

Review of the manuscript essd-2025-514 **“A 30-year ocean front datasets based on deep learning from 1993 to 2023 for Northwest Pacific ocean”** by Yuan Niu, Xuefeng Zhang, and Dianjun Zhang submitted to *Earth System Science Data* (ESSD)

Summary: This is an interesting paper that has potential to become a major contribution pending major revisions. The results (presented as maps of fronts) look quite realistic. Every front in these maps corresponds to a similar front reported by other researchers. [Similarity here means location and configuration of the front.] Some fronts reported by other researchers are missing in the frontal maps presented in the reviewed manuscript. This is not surprising since most fronts are seasonal. Therefore, it is possible that such fronts can be found in the entire 30-year dataset generated in this study and made freely available by the authors on the Web. Summing up the above, the manuscript should be published. At the same time, the manuscript suffers from major drawbacks enumerated below. Therefore, the manuscript needs a major revision, after which the revised manuscript must be reviewed very carefully to make sure that all major issues have been adequately addressed. The authors should be given ample time to revise the present manuscript radically and meticulously. The Methods section must be elaborated. The Results section should be expanded. A comparison of the authors' results with the results of published papers on fronts in the China Seas should be considered.

Recommendation: Major revisions. A hasty resubmission should be strongly discouraged.

Major issues:

The text is sloppy. On several occasions, the authors use wrong terms instead of correct terms. In some cases, sentences with wrong terms become incomprehensible. Numerous characteristics of fronts are neither defined, nor explained or illustrated. The text is peppered with redundant passages (some reproduced below). Main conclusions are not supported by data. Descriptions of methods and algorithms are too cursory. Some descriptions are cryptic because of their brevity and non-standard (or non-defined) terms used. Therefore, the results cannot be reproduced and validated by other researchers. The reference list is a total mess. Every reference must be rechecked and corrected. Some references are incomplete and must be completed. The corrupted references resulted in a series of corrupted citations, especially in the Introduction (such citations are listed below).

Comments (both major and minor):

Title: “ocean” should be “Ocean”

L23: jumping zone – Wrong term

L38-40: “[Park and Il-Seok 2003](#)... [Cun-Jin et al. 2008](#)... [Qingling and Jianyu 2010](#)...[Gen-Yun et al. 2012](#)... [Park and Il-Seok 2003](#)...” – These citations are wrong because the respective references are wrong. Fix the reference list, then fix the citations.

L41: "...these algorithms may not effectively distinguish between genuine ocean fronts and other image features or artifacts." – This vague criticism is unsubstantiated. Delete.

L50: "dual I value" – What's that?

L53: "Chuan-Yu and Fan 2009" – Wrong citation. See L38-40 above.

L55: "Traditional methods based on gradient thresholds often struggle to accurately detect complex and diverse ocean fronts. These methods may overlook subtle variations in the gradient values or fail to capture the intricate patterns and transitions associated with complex fronts. This limitation hampers the ability to comprehensively study and understand the dynamics of ocean fronts. In summary, traditional methods for extracting ocean fronts suffer from limitations such as subjective threshold selection, inadequate handling of complex fronts, dependency on edge detection algorithms, and limited adaptability to changing conditions. Overcoming these limitations is essential for achieving accurate and comprehensive detection of ocean fronts." -- This unsubstantiated criticism of all previous algorithms is uncalled for, unwarranted, and unfair. Delete.

L81: "depth learning" should be "deep learning"

L90: "The study area for this research is spanning a latitude range of 0° to 50°N and a longitude range of 100° to 150°E (Fig.1). The research area includes Bohai Sea, Yellow Sea, East China Sea, South China Sea, and Western Pacific. These waters cover various ecosystems such as coastal plains, deep trenches, islands, and coral reefs. The marine hydrological conditions are diverse, covering temperate, subtropical, and tropical waters. The changes in ocean temperature, salinity, and ocean currents have significant impacts on marine ecology and climate. The convergence of ocean currents such as the East China Sea Warm Current, Kuroshio, and Philippine Current in this region has a significant impact on marine ecology and climate change. And it has abundant marine resources, including fishery resources, oil and natural gas reserves, mineral resources, as well as renewable energy such as wind and tidal energy. By specifically examining this region, the research aims to gain insights into the dynamics of ocean fronts and their characteristics in this area. Understanding the behavior and distribution of ocean fronts in the South China Sea is crucial for various applications, including marine ecology, fisheries management, and weather prediction. The chosen geographic extent provides a representative and comprehensive view of the oceanic features and processes occurring in this dynamic and economically important region." – Except for the first sentence, the entire paragraph is trivial and does not belong here. Keep the first sentence. Delete the rest of the paragraph.

L95: Philippine Current should be Mindanao Current

L113: "from the top to the bottom" – Delete

L115: "The Unit is Celsius" should be "°C"

L125: saltation – Wrong term

L135: types of houses – What’s that?

Table 2: “Cell thickness” – Wrong term

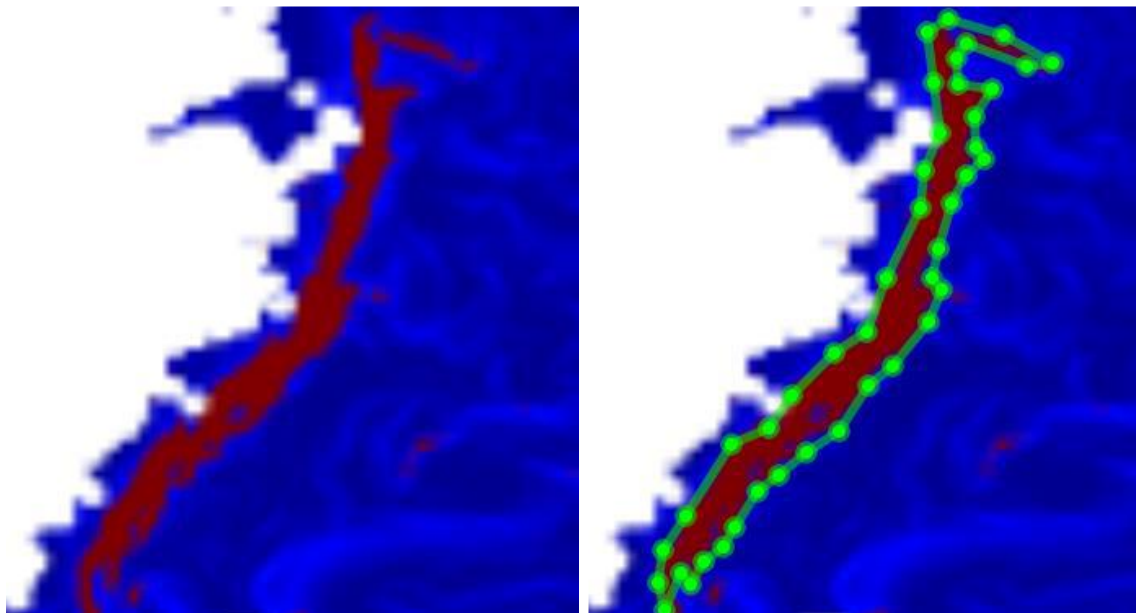
Table 2: “Mercator Ocean Internationa” should be “Mercator Ocean International”

L230-235: This paragraph is an example of the extremely redundant and verbose style of this manuscript:

“To create a gradient image, the gradient of the original temperature data was computed using formulas Fig.5 displays the gradient image of the Ocean Front Time Series in January 2023. The gradient image represents the spatial distribution of ocean fronts, indicating areas of sharp temperature gradients within the specified time period. The colors in the image represent different gradient intensities, with warmer colors indicating stronger gradients. The gradient image provides valuable insights into the spatial patterns and variability of ocean fronts during the specified time frame. It allows for a visual identification of regions with pronounced frontal activity, which is essential for understanding ocean dynamics and processes.” – Comments: The word “gradient” is repeated in every one of six sentences above, except for the last sentence.

Figure 6 (below). The image before marking (left panel) and after marking (right panel).

Comments: The marking algorithm is not explained.



L318: “depth learning” should be “deep learning”

L327-329: “Calculate the feature elements of the ocean front, extract the intensity and width of the ocean front at the corresponding longitude and latitude based on the recognition results of the ocean front, and thus achieve intelligent extraction of the position, intensity, and width of the ocean front.” -- Poor grammar. “Feature elements” have not been defined.

L333: “number of fronts” is a meaningless characteristic. Depending on a particular front detection algorithm, the number of fronts can vary by order of magnitude.

L334: “accuracy” has not been defined

L336: “intensity” has not been defined (assumed to be gradient magnitude)

L340: “width” has not been defined

L356: “ocean fronts are the most active and numerous in summer” – This conclusion is highly questionable. See Hickox et al. (2000, GRL) (“Climatology and seasonal variability of ocean fronts in the East China, Yellow and Bohai seas from satellite SST data”).

L373: “Meteorological conditions such as wind, clouds, precipitation, and atmospheric pressure may affect the clarity and visibility of satellite images.” – Atmospheric pressure does not affect satellite images.

L375: “surges” – What’s that?

L389: “The rapid changes in hydrological conditions may affect the shape and position of the front.” – Shape has not been defined.

L393: “Underwater” should be “Subsurface”

L396: “comprehensive” should be “combined”

L406-408: “An important ocean phenomenon, rapid and accurate detection of ocean front is of great significance to marine ecology, fishery resources and typhoon path prediction. In view of the scarcity and weak edge characteristics of ocean front data, the data are expanded in various forms to increase the data set effectively.” – Just another example of “word salad” of little, if any, interest to the reader. The “weak edge characteristics” have never been explained or illustrated. The phrase “the data are expanded in various forms to increase the data set effectively” is meaningless.

L408: “depth learning” should be “deep learning”

L410: The phrase “the recognized front has good independence and integrity” is meaningless.

L414: “small-scale fronts” are mentioned here but scales have not been discussed at all.

L420: “The deep learning method outperforms traditional methods in extracting feature parameters such as ocean front intensity and width.” – There is no proof in this study. Such claims must be supported by data.

L422: “scale” is mentioned again. See L414.

===== END of REVIEW =====