UNIVERSITI TEKNOLOGI MARA

EVALUATION OF SATELLITE PRECIPITATION PRODUCTS (CHIRPS DATA) IN PENINSULAR MALAYSIA USING GOOGLE EARTH ENGINE (GEE)

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ABSTRACT

The lack of data in areas with few rain gauges to conduct any hydrological study may be overcome through satellite-based precipitation products and reanalysis precipitation products. The global coverage products in the Google Earth Engine (GEE) data analysis platform's repository provide geospatial information that can measure the amount of precipitation. Nevertheless, it is important to evaluate the reliability of the products. Thus, the aim of this study is to evaluate the reliability of satellite and reanalysis precipitation products (CHIRPS Dataset) stored in the GEE repository compared to rain gauge observation from 2011 to 2021 using data from four (4) stations (Cameron Highlands, Bayan Lepas, Subang and Gong Kedak) in Peninsular Malaysia.. The objectives of this study are; i) to determine the trend of the CHIRPS dataset and rain gauge observation from 2011 to 2021 at four (4) selected stations, ii) to determine the correlation of the CHIRPS dataset and rain gauge observation in the years 2011, 2016 and 2021 by monthly and monsoon at four (4) selected stations, iii) to map the precipitation CHIRPS dataset in 2011, 2016 and 2021 in Peninsular Malaysia. A statistical method to measure the strength of the linear relationship between two variables and compute their association called correlation analysis was performed in this study. The results show station Gong Kedak consistent with the highest correlation between rain gauge observations and CHIRPS dataset in 2011 and 2016. In 2021, the highest correlation is station Bayan Lepas. Meanwhile, station Cameron Highlands consistent with the lowest correlation in 2011, 2016 and 2021. All the stations in Inter Monsoon 2 consistent with the higher correlation in 2011, 2016 and 2021. Meanwhile, Southeast Monsoon consistent with the lowest correlation in 2011, 2016 and 2021. In Southeast Monsoon, station Gong Kedak consistent with the lowest correlation in 2011 and 2016. But, in 2021 the with the lowest correlation is Bayan Lepas. In conclusion, CHIRPS data is an alternative that can be used to estimate rainfall distribution in Malaysia.

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1 CHAPTER 1
INTRODUCTION

1.1 Introduction

This chapter will explain the research background, problem statement, aim and objectives, significance of study, research questions, scope and limitations of this thesis work.

1.2 Research Background

The principal implications of global warming are expected to be an increase in the frequency and intensity of extreme rainfall events (Cheng et al. 2012). Intense rainfall on short time scales or persistent rainfall on long time scales frequently result in massive floods, putting people in danger. Unpredictable rainfall events wreak havoc in Peninsular Malaysia, costing millions of Malaysian ringgits to repair. Increased rainfall intensities have contributed to an increase in massive flood cases, including flash floods and landslides, over the last decade (Syafrina et al., 2015).

Rainfall is an important factor that affects the economy and food security in an indirect way (Kinda & Badolo, 2019). Rainfall is associated with economic growth. In general, benefits dry and impoverished areas that rely heavily on rainfed agriculture. Thailand is a middle-income country with a tropical climate, though rainfall varies depending on region. Due to its narrow topography running north-south and bordering the Andaman Sea to the west and the Gulf of Thailand to the east, the northern and northeastern regions receive little precipitation, whereas the southern region receives the most (Sangkhaphan & Shu, 2020). Despite the fact that the majority of Kenya's population depends on agriculture for food and a living, agricultural productivity is expected to decline as erratic rainfall increases. Weather and climate variability and change have a greater impact in Kenya's arid and semi-arid lands (ASALs) (Omoyo et al., 2015). According to Edame et al. (2011), climate change is anticipated to further diminish agricultural output and make production more unpredictable in most nations where agricultural productivity is already low and the methods of dealing with unfavourable events are limited. They also predict that agricultural productivity in Africa, Asia, and Latin America will fall by up to 20%. (Edame et al., 2011).