Relationships between the variations of rainfall in Indonesian rainy season and SOI/SST during 1980-2009 in highland area; case study in Gunung Kidul, Yogyakarta, Indonesia

Bayu Dwi Apri Nugroho*, Hiromitsu Kanno**, Ryoji Sameshima**, Hiroshi Fujii***, and Prima O.D.A****
*The United Graduate School of Agricultural Sciences, Iwate University, Japan
**National Agricultural Research Center for Tohoku Region, NARO, Japan
***Faculty of Agriculture, Yamagata University, Japan
****Faculty of Software and Information Science, Iwate Prefectural University, Japan

A. Introduction
Since 1980's, climate abnormality occurred in Indonesia and one of the effect from climate abnormality is in rainfall. As reported by Irawan (2002), that in Indonesia, the decrease of rainfall during El Nino in 1997 was -39.9%. Effect of climate abnormality in rainfall is severe drought in Indonesia and mostly affected in highland area.

Gunung Kidul district is one of the highland areas, part of Yogyakarta Special Province in Java Island (Figure 1). Gunung Kidul district is an area which depends on rainfall in agricultural sector. It is necessary to explore relationships climate abnormality with agricultural crops production. Elevation of this area is from 0 m to 700 m above sea level. This study examines distribution of precipitation in rainy season (October - March) during 1981-2009 in Gunung Kidul and correlations with Southern Oscillation Index (SOI) and Sea Surface Temperature (SST).

B. Data and Methods
The rainfall data from 1981-2009 in 11 points were collected from the precipitation observation stations of Agricultural Service for Food Crops and Horticulture, Gunung Kidul district. The SOI and SST data were collected from Japan Meteorology Agency (JMA) web-site. SST area is IOBW. The spatial data of Gunung Kidul district with a scale 1:25,000 is taken from National Coordinating Agency for Survey and Mapping (Bakosurtanal) Republic of Indonesia.

The precipitations are the average of accumulative rainfall during rainy season (October to March) from 1981 to 2009 in each station. Correlations between the precipitation and SOI/SST were calculated in all period and in 11-years running period.

C. Results and discussion
Distribution of precipitation in Gunung Kidul is shown in Fig.2. The precipitation is large at seaside and hilly area-southern and northern areas, and little around the central low-land area. Correlations between variations of rainfall in the rainy season and SOI/SST, the high correlation between variations of rainfall in the rainy season and SOI occurs in area (figures will be shown in the presentation), which has much rainfall. On the other hand, high correlation with SST occurs in area, which has less rainfall. The hypothesis is that; the west and the south areas are plain and near the sea, but in the east area, which less rainfall, the area is hilly topography, then the wind directions and mountain effect for precipitation might be different in each SST and SOI preference mode.