

# Analysis Of Data Climate The Several Town In Indonesia For Support The Development Of Standard Adaptive Comfort The Traditional Homes.

Wahyu Sujatmiko <sup>1</sup>, Amat Rahmat <sup>2</sup>, Karto Wijaya <sup>3</sup>

<sup>1</sup> Research Center for Human Settlements, Ministry of Public Works and Public Housing

<sup>2,3</sup> Architecture Program, Faculty of Civil Technology and Planning (FTSP), Universitas Kebangsaan

Email: wahyu.s@puskim.pu.go.id

**ABSTRACT** : According to the adaptive thermal comfort approach, the neutral temperatures or the comfortable temperature of building occupants can be predicted based on the average data of the outdoor air temperature in the vicinity of the residential buildings. Generally the residents of the residential buildings still feel comfortable in the range of zones 80% or plus minus two and a half degrees of comfortable temperature.

This paper attempts to analyze the typical annual climate data was published by ASHRAE RP 1477 in the Year 2011 for the purpose of estimating the comfort zone of traditional buildings in Indonesia. The method was used is the statistical data processing of 28 cities in Indonesia, to be presented in the form of average, minimum, maximum, daily and monthly data. It is expected that this method will get selected daily data profile and monthly data. Furthermore, the monthly data calculated comfort zone follows the adaptive thermal equation of ASHRAE 55 2004.

The existing data are expected later to be used to compare with the actual data of mean vote which have accumulated over several years of this measurement for prediction the comfort level of the existing traditional dwelling.

**Keywords** : Typical Annual Climate Data; Adaptive Thermal Comfort; ASHRAE; Traditional Buildings; Natural Ventilation

## INTRODUCTION

The Measurement of comfort level from the traditional residential thermal has been done by Traditional Research Centre since 2008 with the writer was opportunity to do the measurement at several locations in Bali, Sumba, Lombok, Flores, Sumbawa, and Timor. If the data and also all of data from colleagues other researchers collected it can be compiled a data base thermal comfort level of traditional dwelling in Indonesia.

A comparable appraisal may be the adaptive thermal comfort data formulated by ASHRAE 55 in the adaptive thermal comfort section. The ASHRAE formulation shows that the occupancy thermal comfort level can be approximated from a thermal insulation zone formulation, where the temperature is conveniently correlated with the mean outdoor air temperature of the building. Thus the climate data is a reference data that is very useful for prediction of thermal comfort level of the dwelling.

This paper was attempts to formulate a comfort zone referring to the typical annual climate data that ASHRAE has been formulated and collected for 28 cities in Indonesia.

## METHODS

A naturally ventilated building in humid tropical climatic conditions like Indonesia is a challenge for the energy savings, because the solutions with air conditioning waste a lot of energy. The problem of natural ventilation design of the building envelope is relatively more complex than the design for buildings with air conditioning for tropical, hot and humid climate conditions.

Excess humidity and solar radiation so that excess high temperatures make passive cooling designs dependent on building envelopes was very difficult to apply. It is a challenge to build a passive system design. Thus the climate data can be a basis for the study of the performance from passive systems of traditional building occupancy. There are two kinds of approaches for thermal comfort; namely the static model and the adaptive model. The static thermal comfort model is the classical model of the thermal comfort, with use of thermal indexes such as PMV (predicted average sound) (Fanger, 1970), which can be calculated with ASHRAE Comfort Thermal software. The convenient solution to the classical model is based more on use of air conditioning engines, less exploring passive system

architecture. Thus the approach to thermal comfort is more suitable for exploring the thermal comfort of traditional building dwellings is adaptive approach, ie ASHRAE 55 (2004) thermal comfort standard. The formulation of the adaptive thermal comfort of ASHRAE, according to de Dear and Brager (2001) as used in Sujatmiko (2015) are:

$$T_n = 17.8 + 0.31 * T_o \quad (1)$$

With  $T_n$  is the neutral temperature or comfortable temperature (in oC) and  $T_o$  is the average monthly outer air temperature (in oC).

The method was used is: a. First, ashrae's climate tabulation data for aspects of radiation data, illumination, temperature, humidity, wind speed and direction to be analyzed statistically into the daily typical monthly and monthly profile data. B. Make a neutral temperature calculation or comfortable temperature and the arta 80% comfortable zone was refers to the adaptive thermal formulation ashrae 55. C. Analysis of results against sni planning standards of existing building passive cooling systems.

The cities was analyzed include a number of cities in Sumatra, Kalimantan, Java, Bali, Lombok, Flores, Sumba, Sumbawa, Timor, Sulawesi, Maluku and Papua island as shown in the following figure:

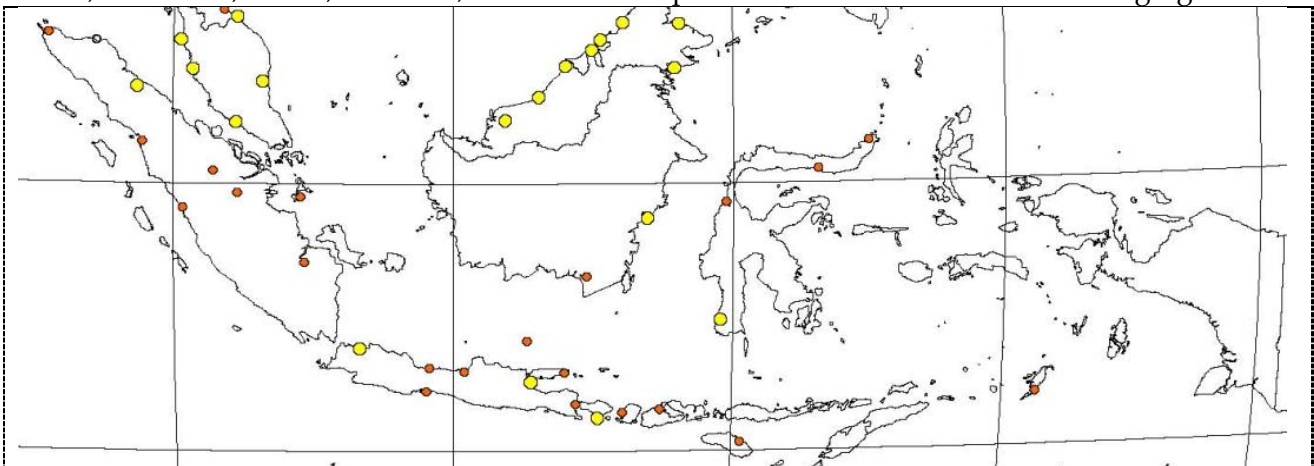


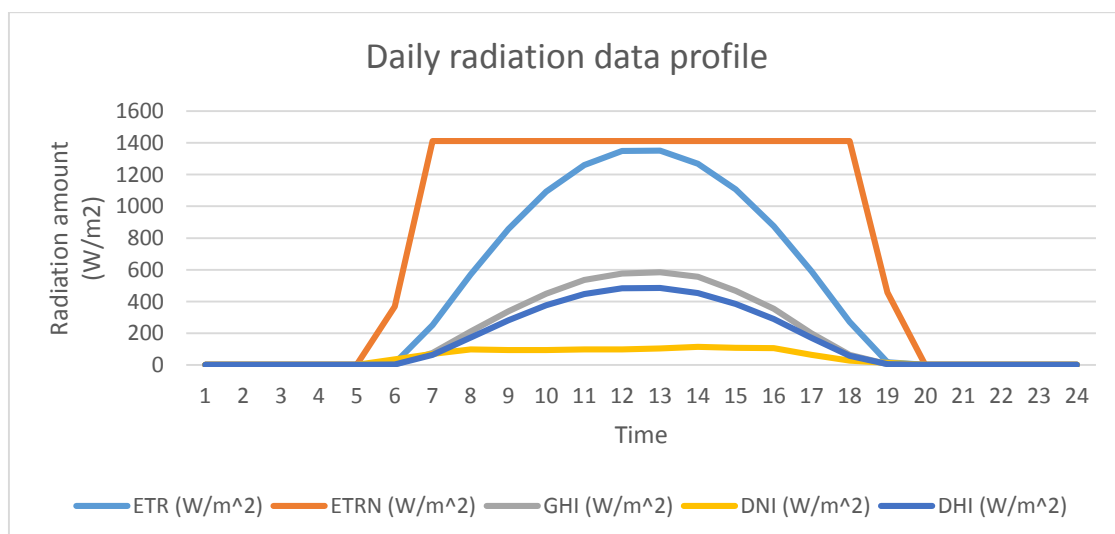
Figure 1. The location of the analyzed climate data refers to the typical annual ASHRAE climate data

## RESULTS AND DISCUSSION

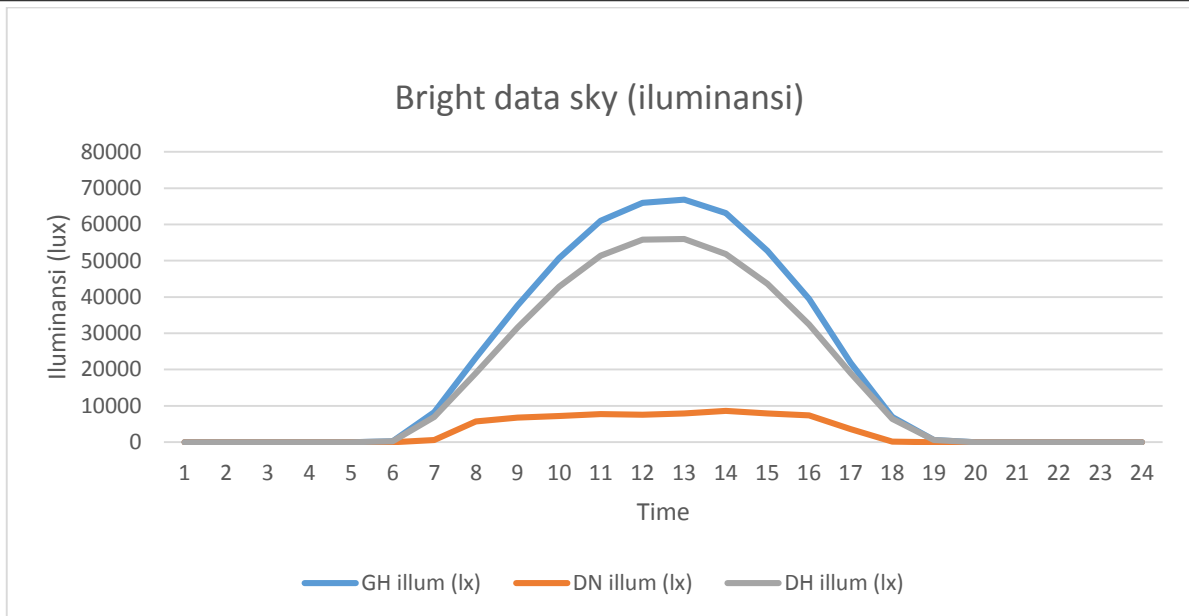
Full results will be submitted. Here are presented some results as an illustration:

### 4.1. Daily and Monthly Climate Data Profiles Each City In the climate data section will be presented several things:

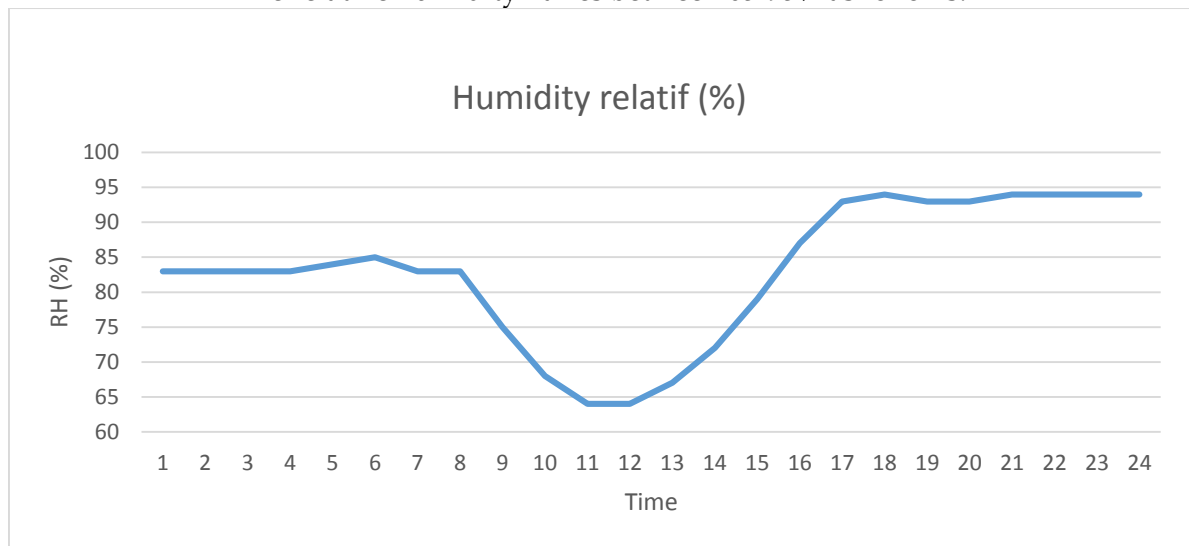
1. Selected daily and monthly climate data profiles in reference data cities (maps in Fig.). The following is provided sample data for one city in the form of daily average in January. Given the large amount of data and page constraints it is likely to show only average monthly data from typical annual climate data.



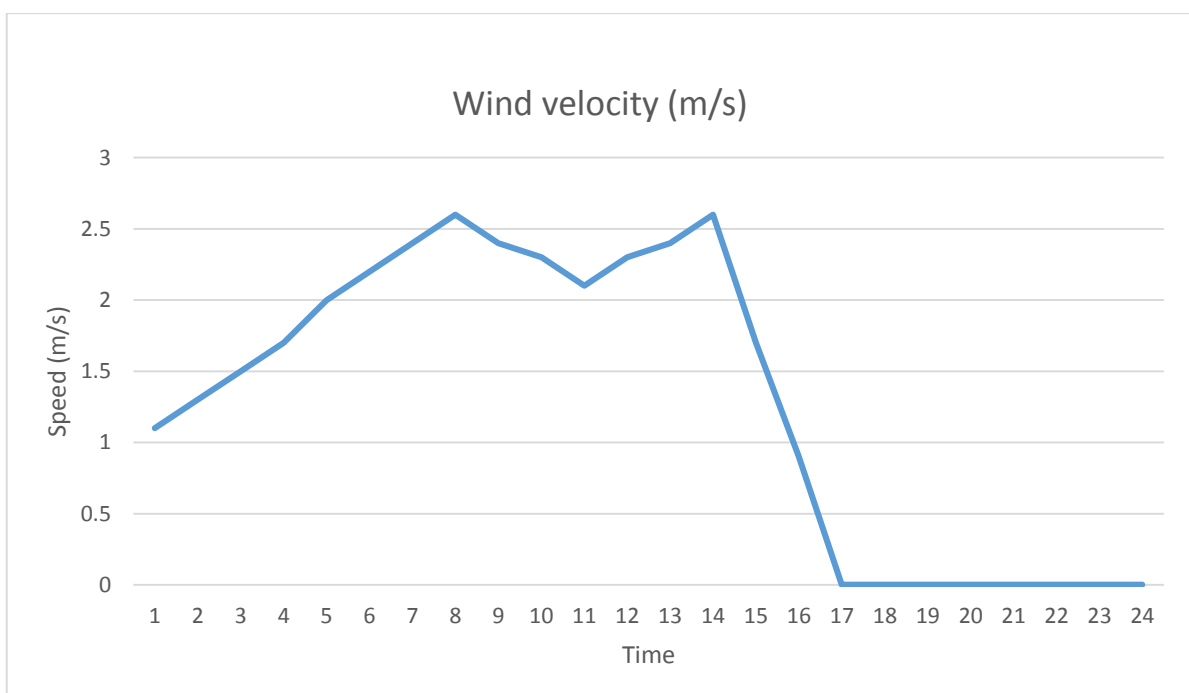
There is also bright sky data is in the following picture. When compared with the sky data of 10,000 lux planning lighting, there is considerable variation if the maximum price is obtained.

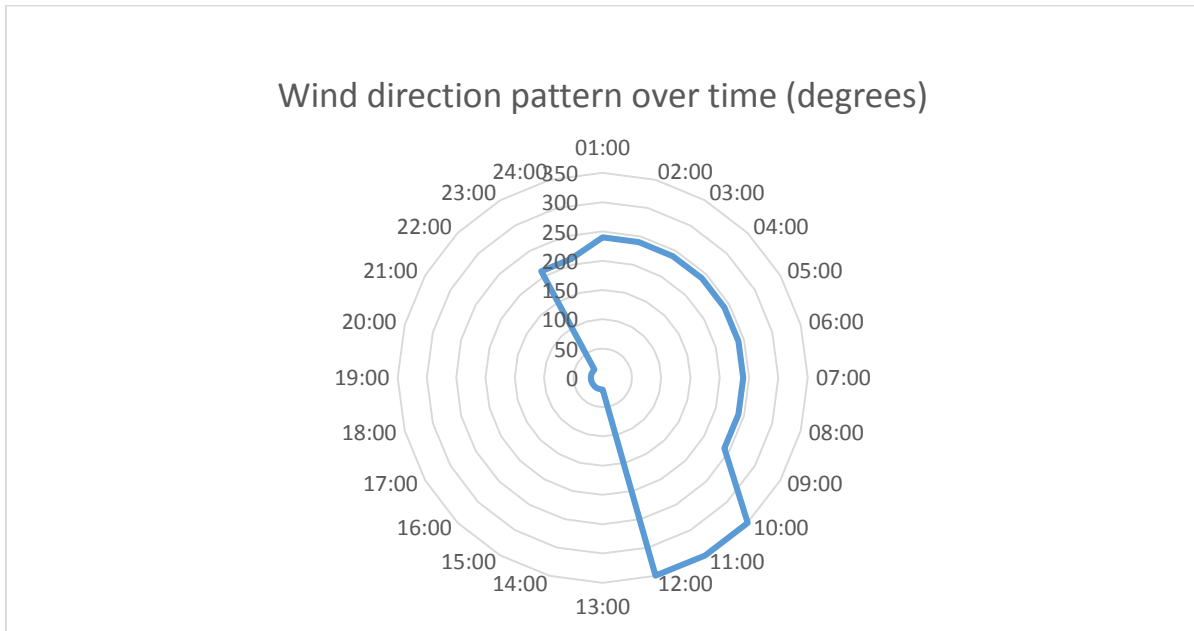


The relative humidity varies between 65-95% as follows:



Wind flow patterns and directions are presented in the following figure:

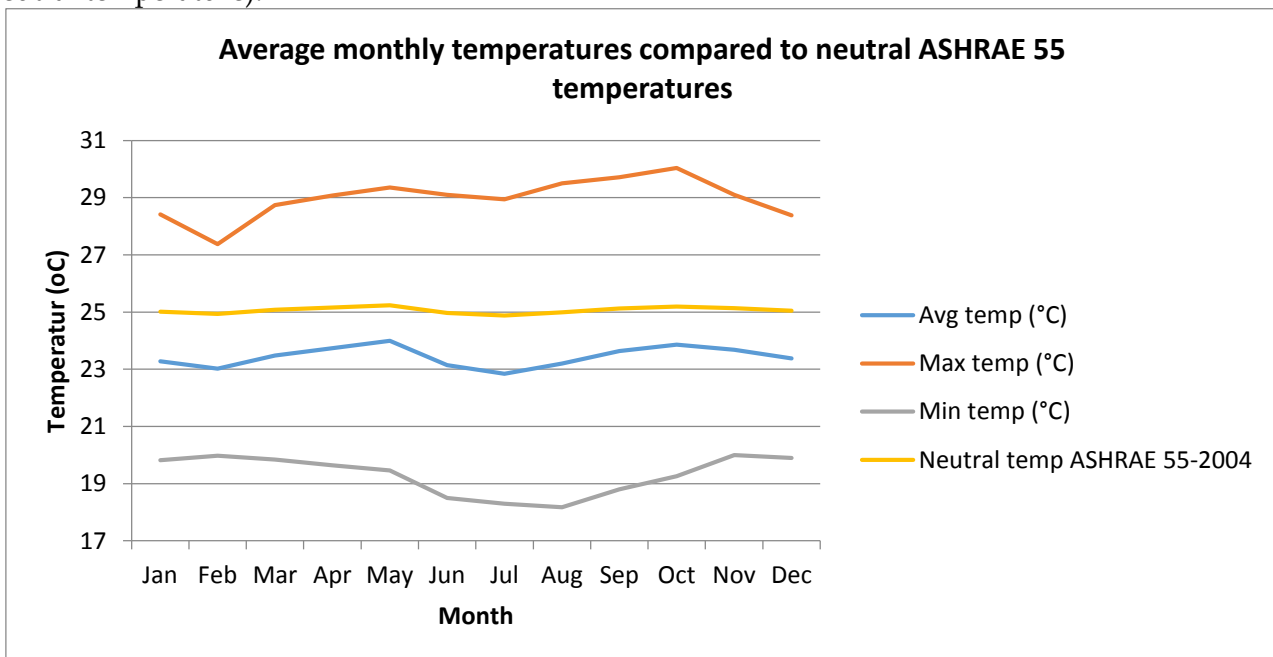




**4.2. Karta Zone Comfortable Every Town**

Average city air temperature data comparable with neutral temperature data in accordance with ASHRAE 55 for the city and the comfort zone range of 80% (or plus minus 2.5 oC from neutral temperature).

Here is presented one example of the results (images excluding the range plus minus 2.5 degrees of neutral temperature).



**CONCLUSION**

This paper will present the results of climate data analysis for a number of several cities in indonesia by referring to typical annual data by the ashrae method and the thermal comfort zone data by using the ashrae 55 thermal formulation 55. The existing data can be compared with the actual result of the mean ode has now been collected into a kind of thermal impression database of traditional building dwellings. Such data can be a guide in the assessing the performance of traditional residential thermal and the formulation of traditional thermal comfort thermal standards.

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