

## Seasonal variability of stable isotopes in precipitation over Indonesia observed for 2010-2018

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This study reveals the seasonal variability of stable isotopes in precipitation over Indonesia based on weekly rainfall sampling from 2010 to 2018 at 63 stations belong to Indonesia Agency for Meteorological, Climatological and Geophysical (BMKG). More than 4,300 samples were collected and analyzed stable water isotopes ( $\delta^{18}\text{O}$  and  $\delta\text{D}$ ) by using the Cavity Ring-Down Spectroscopy (Picarro, L2120i) in the Hydrology Laboratory of Kumamoto University, Japan. Daily rainfall amount data was used from the Global Satellite Mapping of Precipitation (GSMaP) by JAXA/EORC. Monthly mean  $\delta^{18}\text{O}$ ,  $\delta\text{D}$ , and d-excess values weighted by the rainfall amount was calculated from the dataset.

The Cluster analysis was used to distinguish the spatial grouping of seasonal variability of monthly rainfall. As a result, there are three clusters in this region. Clusters 1 has clear seasonal patterns with the highest in the dry season and lowest in the wet season which stations are located in central Indonesia around Java Sea. Cluster 2 shows opposite patterns of the Cluster 1 located in east Indonesia. There is not significant seasonal variation in Cluster 3, which stations are located in the Java Island near the Equator.

From monthly mean  $\delta^{18}\text{O}$  data at 40 observation sites, multiple regression analysis was performed using latitude, longitude, and rainfall amount as explanatory variables. A significant correlation was observed from May to December, while not significant in other months. Especially from January to March, monthly mean  $\delta^{18}\text{O}$  in rainfall has not any significant correlations with these three variables because the  $\delta^{18}\text{O}$  values are spatially uniform over this area.

Keywords: Indonesia, stable isotopes in precipitation, seasonal variability