# Weather summary for 2014

Weather in Los Baños was summarized including observations taken every 15 minutes from automated weather observation systems. With this detail in weather monitoring, it was possible to describe weather patterns on different levels. This weather summary contains 3 sections. The first section is on annual weather patterns and corresponding monthly and seasonal changes of basic weather agro-meteorological variables. In the second one—with a record of extreme weather conditions underpinned as hottest day, coldest night, and most humid day—the changes within an extreme day, called a diurnal pattern, was graphed. In the third section, the development of a weather disturbance (typhoon) until its peak and dissipation as reflected on rainfall amount and maximum wind speed was described. This three-level presentation deepens the understanding of the changes in weather in Los Baños.

**A. Weather pattern**

Annual rainfall for 2014 was 2,025 mm for the IRRI dryland (upland) site and 1,992 mm for the wetland (lowland) site. These values were 90 mm higher than the long-term average rainfall total for the dryland site and 40 mm lower for the wetland site. Los Baños experienced extreme rainfall with the occurrence of typhoons Glenda and Ruby when daily total rainfall amount increased 16 times the average monthly rainfall amount (Fig. 1). The wettest day at IRRI occurred on 15 July with 242 mm rainfall. The longest recorded continuous wet spell was 16 days (9-24 July) at the dryland site and 19 days (6-24 July) on the wetland site. The longest continuous dry spell was 32 days at the dryland site (from 25 March to 25 April) and 29 days in the wetland site (28 March to 25 April). Mean monthly solar radiation reached the peak in April (20.1 MJ $m^{-2}$ $d^{-1}$ for dryland site and 19.9 MJ $m^{-2}$ $d^{-1}$ for wetland site), then it gradually declined in December (9 MJ $m^{-2}$ $d^{-1}$ for both sites). The highest recorded daily accumulated solar radiation for 2014 was on 30 March (24.7 MJ $m^{-2}$ $d^{-1}$) at the dryland and 11 September (24.3 MJ $m^{-2}$ $d^{-1}$) at the wetland site.

The highest mean monthly duration of bright sunshine was 9.3 hr $d^{-1}$ in April, and declined to low values of 2.9 hr $d^{-1}$ in December. The longest record of sunshine in Los Baños was on 29 June, with 12.2 hr of bright sunshine.

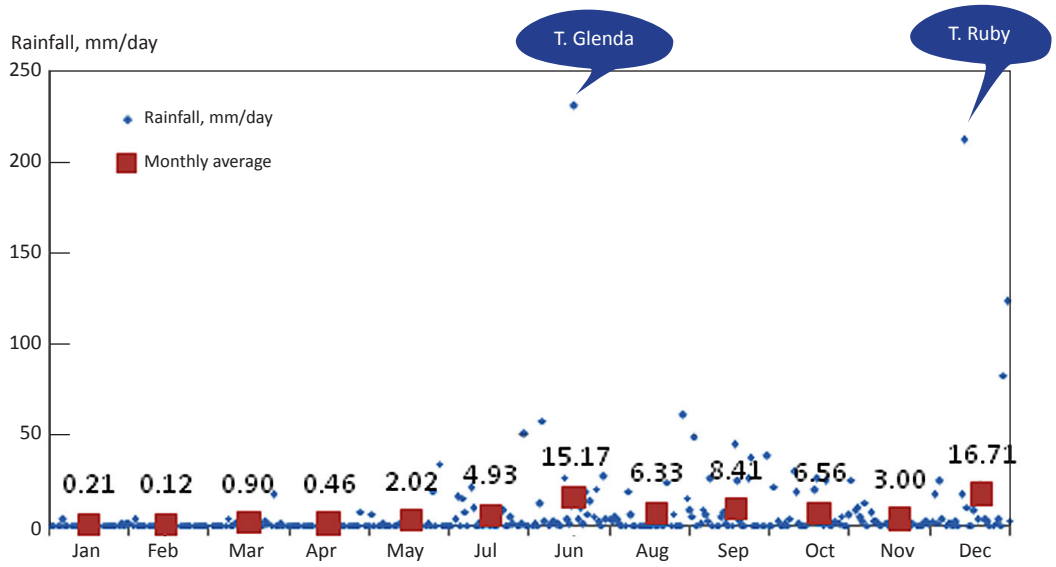


**Fig. 1. Comparison of daily total rainfall (blue diamond) and monthly average rainfall amount (red squares with labels) in mm $day^{-1}$. The occurrence of Typhoon Glenda in July and Typhoon Ruby in December increased the rainfall amount to much more than 10 mm $day^{-1}$ as the daily rice water requirement.**

Maximum temperature reached its highest value on 18 May (36.5 °C at the dryland site) and on 20 May (36.3 °C at the lowland site). The lowest recorded values in January was 21.3 °C in the dryland site and 21.4 °C in the wetland site. Twenty-nine days of 2014 had a temperature reading of more than 35 °C and most of these hot days occurred in April, May, and June. There were eight days which had a temperature of more than 36 °C.

The monthly average of minimum temperature slightly increased from January to May, and gradually decreased till December. The coldest day of 2014 in Los Baños was 25 January (16.5 °C at the wetland site and 16.6 °C at the dryland site). There were 49 days with a minimum temperature of more than 25 °C. Most of the warm nights occurred between April and May. Four warm nights per month were also recorded between September and November.

Daily mean wind speed measured at a 2-m height was 1.7 m $s^{-1}$ for the dryland site and 1.4 m $s^{-1}$ for the wetland site. Wind speed was generally low (>2.0 m $s^{-1}$) except during the occurrence of tropical weather disturbances. Typhoon Glenda had a peak wind speed of 40 m $s^{-1}$ at 2:00 in the morning of 16 July. Daily mean wind speed was only 7.1 m $s^{-1}$ at the dryland and 6.8 m $s^{-1}$ at the wetland station.

Because of a slightly higher temperature, lower amount of rainfall, and higher vapor pressure deficit at mid-day, free water evaporation in the upland site was slightly higher than the wetland site. Open-pan evaporation total were 1,912 at the dryland site and 1,759 at the wetland site. These values were 108 mm higher than the long-term evaporation total at the dryland site and 104 mm higher than the long-term evaporation total at the wetland site.

**B. The diurnal weather pattern**

Earlier, we looked at patterns within the year and identified months within wet or dry cropping seasons. Now, with diurnal patterns, we look at weather changes within the day. Patterns on the hottest day (20 May), coldest night (25 January), and the most humid day (9 August) from the wetland site are presented.

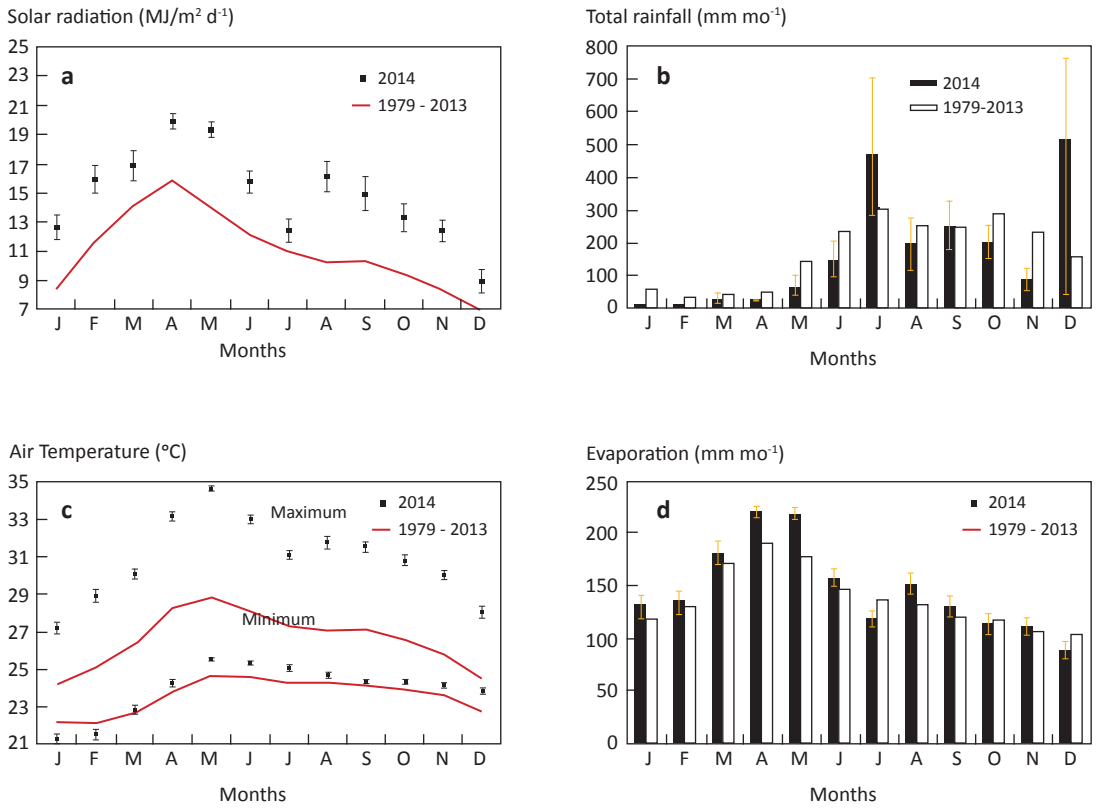


**Fig. 2. Annual weather patterns for (a) daily solar radiation in MJ $m^{-2}$ $day^{-1}$, (b) total rainfall mm per month, (c) maximum and minimum air temperature in °C, and (d) total evaporation per month.**

Figure 3a shows temperature trends within a day of maximum temperature (blue line) and minimum temperature (red line) from the wetland site. Both the hottest and coldest days followed a similar diurnal pattern, in which the sun rose at 6:00 a.m. Temperature continued to rise at 10:00 a.m., leveled for a few hours, then declined gradually until 6:00 p.m. The highest diurnal difference was 10 °C. The blue line shows hot temperatures (> 34.7 °C) from 10:00 a.m. till about 2:00 p.m. The coldest temperature (16.5 °C) occurred from about 5:30 a.m. until 7:00 a.m.

Lowest relative humidity on record occurred (Fig. 3b) from 2:00 to 4:00 p.m. From 90% values in the morning, relative humidity gradually dropped to its lowest (64%), remained low (65–70%) until 4:00 in the afternoon when it gradually increased, and, by midnight, relative humidity was back to >90%. It remained high until the sun rose again the following day.

## C. Typhoon Glenda

Some weather events were not confined within a day, like the most memorable weather event at IRRI for 2014. When Supertyphoon Glenda passed over Los Baños in mid-July, it rained continuously for more than 16 hours. Figure 4a shows four continuous rainfall events from 14 to 16 July, each event corresponding to strengthening rainfall ringbands of Typhoon Glenda. Rainfall events were characterized by peaks at 8 mm, at 12 mm, and at >18 mm. The last ringband was nearest to the eyewall of the typhoon, which brought the strongest force of winds and rains. The highest recorded 24-hr amount of rainfall was 242 mm on 15 July. In Figure 4b, wind speed remained below 5 m $sec^{-1}$, then gradually increased as the typhoon eye came nearer and reached a peak (40 m $sec^{-1}$) at about 6:00 on the morning of 16 July.

Despite the continuously changing weather, typical climate extremes and weather patterns could be distinguished in Los Baños.

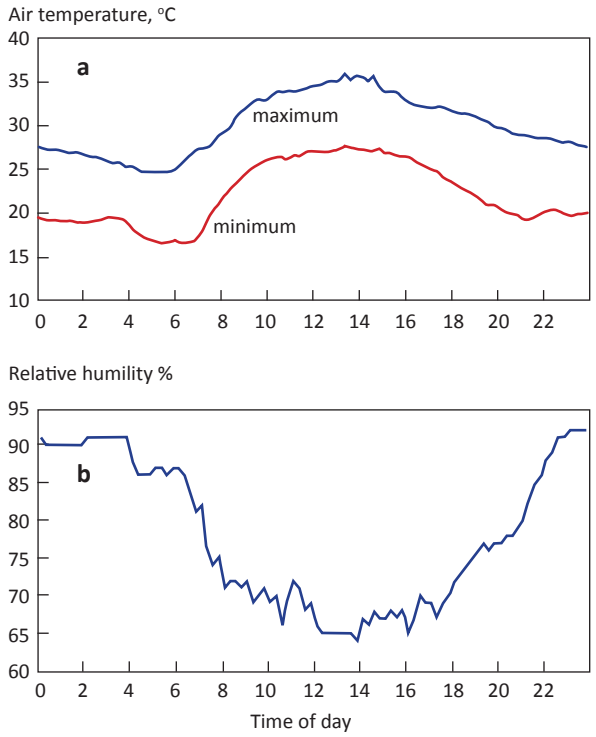


**Fig. 3. Diurnal patterns of extreme (a) temperatures (°C) and (b) humidity (%) recorded in 2014. X-axis is time of day from midnight. Observations were recorded every 15 minutes.**

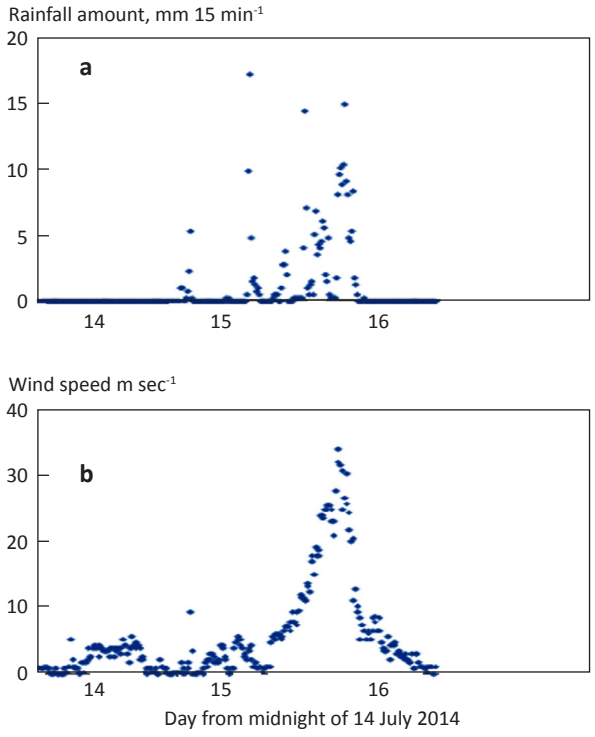


**Fig. 4. Weather patterns during the passage of Typhoon Glenda over Los Baños. IRRI wetland station (a) rainfall amount in mm and (b) maximum wind speed m $sec^{-1}$. Observation points were reported every 15 minutes, giving 96 observations per day.**