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Interactive comment on "Exceptionally cold water days in the southern Taiwan Strait: their predictability and relation to La Niña" *by* Yu-Hsin Cheng and Ming-Huei Chang

Anonymous Referee #2

Received and published: 9 February 2018

It is very delighted to see these authors to describing the Exceptionally cold water days in the southern Taiwan Strait: their predictability and relation to La Niña. This manuscript tried to assess the predictability of exceptionally cold water and to develop a warning system in the Taiwan Strait (TS). It was clearly written, and already to develop one warning system using the Oceanic Niño Index and integrated wind speed. But it is still difficult to apprehend whether the authors were mainly concerned of "Exceptionally cold water days in the southern Taiwan Strait". Firstly, the authors need to clearly define the cold waters days or the hotspot area (such as Penghu islands) as they demonstrate exceptionally cold water hit the marine natural resources around the Penghu Islands in the southwestern TS, causing considerable damage in marine

aquaculture. Secondly, "cold damage" is still unclear. Based on the description in this submission, the "cold damage" should be a kind of biological or ecological response to low water temperature in the waters around Penghu islands. Therefore, the authors need to consider where is the optimum area for developing the warning system on "Cold damage". And, the analysis or observation on the impact of marine resource or aquaculture production of hotspot area (NOT equal to the blue dotted quadrilateral in Figure 1) may important in the session of result or discussion. For example, the author showed a moderate SST belt extending from southwest to northeast, and an isotherm of nearly 18 °C across the northern Penghu Islands in fig.3a. It might reveal to separate the colder water in the west from the warmer water in the waters of northern Penghu Islands (Not in the southeastern TS). Thirdly, risk definition is also unclear. I did not know whether the risk include both of the vulnerability and impacts. I was also tried to search similar report for Coral Bleaching Products of NOAA (http://www.ospo.noaa.gov/Products/ocean/coral_bleaching.html) for high risk influenced by the vulnerability and impacts . They indicate the accumulation of thermal stress (i.e. Degree Heating Weeks, DHWs) that coral reefs have experienced over the past 12 weeks. At the same time, they also define the magnitude of impact levels as : the minor (<25% affected), moderate (26–50% affected), and severe (>50% affected) bleaching responses observed at the study sites. If possible, please try to explain the risk in this manuscript. Fifthly, the warning system found the high risk (or hazards) happened in the years of 2000, 2008, 2011 and 2012. But the reference only indicates the "cold damage" happened in 2008 and 2011 (Chang et al., 2013), How about the condition in 2000 and 2012. I suppose there are weak cold damages in years of 2000 and 2012. If so, the authors should consider to explain or discuss about what's the difference of marine environment or wind condition between cold damage (2008 and 2011) and weak or non-cold damage (2000 and 2012) years. And if possible, please add one sub-figure for cold events in 2000 to compare the annual variations in figure 11, as the authors describe the cold damage around the Penghu Islands has occurred three times: 2000, 2008, and 2011 (line 30-31, page 2). Otherwise, the Oceanic Niño

Index (ONI), defined as a 3-month running mean of SST anomalies, is describe in the line 10, page 3. However, the ONI indexes in January, February and March 2012 are -0.8, -0.6 and -0.5, respectively. It seems that the 2012 winter did not match up with the first definition of <-0.9âĐČ. Why? And whether the author is considered to describe or discuss about the long-term variation or trend in Taiwan Strait as the topic is focus on "Exceptionally cold water days". If so, a new publish was suggested as your reference "Kuo et al., 2017 or 2018, Long-term observation on sea surface temperature variability in the Taiwan Strait during the northeast monsoon season, International Journal of Remote Sensing".

Specific: 1. There are too many errors of reference forms in the reference sections. For example, the format in line 17 and 25 of page 9 for references are different as following: Line 17: Kuo N-J, Ho C-R (2004). . .. Line 19: Lau N-C, Nath MJ (2006). . . Line 25: Lu Yi-Lin, Hsien I-L, Chung C-S, Lin, C-Y, Chen S-C, Tsai W-S (2012) Please check in detail by yourself. 2. L19∼20 of page 1, The authors may consider to modify the geographic term, for example, the average depth is 50 m, as they also use the description "approximately 30 m" for the Taiwan Bank. 3. Please try to explain the importance of this sentence "A lag-0- to lag-6-month correlation between rainfall anomalies in western Pacific and the peak La Niña was also observed by Wang et al. (2000)." (line 29-30, page). Did author try to say something using this sentence. 4. L8∼L9 of page 3, the authors use "the 60 coldest days of winter based on the climatologically averaged SST (January 6–March 6 in non-leap years, and January 6–March 5 in leap years)" is not easy to understand the coldest days. The authors may consider to add one figure or supplement figure for this. In addition, please confirm the definition of SSTA in line 17 of page 3. The sea surface temperature anomaly (SSTA) is the difference between the observed SST and the climatological SST. Did author use which the climatological daily SST is? In general, the SSTA is good indicator to see the long-term warming or cooling trend.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-

2017-414, 2018.