does not:
ww3euro: bounded by 29n,66n,015w,045E, 0.2 x 0.2 grid, to 96 hrs @ 6 hr increments

HRRR:
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"High Resolution Rapid Refresh" is a NOAA hi-res forecast updated hourly, with forecast intervals as short as 15 minutes. HRRR primarily covers the Continental US but does spill into the coastal waters-- very roughly east of a line from 24N 123W to 48N 133W in the Pacific, and 23N 074W to 48N 063W in the Atlantic.

To see the full extent of coverage, send this grib request to query@saildocs.com (about 18KB):
Send HRRR:55N,20N,140W,060W|0.5|0|WIND

Maximum resolution is 0.025 x 0.025 deg (around 2 miles) but care is needed: With large areas, high resolution and hourly increments (or less) the files can easily get huge.

The hourly update is code HRRR and available out to 18 hours. Sub-hourly data is available, 0.25-hour (15 min) forecast intervals out to 6 hours, 0.5 hour intervals to 12 hour and hourly beyond that. Data is available at HH+01:30 where "HH" is the hourly synoptic time of 00z, 01z, etc. So for example the 00z update cycle is available at 01:30 utc. Saildocs will always send the most-recently available data. The model run is also part of the file-name listed in the reply-message.

There is also an extended model run (code HRRRX) every 6 hours which goes out to 48 hours, available by HH+02:00. Forecast interval for the first 18 hours is as above, then hourly.

Available HRRR parameters are:
PRMSL (pressure at sea level)
WIND (10 meters above surface)
GUST (10 meters)
AIRTMP (temperature 2 meters above surface)
SFCTMP (temp at surface)
LFTX (Lifted index)
CAPE (clear air potential energy)
RAIN (Precip rate, mm/hr)
CLOUDS (Total cloud cover)
REFC (Simulated radar reflectivity)

A sample file could be this, sent to query@saildocs.com (about 35KB):
send HRRR:35N,31N,122W,116W|0.2,0.2|0,1..18|WIND

ECMWF "Open Data":
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The European ECMWF model data is highly regarded but the full catalog is not available for distribution without prohibitive fees. Previously, only very limited data was available as "WMO Essential" data to satisfy international obligations. However, ECMWF has now extended their "Open Data" project to grib data. From March 8 2022 Saildocs now provides this data which can be freely distributed.

Available parameters are WIND, MSLP, HGT500, and TEMP (2-meter air temp).

The code is "ECMWF", default parameters are surface pressure and wind. The grid is 0.4 x 0.4 deg, forecasts are available from 00 to 144 hours (6 days) at 3-hour increments and 150 to 240 hours (ten days) at 6-hour increments. The data is updated twice a day for the 00z and 12z forecast, and generally available by HH+8, or 08:00 and 20:00 utc.

A typical request might be:
send ECMWF:35N,19N,123W,102W|0.4,0.4|0,3..72|MSLP,WIND

ICON:
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"ICON" is a global model run by Deutscher Wetterdienst (DWD), the German Met service. It is based on an Icosahedral (triangular) grid, hence the name, and converted to a lat-lon grid by Saildocs. It is a well-respected model, updated four times a day, and available from Saildocs on a 1/8-deg grid (0.125 x 0.125), at 3-hour intervals out to 180 hours for the 00z and 12z model runs and 120 hours for the 06z and 18z runs. Data is generally available 4 hours after the synoptic time (e.g. 04z for the 00z run). Available parameters are wind, mean lea-level pressure and 500hPa height (WIND,MSLP,HGT500), also GUST, SFCTMP, AIRTMP (2m).

There is also a higher-resolution regional "nest" for Europe, bounded by the limits of 29.5N-70.5N and 023.5W-045.0E. The data grid is 0.0625 x 0.0625 deg (around 7km) available at 3-hour intervals out to 120 hours. Use the same "ICON" code, Saildocs will select the appropriate data for the requested lat-lon area.

A typical request could be:
send ICON:26N,20N,114W,105W|0.25,0.25|0,6..72|WIND,MSLP,HGT500

NAVGEM:
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This is the US Navy model formerly known as NOGAPS, with data available on a 1-deg grid with forecasts every every 3 hours to 24, then 6 hours to 96, then 12 hours to 144, and updated every 6 hours by HH+06:00. Available parameters are PRMSL,WIND,HGT (the default is PRMSL,WIND). The general view is that GFS has better accuracy on average, but Navgem is an independent model and is valuable as a "second opinion".

COAMPS:
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This is a meso-scale (i.e. more detailed) regional model provided by the US Navy. Data is available for three regions: eastern Pacific, west Atlantic, and Carib/Central America. The syntax is the same as for a basic grib, except the request-code "coamps:" is used in place of "gfs:" or "grib:".

For the four US coastal areas, forecast data is available on a 0.15 x 0.15-deg grid at 3-hour intervals out to 96 hours (except 72 hrs for w-Atl). Available (and default) parameters are WIND. The euro model is 96 hours at 6-hour intervals for pressure and wind.

The areas for the currently available coamps areas are:
NE Pac: 34n,64n,172w,118w
So Cal: 22n,43n,128w,109w
Eq. Am: 12s,32n,122w,058w
W Atl: 20n,55n,093w,055w
Euro: 29n,66n,015w,040e

The same "coamps:" code is used for all regions, and Saildocs chooses the appropriate region based on the requested lat-lon area. Requests which fall partially outside the selected region will be trimmed at the edge of the region, and a zero-length file will result if the request is completely outside any of the regions. It is not possible to span multiple regions because data from different files does not match at the region edges, apparently a boundary-condition limitation with the model.

RTOFS:
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This is an ocean current forecast model from NOAA's RTOFS system, based on the HYCOM model (see http://polar.ncep.noaa.gov/ofs/ for more details). It was previously two different models and three overlapping areas (gulf-stream, Atlantic and Global) but now consolidated into a single global model available with the code "RTOFS". The resolution is 0.08 (1/12) deg.

RTOFS data is currently available out 72 hours at 3-hour increments generally available around 11:00z. A second model run provides forecasts beyond 72 hours, out to 192 hours (8 days) at 6-hour increments, generally available around 17:00z. If data beyond 72 hours is not yet available, then Saildocs will fill the request from the previously daily file.

Available RTOFS parameters are CURRENT (or CUR or UOGRD,VOGRD), WTMP (or WATER_TEMP), DSL_M (sea-level deviation), and SALTY (salinity). The default (if parameters are omitted) is CURRENT. Ice concentration (ICEC or ICE) and thickness (ICETK) are also available.

More information is available here: https://polar.ncep.noaa.gov/global/about/

OSCAR:
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OSCAR is a 5-day historical current map in grib format, but is currently unavailable from Saildocs -- see http://www.svsarana.com/oscar).

Gridded Marine Forecast Data
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NDFD: NDFD (National Digital Forecast Database) is a US National Weather Service (NWS) project to make forecaster-generated weather forecast data available in gridded format for the NWS areas of responsibility. These data files are prepared along with the forecast charts (radiofax charts) and text bulletins. The advantage of the grib format is a much more efficient file format (and smaller files) than chart images.

NDFD is a developing project, and available data will be expanded. Currently wind and wave data is available for the Pacific from 20S to the equator and west to 120w, equator to 30n and west to 140w, 30n to 49n and west to 133w, and offshore waters around Alaska and Hawaii. The current Atlantic coverage is 03n to 31n from the Gulf eastwards to Africa, and from 31n to 50n from the coast east to 064W.

To request NDFD data use the code "NDFD", specify the lat-lon area (respecting the available areas, above). The resolution is 0.12 deg (default is 1-deg if omitted), forecasts are available out to 7 days at 3 to 6-hour increments. Files are currently updated by 01:00z (for the 00z forecast), then 07:00, 13:00, 19:00 and 23:00z.

Currently available parameters are WIND,GUST,WAVES.

A typical request would be:
send NDFD:26N,20N,114W,105W|0.25,0.25|12,24..72
(Roughly Cabo to Puerto Vallarta, 0.25 deg grid, every 12 hours out to 3 days, about 12KB).

NDFD is still in "experimental" status which means that the data may not be available or correct (which is always true for computer data).

For more info about the NDFD program is here: https://ocean.weather.gov/opc_gridded_marine.php
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To receive an updated copy of this document whenever changes are made, send the following one-line request to: query@saildocs.com

subscribe gribmodels days=365

(The "days" parameter indicates the time that Saildocs will check for changes: "365" means one year, "0" means indefinitely).

To get general info about Saildocs send a (blank) email to: info@saildocs.com (auto-responder)

For problems/questions relating to Saildocs, send an email to: support@saildocs.com

Thanks for using Saildocs and Good Sailing!

(Updated 2022-12-14 Jim Corenman)