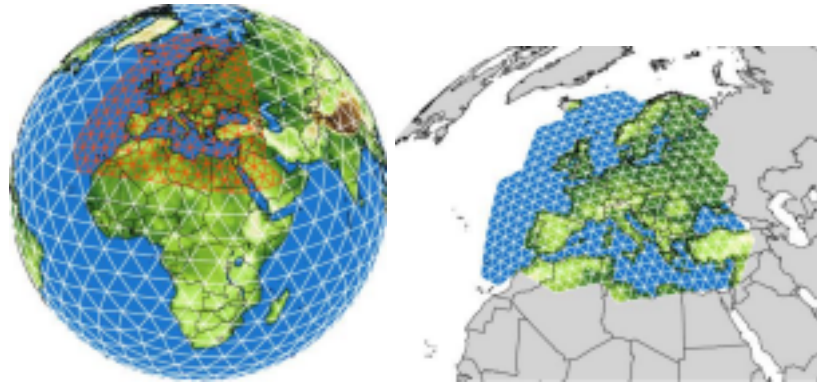




DWD

ICON



Charnock-Parameter

The Charnock coefficient is linked to the amount of momentum that is used to generate waves which varies depending on the sea state evolution:

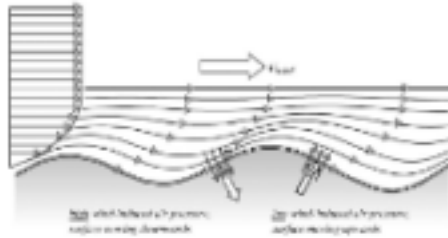
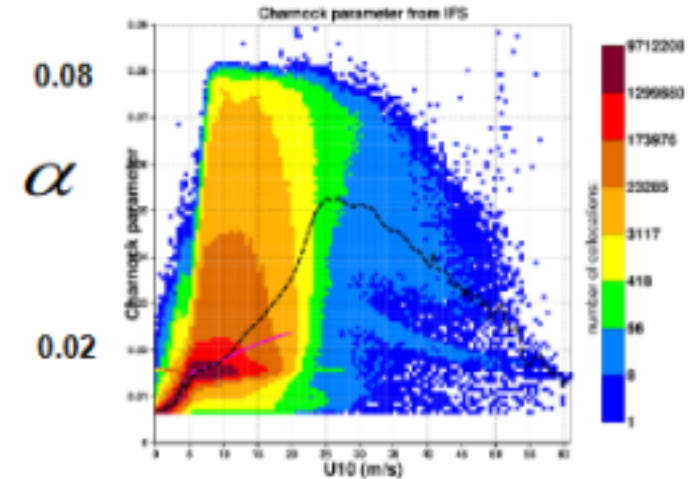


Figure 6.16 The mean lateral wind profile relative to a propagating baroclinic wave.

As waves grow by this mechanism, the mechanism becomes more effective, as the wind velocity profile gets flatter, which in turn makes the mechanism even more effective, etc.



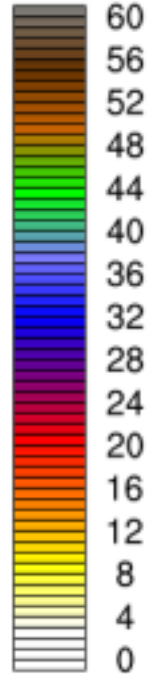
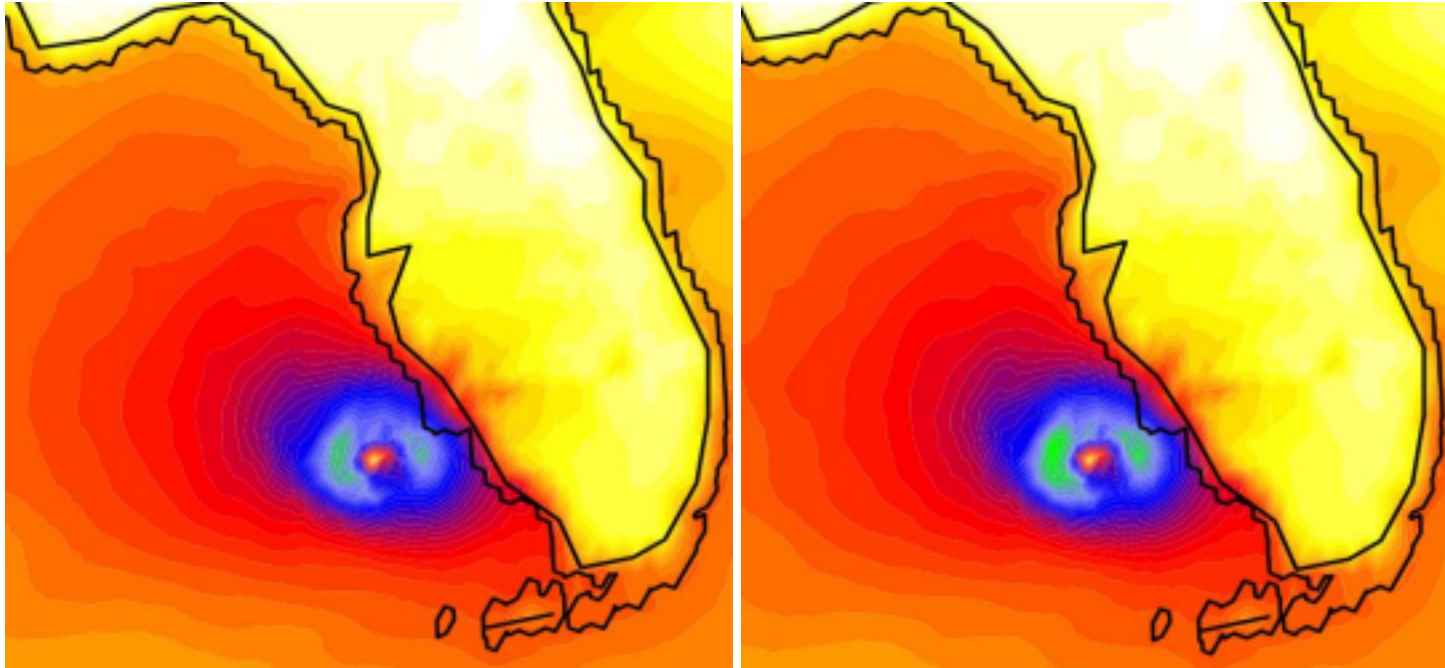
Forecast data from stream file, class of expert goals, all time points with sea ice cover = 0.0 from 2017004-2017C, for steps from 6 to 240 by 6

U10

Charnock parameter from IFS



TC Ian (2022092800 + 12h)

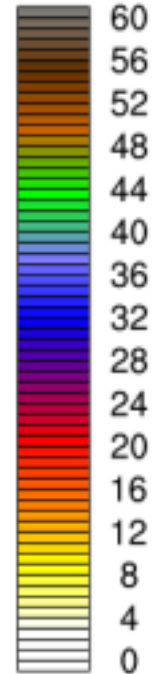


m/s R3B7 R3B7

Reference reduction of Charnock > 25 m/s



TC Ian (2022092800 + 12h)



m/s R3B8 (6,5km) R3B9 (3,25km)

red. Charnock > 25 m/s shallow convection



Cyclone Tracking at DWD

ICON



Cyclone tracking



WTRACK

Time stepping (hourly to 6-hourly)

- Any Grid configurations
- Grid resolutions (13km to 160km)
- Applications for Weather and Climate
- Tracking of wind and precipitation

ZYPACK

Tropical and extratropical Cyclones



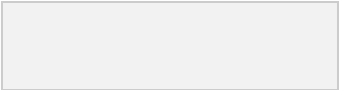
fields

TC-Tracking

Extratropical cyclones



Strike probability (60 nautical miles)





- predictability of a TC varies with forecast lead time and when using a fixed neighborhood size, information might be lost especially in the early stages of the forecast.
- The property of “usability” of a probability forecast relates to the amount of information on the forecast and its uncertainty that is given to the user.

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Refinement distribution of forecast probabilities

Blue: a larger domain enhances probabilities, but makes the forecast less precise. **Red:** perfect for the given

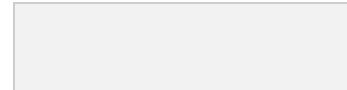
the event definition, but what really is the information transport to the user? **Yellow**: provides maximum “probabilistic resolution”.

Optimizing

- the **red** case in terms of forecast preciseness
- the probabilistic forecast skill of the **blue** case

Entropy

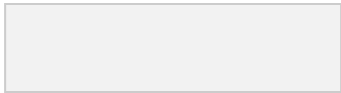
$$H = - \sum_{i=1}^n p_i \ln(p_i),$$





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Cyclone tracking



Example: Tracking algorithm (MSLP minimum)

running at DWD

Ensemble Tracks Strike

Probability
Max Entropy
Strike Probability

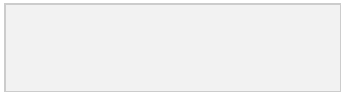
of wind gusts

precipitation
neighbourhood size

90% percentile

90% percentile
of max

→ **Storm Ian** 20220920 - 20221001





New cyclone 202211 / 0512 - 0700

ICON





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https://www.dwd.de/DE/fachnutzer/forschung_lehre/numerische_wettervorhersage/nwv_aenderungen/_functions/DownloadBox_modellaenderungen/nwv_aenderungen_icon_gesamt.html?nn=16102&lsbld=479218

26km 20221012 == ICON 2.6.5-nwp0,

? == Reduction of Charnoc-Parameter

20221123 == Resolution upgrade ICON-EPS 40km ->

Summary ICON changes 2022

specifically the formation and decay of non-convective subgrid-scale cloud water are now associated with latent heat

release. 20220921 == Arctic Sea Ice Bugfix

20220914 == Use of invariant data in surface analysis (CLON, CLAT, FR_LAND, SOILTYP, HSURF, Z0, ROOTDP)

20220713 == Meteosat-9 AMVs

20220704 == ICON 2.6.4-nwp5 & Assimilation of SPIRE radio occultations

20220615 == switch to Meteosat-9

20220511 == updates Radiance Assim. & **Assimilation T_2M by model-DA coupling** & ICON-2.6.4-nwp4

20220323 == RTTOV13update & additional GNSS radio occultation data

20220119 == CADS-IASI new version & SSTanalysis & LatendHeatNudingCorrection

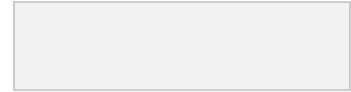
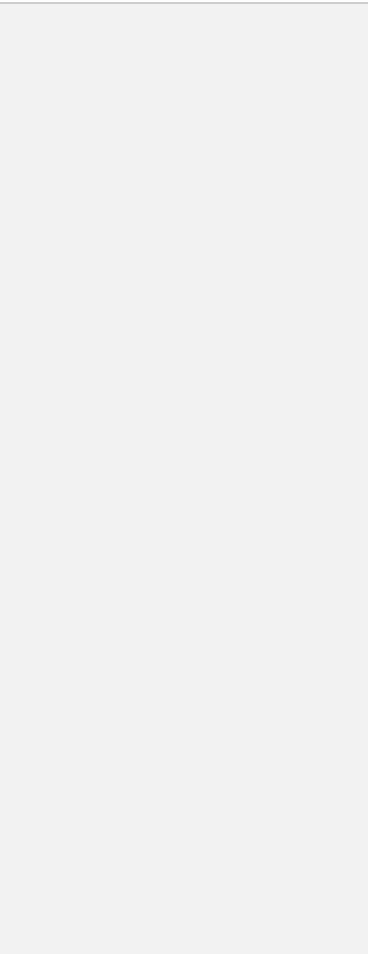
TC Ian 20220920 - 2022093000

ICON





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20220920 00UTC

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FIP 20

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