

Global Wind Hazard Preview

TAOS[™] Real Time Operations System
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April 28, 2024

Abstract

TAOStm WX Global Analysis of wind hazards and economic impact estimates based the 20240428000000 00z forecast. This analysis was run using proc:ghs TAOS Version 25.01:ROCKY9:GCC11:2024:106:1435, and includes wind hazards from tropical cyclones, winter storms, mid latitude cyclones, and other synoptic scale weather systems.

Report generated Sun Apr 28 07:43:14 AM UTC 2024 on cortex2 using GFS data downloaded on Sun Apr 28 03:31:48 AM UTC 2024.

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Chapter 1

Forecast Day 1: 2024-04-28

Table 1.1: Global Economic Impacts for day 1

<i>scenario</i>	<i>exposures</i>	<i>economic_impact</i>
f001.20240428	332203	5.86 Million USD

Table 1.2: Countries with over 100 thousand USD in impacts

<i>name</i>	<i>num_exposures</i>	<i>economic_impact</i>
Argentina	200945	1.25 Million USD
India	3227	.27 Million USD
Iraq	13921	.23 Million USD
Saudi Arabia	47307	3.69 Million USD

(4 rows)

GFS Surface Winds for 2024-04-28 00:00.

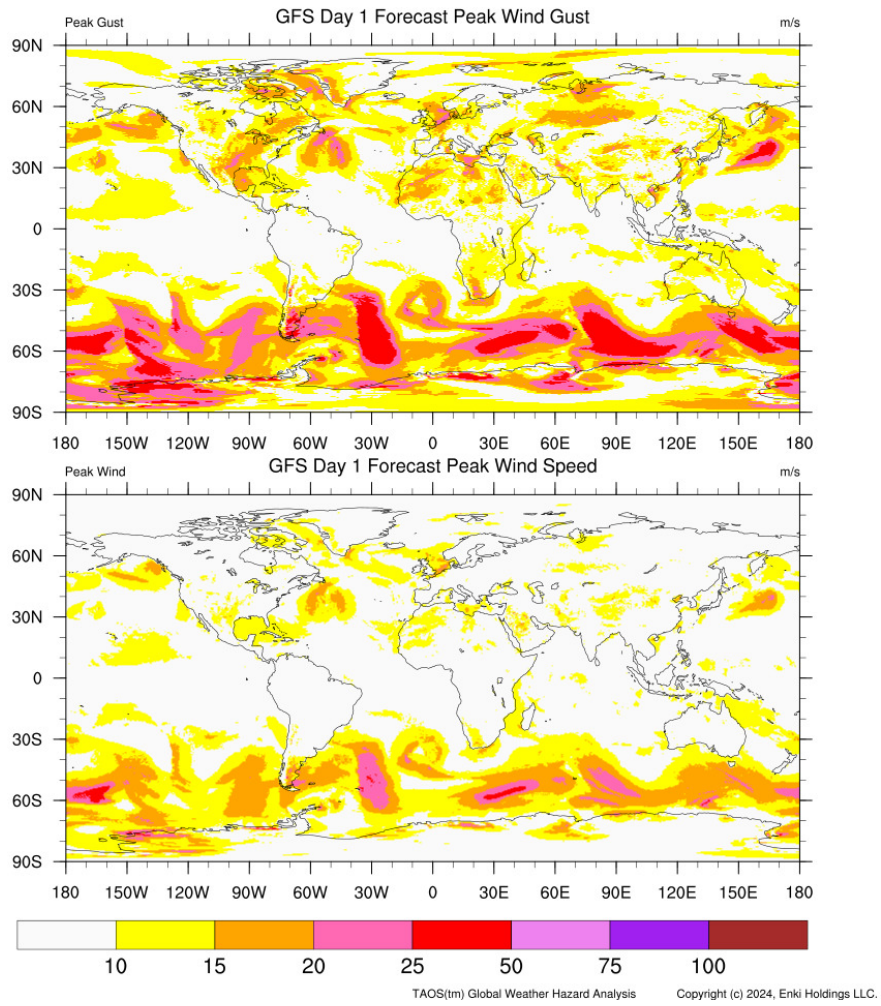


Figure 1.1: GFS Wind Forecast for day 1

Chapter 2

Forecast Day 2: 2024-04-29

Table 2.1: Global Economic Impacts for day 2

<i>scenario</i>	<i>exposures</i>	<i>economic_impact</i>
f002_20240428	394516	25.67 Million USD

Table 2.2: Countries with over 100 thousand USD in impacts

<i>name</i>	<i>num_exposures</i>	<i>economic_impact</i>
Argentina	191557	1.89 Million USD
Iraq	27296	.66 Million USD
Pakistan	18883	.21 Million USD
Saudi Arabia	112528	22.51 Million USD
Syria	9567	.15 Million USD

(5 rows)

GFS Surface Winds for 2024-04-29 00:00.

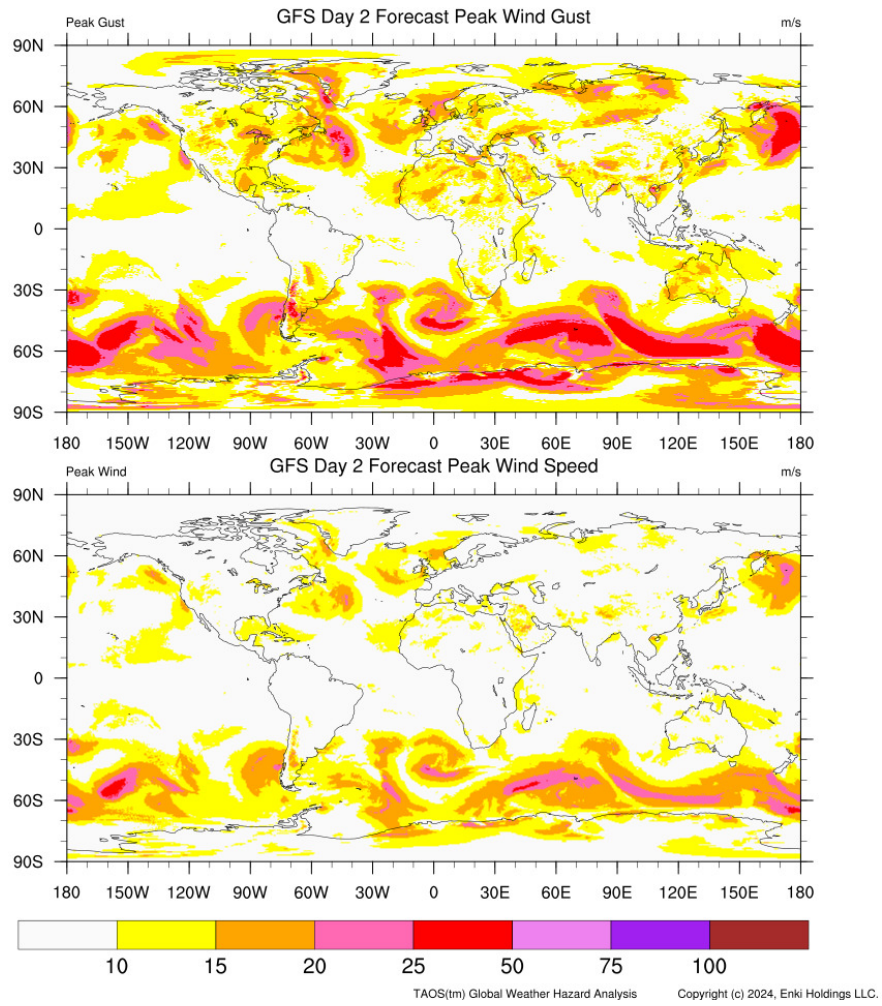


Figure 2.1: GFS Wind Forecast for day 2

Chapter 3

Forecast Day 3: 2024-04-30

Table 3.1: Global Economic Impacts for day 3

<i>scenario</i>	<i>exposures</i>	<i>economic_impact</i>
f003.20240428	300061	2.65 Million USD

Table 3.2: Countries with over 100 thousand USD in impacts

<i>name</i>	<i>num_exposures</i>	<i>economic_impact</i>
Argentina	164880	.96 Million USD
Iraq	8723	.46 Million USD
Libya	35932	.19 Million USD
Pakistan	24360	.19 Million USD
Saudi Arabia	23803	.64 Million USD

(5 rows)

GFS Surface Winds for 2024-04-30 00:00.

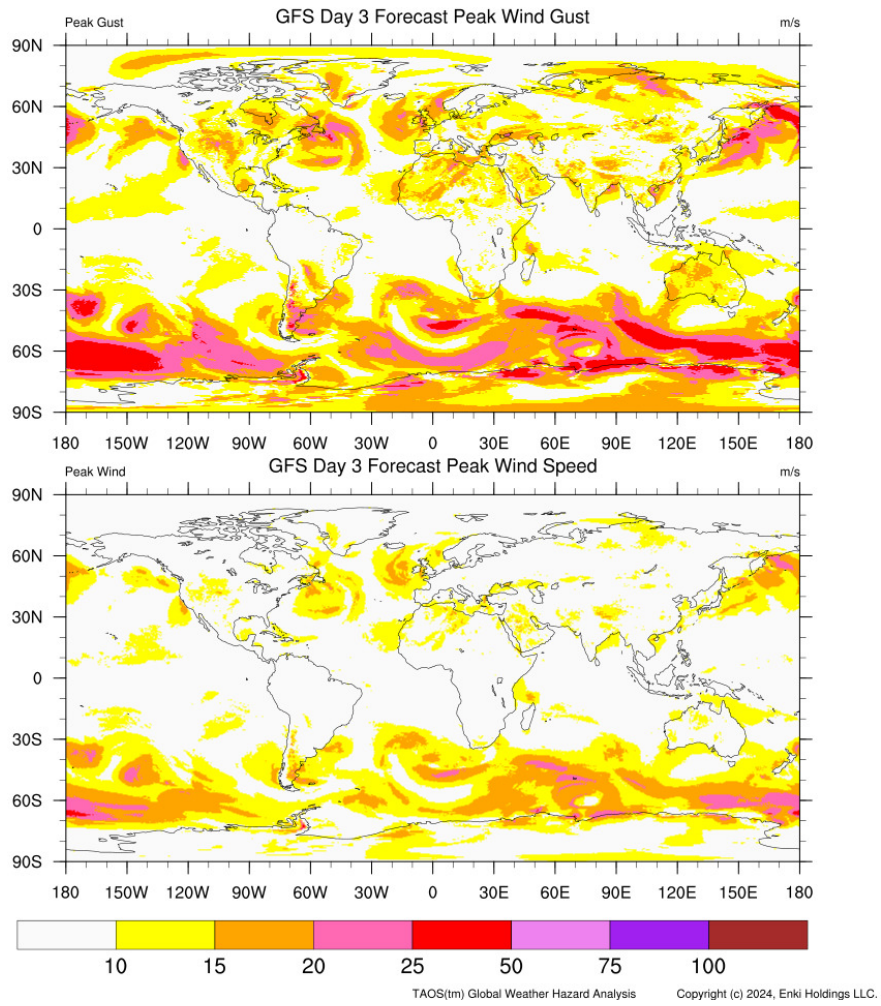


Figure 3.1: GFS Wind Forecast for day 3

Chapter 4

Forecast Day 4: 2024-05-01

Table 4.1: Global Economic Impacts for day 4

<i>scenario</i>	<i>exposures</i>	<i>economic_impact</i>
f004.20240428	321084	7.01 Million USD

Table 4.2: Countries with over 100 thousand USD in impacts

<i>name</i>	<i>num_exposures</i>	<i>economic_impact</i>
Argentina	86385	.69 Million USD
China	115555	.31 Million USD
New Zealand	686	4.39 Million USD
Russia	37954	.62 Million USD
Saudi Arabia	48925	.68 Million USD
United States	13474	.22 Million USD

(6 rows)

GFS Surface Winds for 2024-05-01 00:00.

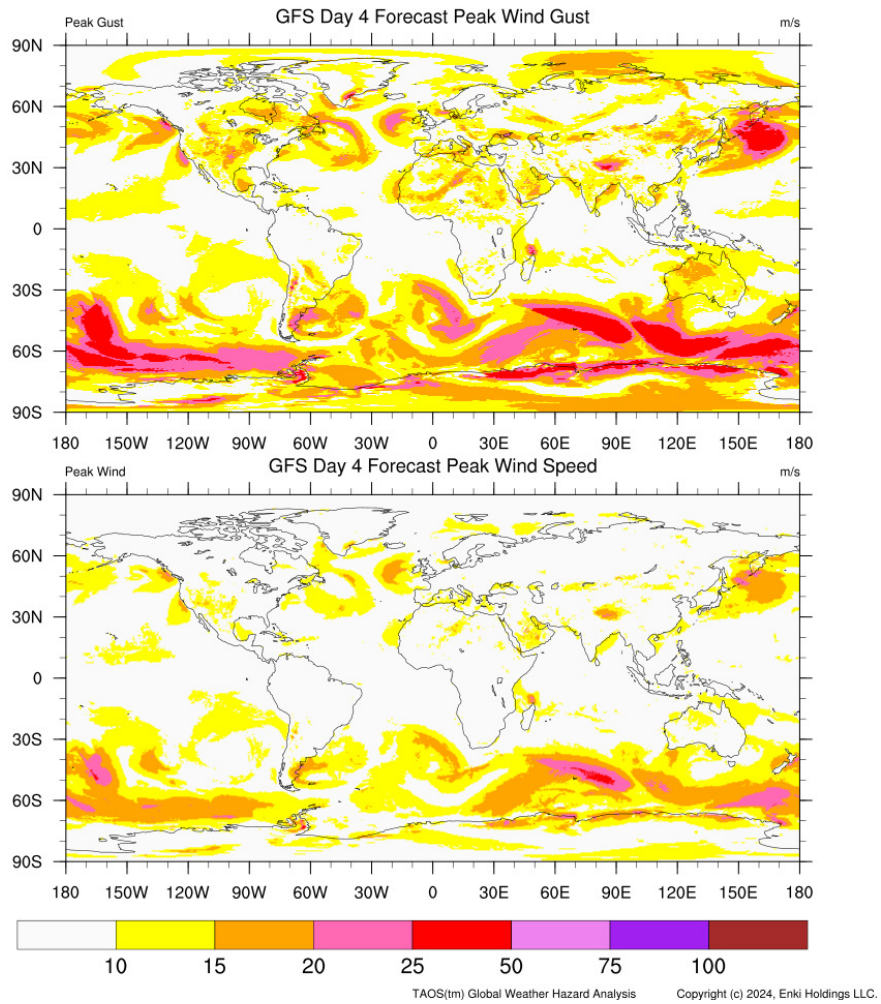


Figure 4.1: GFS Wind Forecast for day 4

Chapter 5

Forecast Day 5: 2024-05-02

Table 5.1: Global Economic Impacts for day 5

<i>scenario</i>	<i>exposures</i>	<i>economic_impact</i>
f005_20240428	98942	4.22 Million USD

Table 5.2: Countries with over 100 thousand USD in impacts

<i>name</i>	<i>num_exposures</i>	<i>economic_impact</i>
Bangladesh	7210	2.51 Million USD
India	1398	.82 Million USD
Iran	21975	.21 Million USD
Russia	28145	.33 Million USD
United States	30315	.21 Million USD

(5 rows)

GFS Surface Winds for 2024-05-02 00:00.

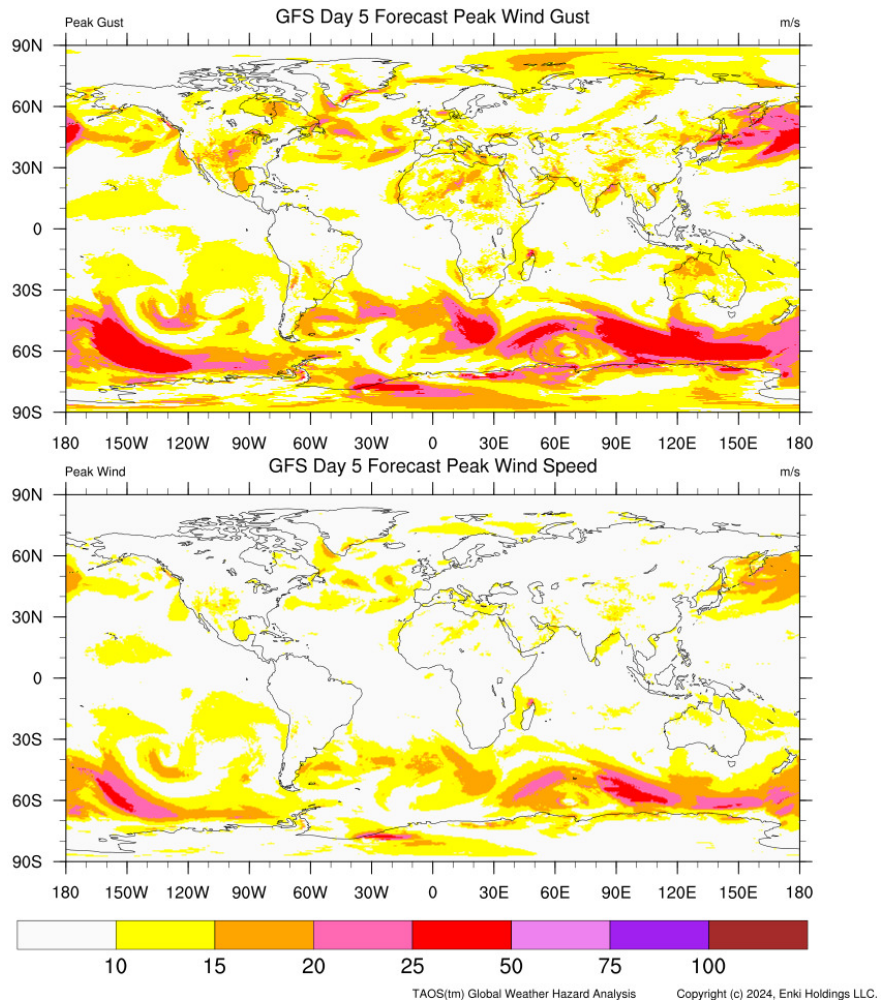


Figure 5.1: GFS Wind Forecast for day 5

Chapter 6

Technical Notes

The TAOStm WX Global Analysis (TAOS/WX) is part of the TAOStm storm hazard modeling system. TAOS/WX ingests global or regional weather models and, using the same graphical processing systems, statistical methodologies, exposure, and damage models as the tropical cyclone (TAOS/TC) and earthquake (TAOS/EQ) packages, generates estimates of weather hazards and the economic impact of weather hazards on those exposures.

6.1 Input Meteorological Data Processing

This chapter describes the Beta version 1.0 of TAOS/WX, which is a hind-cast and five day forecast using the US National Center for Environmental Prediction Global Forecast System (GFS) as the source of raw meteorological data. This data is processed in to standard TAOStm format NetCDF files for further processing by the TAOStm graphical and analytical tools.

6.1.1 Forecasts

Each day at 08z (5am EDT) the outputs of the primary 00Z GFS run are downloaded from NCEP using either the NOMADS or NOAA telecommunications gateway servers. The raw data sets in GRIB2 format are processed and converted in to NetCDF format for compatibility with TAOStm standard tools as well as for more efficient downstream processing and storage. The GFS data are processed by a streamlined version of the TAOS/TC model to generate exposure grid level wind, wave, storm surge, rain, and inland flood

products. These are then available for graphics generation or analysis by the exposure and damage processing system.

6.1.2 Hindcast

Along with the 00z forecast run, the data acquisition system fetches the simulations used by NCEP to “bootstrap” each GFS run and prepare for the next simulation. These are effectively 6 hour hindcasts, which are integrated to form hourly snapshots and maxima of the previous day. As with the forecast outputs, the GFS data are processed by a streamlined version of the TAOS/TC model to generate exposure grid level wind, wave, storm surge, rain, and inland flood products. These are then available for statistical analysis, graphics generation, or analysis by the exposure and damage processing system.

6.2 Exposure and Damage Processing

This is a brief overview of the exposure system and damage calculations with an emphasis on differences between TAOS/WX and other TAOStm family processing. The processed GFS meteorological forecast is run against the TAOStm basic exposure system at a resolution of 30 arc seconds (std30). The results are in 2021 US Dollars based on Purchasing Power Parity (PPP), with economic impact results generated for 3,614 level one administrative areas in 248 countries. For more complete information on the exposure data base see the latest version of the **TAOStm Basic Exposure Data and Hazard Impact Estimation System Technical Overview**.

The Standard PPP based Exposure Data set is used for this analysis. NASA Global Population data and NOAA satellite derived land cover data are used in the exposure generation process to identify urban areas, agricultural areas, and other characteristics for creating an exposure classification for each inhabited 1km (30 arc second) land grid cell. The exposure system classifies each grid cell in to one of up to eight possible exposure categories and allocates an economic value to that cell. The Global Administrative Areas project (GADM) is the primary reference for National, Level 1 (State Equiv), and Level 2 (County Equiv) boundaries.

Damage fractions are computed using the same Fortran 90 program used in the TC and EQ systems (dmgmod). Wind damage curves are derived

from a third power function based on wind speed and the type of exposure. Further information (including damage curve plots) may be found in the Technical Overview.