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SUMMARY OF THE 2011 TYPHOON SEASON

(Item 4 of the Provisional Agenda)

Submitted by the RSMC Tokyo - Typhoon Center

Review of the 2011 Typhoon Season

Provided by RSMC-Tokyo

In the western North Pacific, 21 named tropical cyclones (TCs) formed in 2011 and eight reached typhoon (TY) intensity (see Table 1). The total number of 21 is the fourth least since 1951 because only two named TCs formed from October to December, which is the record-tying least number since 1951. The mean formation latitude** and longitude** was 16.2°N and 134.7°E, showing small deviation to the west from the 30-year average* (16.2°N and 137.4°E).

In May, two named TCs formed near and east of the Philippines (see green lines in Figure 3) and Aere(1101) damaged the Philippines.

10 named TCs formed from June to August (see red lines in Figure 3). Nock-ten(1108) which formed near the Luzon Island in July moved westward and damaged the Philippines, the southern China and the Indochina Peninsula. Nanmadol(1111) formed over the sea east of the Philippines in August and moved northwestward, which damaged the Philippines and Taiwan. Talas(1112) formed over the sea west of the Mariana Islands in August and moved northward and damaged Japan.

Seven named TCs formed in September (see blue lines in Figure 3). The first four from Noru(1113) to Sonca(1116) formed north of latitude 20 degrees north and moved northward. Roke(1115) formed over the sea west of the Mariana Islands and moved northward and damaged Japan. Nesat(1117) and Nalgae(1119) formed over the sea east of the Philippines in late September and hit the Philippines in a row and brought damage.

Two named TCs formed from October to December (see yellow lines in Figure 3). Washi(1121) formed over the sea west of Palau Islands in December and moved westward, which brought heavy damage to Mindanao Island of the Philippines.

* The 30-year average is from 1981 to 2010

** Mean formation latitude (longitude) here is defined as the arithmetic average of the latitudes (longitudes) of genesis points of all TCs of TS intensity or higher

Table 1 List of the tropical cyclones reaching TS intensity or higher in 2011

Tropical Cyclone			Duration (UTC) (TS or higher)		Minimum Central Pressure (UTC) lat(N) long(E) (hPa)			Max Wind (kt)	
TS	Aere	(1101)	071200	May - 111800	May	081200	15.1 123.1	992	40
TY	Songda	(1102)	211200	May - 290600	May	260600	15.6 125.8	920	105
TS	Sarika	(1103)	091200	Jun - 110600	Jun	100000	18.9 117.6	996	40
TS	Haima	(1104)	211200	Jun - 241800	Jun	240000	20.6 108.2	985	40
STS	Meari	(1105)	220000	Jun - 270600	Jun	240900	23.6 125.0	975	60
TY	Ma-on	(1106)	120000	Jul - 241200	Jul	161200	21.9 137.1	935	95
TS	Tokage	(1107)	150000	Jul - 151800	Jul	150000	14.2 132.9	1000	35
STS	Nock-ten	(1108)	260000	Jul - 310000	Jul	280600	18.1 115.5	985	50
TY	Muifa	(1109)	280600	Jul - 090000	Aug	301800	16.6 132.4	930	95
STS	Merbok	(1110)	030600	Aug - 091800	Aug	071800	33.1 155.5	980	50
TY	Nanmadol	(1111)	231200	Aug - 310000	Aug	260000	16.7 123.9	925	100
STS	Talas	(1112)	250000	Aug - 050600	Sep	291200	24.1 140.1	970	50
TS	Noru	(1113)	031200	Sep - 061200	Sep	050600	35.1 150.0	990	40
TS	Kulap	(1114)	070000	Sep - 090000	Sep	070600	21.6 135.7	1000	35
TY	Roke	(1115)	130600	Sep - 220600	Sep	201200	30.3 133.6	940	85
TY	Sonca	(1116)	150600	Sep - 201200	Sep	190000	34.6 144.3	970	70
TY	Nesat	(1117)	240000	Sep - 301800	Sep	261800	16.2 122.9	950	80
TS	Haitang	(1118)	250000	Sep - 261800	Sep	250000	16.4 113.1	996	35
TY	Nalgae	(1119)	271800	Sep - 041800	Oct	010000	16.8 122.7	935	95
TS	Banyan	(1120)	101800	Oct - 110600	Oct	101800	7.7 128.9	1002	35
STS	Washi	(1121)	150600	Dec - 190000	Dec	160600	7.9 126.9	992	50

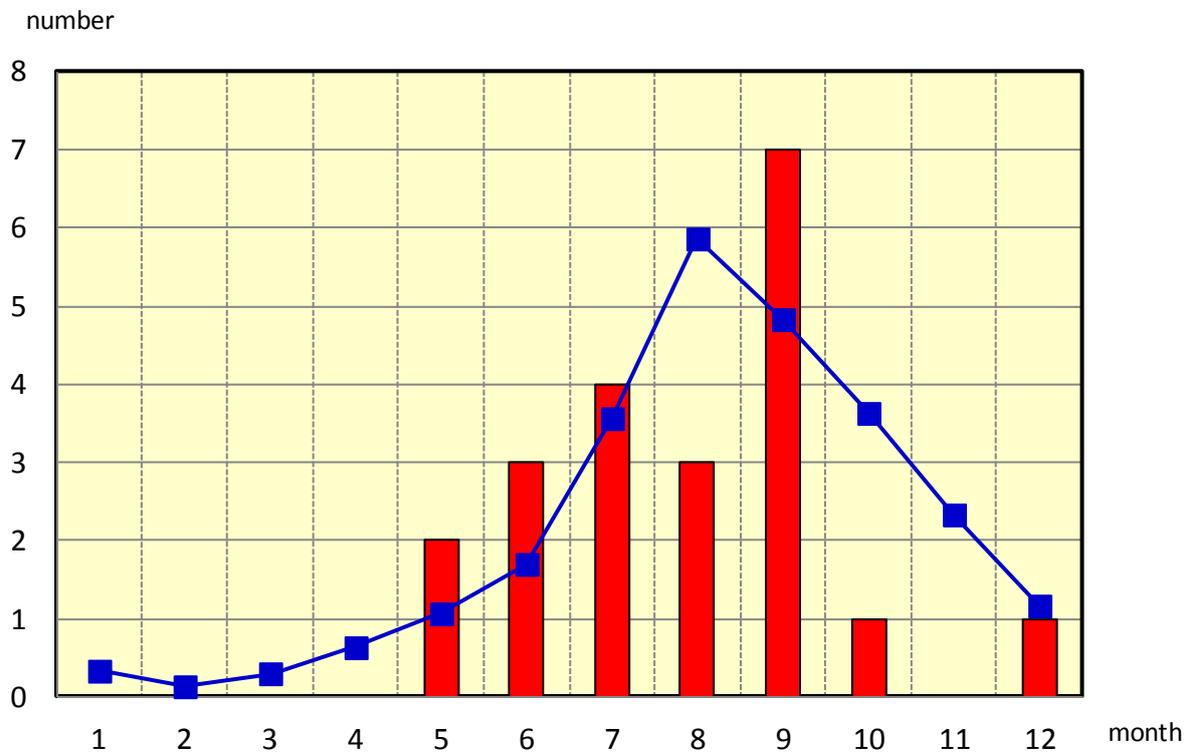


Figure 1 Monthly formation number of named TCs in 2011

Red bar: formation number in 2011, blue line: 30-year average from 1981 to 2010

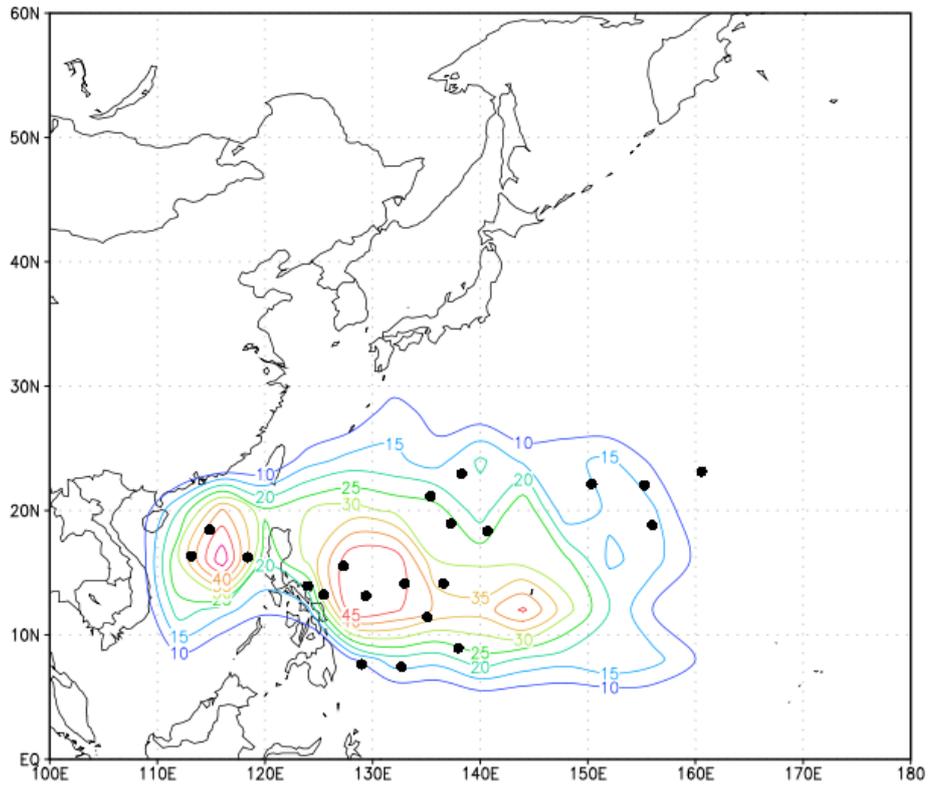


Figure 2 Genesis points of Tropical Cyclones in 2011 (dots) and frequency distribution of genesis points for 1951-2010 (lines)

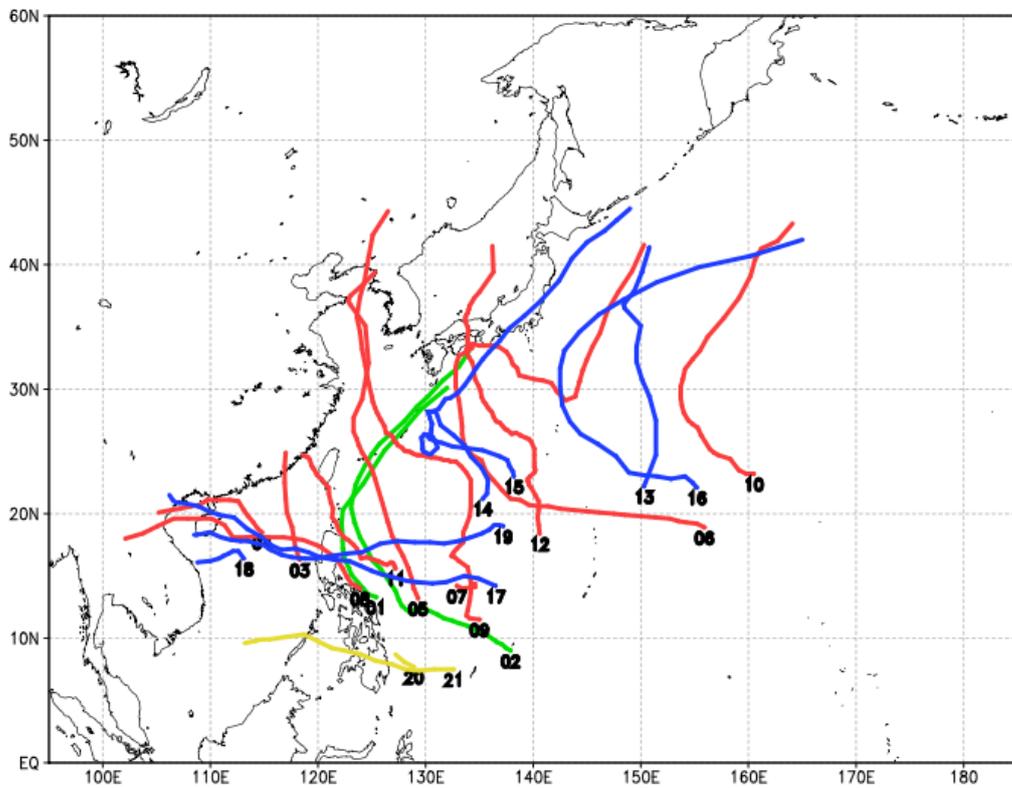


Figure 3 Tracks of Tropical Cyclones in 2011

The numbers represent the genesis points of named TCs (the last two digits of their identification numbers).

Narrative Accounts of the 20 Named Tropical Cyclones in 2011

AERE (1101)

Aere formed as a tropical depression (TD) over the sea east of Samar Island of the Philippines at 12 UTC on 6 May 2011. Moving northwestward, it was upgraded to tropical storm (TS) intensity at 12 UTC on 7 May and reached its peak intensity with maximum sustained winds of 40 kt and a central pressure of 992 hPa east of Luzon Island 24 hours later. After moving along the northeastern coast of Luzon Island, Aere turned northeastward and moved along the Okinawa Islands before it weakened to TD intensity south of Kyushu Island at 18 UTC on 11 May. It continued moving northeastward south of Honshu Island. Aere transformed into an extratropical cyclone east of Honshu Island at 18 UTC on 12 May and crossed longitude 180 degrees east near the Aleutian Islands before 06 UTC on 15 May.

SONGDA (1102)

Songda formed as a tropical depression (TD) over the sea east of Yap Island at 18 UTC on 19 May 2011. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity just south of Yap Island at 12 UTC on 21 May. Soon after Songda was upgraded to typhoon (TY) intensity east of the Philippines at 18 UTC on 24 May, it turned northwestward and reached its peak intensity with maximum sustained winds of 105 kt and a central pressure of 920 hPa east of Luzon Island at 06 UTC on 26 May. Gradually turning northeastward, Songda moved along Okinawa Islands and transformed into an extratropical cyclone at 06 UTC on 29 May south of Shikoku Island. It continued moving east-northeastward until it dissipated four days later near the dateline.

SARIKA (1103)

Sarika formed as a tropical depression (TD) near the west coast of Luzon Island at 18 UTC on 8 June 2011. Moving northwestward, it was upgraded to tropical storm (TS) intensity west of Luzon Island at 12 UTC the next day. Gradually turning northward, Sarika reached its peak intensity with maximum sustained winds of 40 kt and a central pressure of 996 hPa in the South China Sea at 00 UTC on 10 June. Keeping its northward track, it hit southern China before 00UTC on 11 June. Sarika weakened to TD intensity at 06 UTC that day and dissipated six hours later.

HAIMA (1104)

Haima formed as a tropical depression (TD) east of Mindanao Island at 18 UTC on 16 June 2011. It moved northwestward along the east of Luzon Island and turned westward crossing the Luzon Strait. Moving westward over the South China Sea, it was upgraded to tropical storm (TS) intensity at 12 UTC on 21 June. Moving northwestward then westward off the southern coast of China, Haima passed Leizhou Peninsula and entered the Gulf of Tonkin where it reached its peak

intensity with maximum sustained winds of 40 kt and a central pressure of 985 hPa at 00 UTC on 24 June. Continuing to move westward, Haima weakened to TD intensity at 18 UTC on the same day over Viet Nam and dissipated around Laos 24 hours later.

MEARI (1105)

Meari formed as a tropical depression (TD) over the sea north of Palau at 18 UTC on 20 June 2011. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity over the sea east of Samar Island of the Philippines at 00 UTC on 22 June. After turning north-northwestward, Meari was upgraded to severe tropical storm (STS) east of Luzon Island at 24 hours later. Keeping its north-northwestward track and gradually accelerating, Meari reached its peak intensity with maximum sustained winds of 60 kt and a central pressure of 975 hPa south of the Sakishima Islands at 09 UTC on 24 June. After moving northward over the East China Sea, it turned sharply to the northeast near the Shandong Peninsula and was downgraded to TS intensity in the Yellow Sea at 00 UTC on 27 June. It transformed into an extratropical cyclone off the northwestern coast of the Korean Peninsula at 06 UTC on 27 June and dissipated 6 hours later.

MA-ON (1106)

Ma-on formed as a tropical depression (TD) over the sea southeast of Marcus Island at 12 UTC on 11 July 2011. Keeping its westward track, it was upgraded to tropical storm (TS) intensity at 00 UTC the next day and upgraded to typhoon (TY) intensity northeast of the Mariana Islands at 00 UTC on 14 July. Soon after turning northwestward, Ma-on reached its peak intensity with maximum sustained winds of 95 kt and a central pressure of 935 hPa northeast of Okinotorishima Island at 12 UTC on 16 July. It turned northward late on 17 July and made landfall in Shikoku with TY intensity at around 14 UTC on 19 July. After a few hours of the landfall, Ma-on moved eastward and passed around Shionomisaki with intensity of Severe Tropical Storm (STS) before 01 UTC the next day. It moved south-eastward until early 22 July and then turned north-northeastward. Ma-on transformed into an extratropical cyclone east of Hokkaido at 12 UTC on 24 July and dissipated east of Kamchatka seven days later.

TOKAGE (1107)

Tokage formed as a tropical depression (TD) far east of the Philippines at 18 UTC on 13 July 2011. Moving over a small circle in a counterclockwise starting westward, it was upgraded to tropical storm (TS) intensity at 00 UTC on 15 July 2011 when it reached its peak intensity with maximum sustained winds of 35 kt and a central pressure of 1000 hPa. It was soon downgraded to TD intensity 18 hours later and dissipated 6 more hours later.

NOCK-TEN (1108)

Nock-ten formed as a tropical depression (TD) over the sea east of Samar Island of the

Philippines at 18 UTC on 24 July 2011. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity near the southeastern coast of Luzon Island at 00 UTC on 26 July. After crossing Luzon Island, Nock-ten was upgraded to severe tropical storm (STS) and reached its peak intensity with maximum sustained winds of 50 kt and a central pressure of 985 hPa in the South China Sea at 06 UTC on 28 July. Moving westward over the same waters, it crossed Hainan Island and entered the Gulf of Tonkin where it was downgraded to TS intensity at 06 UTC on 30 July. Turning west-southwestward, Nock-ten weakened to TD intensity near the border between Laos and Thailand at 00 UTC on 31 July and dissipated 6 hours later.

MUIFA (1109)

Muifa formed as a tropical depression (TD) over the sea southwest of Guam at 00 UTC on 27 July 2011. It was upgraded to tropical storm (TS) intensity at 06 UTC the next day while keeping its westward track. After turning to north on 28 July, Muifa was upgraded to typhoon (TY) intensity east of the Philippines at 00 UTC the next day. It developed rapidly and reached its peak intensity with maximum sustained winds of 95 kt and a central pressure of 930 hPa southwest of Okinotorishima Island at 18 UTC on 30 August. Muifa turned gradually to west on 2 August and kept its westward track for about two days. While turning northward on 5 August, it passed around Kumejima Island with TY intensity at around 13 UTC. While moving northward in the East China Sea and the Yellow Sea, Muifa weakened its intensity slowly. It hit the northern Korean Peninsula on 8 August and weakened to TD intensity in the Northeast China on 00 UTC the next day. After transforming into an extratropical cyclone on 12 UTC on 9 August, it moved eastward and crossed Sakhalin. It moved slowly northward in the Sea of Okhotsk and dissipated at 18 UTC on 15 August.

MERBOK (1110)

Merbok formed as a tropical depression (TD) over the sea northwest of Wake Island at 18 UTC on 2 August 2011. Moving westward, it was upgraded to tropical storm (TS) intensity twelve hours later. Moving west-northwestward, Merbok was upgraded to severe tropical storm (STS) intensity at 00 UTC on 6 August and it then turned northeastward and reached its peak intensity with maximum sustained winds of 50 kt and a central pressure of 980 hPa at 18 UTC the next day. Keeping its northeastward track, Merbok transformed into an extratropical cyclone far east of Japan at 18 UTC on 9 August and dissipated over the sea east of the Kamchatka Peninsula at 06 UTC on 12 August.

NANMADOL (1111)

Nanmadol formed as a tropical depression (TD) over the sea east of Samar Island of the Philippines at 12 UTC on 21 August 2011. Moving north-northwestward, it was upgraded to tropical storm (TS) intensity over the sea east of Luzon Island at 12 UTC on 23 August. Turning west-northwestward, Nanmadol was upgraded to typhoon (TY) intensity over the same waters at

00 UTC on 25 August and reached its peak intensity with maximum sustained winds of 100 kt and a central pressure of 925 hPa 24 hours later. Moving northwestward, it crossed the northeastern coast of Luzon Island and the southern coast of Taiwan Island, and entered the Taiwan Strait where it was downgraded to TS intensity at 18 UTC on 29 August. Turning westward, Nanmadol weakened to TD intensity on the coast of southeastern China at 00 UTC on 31 August and dissipated 18 hours later.

TALAS (1112)

Talas formed as a tropical depression (TD) over the sea west of the Mariana Islands at 18 UTC on 23 August 2011. Moving northwestward, it was upgraded to tropical storm (TS) intensity at 00 UTC on 25 August. Decelerating northward, Talas was upgraded to severe tropical storm (STS) intensity at 12 UTC on 27 August and reached its peak intensity with maximum sustained winds of 50 kt and a central pressure of 970 hPa southwest of Iwoto Island two days later. Turning westward then northwestward, it made landfall in Shikoku Island with STS intensity around 01 UTC on 3 September. After crossing the island northward, Talas made landfall again in Chugoku region of western Japan just after 09 UTC the same day. When it entered the Sea of Japan, it accelerated northward and transformed into an extratropical cyclone at 06 UTC on 5 September. Talas dissipated over Russia at 12 UTC on 7 September.

NORU (1113)

Noru formed as a tropical depression (TD) over the sea southwest of Minamitorishima Island at 00 UTC on 2 September 2011 and moved southwestward and then northeastward. Noru was upgraded to tropical storm (TS) intensity at 12 UTC the next day over the same waters and accelerated northward. It reached its peak intensity with maximum sustained winds of 40 kt and a central pressure of 990 hPa east of Japan at 06 UTC on 5 September. Noru transformed into an extratropical cyclone at 12 UTC on the next day and turned north-northwestward. After entering Sea of Okhotsk and crossing Sakhalin on 7 September, it moved northward and crossed latitude 60 degrees north before 06UTC on 9 September.

KULAP (1114)

Kulap formed as a tropical depression (TD) near Okinotorishima Island at 06 UTC on 6 September 2011. Moving northeastward, it was upgraded to tropical storm (TS) intensity at 00 UTC the next day and reached its peak intensity with maximum sustained winds of 35 kt and a central pressure of 1000 hPa 6 hours later. Turning gradually northwestward, Kulap weakened to TD intensity east of Amami Oshima Island at 00 UTC on 9 September. Keeping its northwestward track, it entered the East China Sea and dissipated near Jeju Island at 06 UTC on 11 September.

ROKE (1115)

Roke formed as a tropical depression (TD) over the sea north of the Mariana Islands at 12 UTC on

9 September 2011. After it moved westward and turned sharply northeastward, it was upgraded to tropical storm (TS) intensity over the sea northeast of Okinotorishima Island at 06 UTC on 13 September. Roke turned again west-northwestward and then turned in a counterclockwise direction to circle near the Daito Islands, before it was upgraded to typhoon (TY) intensity near Kikaijima Island at 12 UTC on 19 September and reached its peak intensity with maximum sustained winds of 85 kt and a central pressure of 940 hPa 24 hours later. Moving northeastward, it made landfall around Hamamatsu City in Shizuoka Prefecture with TY intensity around 05 UTC on 21 September. Keeping its northeastward track, Roke transformed into an extratropical cyclone east of Hokkaido at 06 UTC on 22 September and crossed longitude 180 degrees east near the Aleutian Islands before 12 UTC on 24 September.

SONCA (1116)

Sonca formed as a tropical depression (TD) over the sea south of Minamitorishima Island at 12 UTC on 14 September 2011. Slowly moving northward, it was upgraded to tropical storm (TS) intensity at 06 UTC the next day. Moving westward, Sonca started recurving over the sea east of the Ogasawara Islands and was upgraded to typhoon (TY) intensity at 06 UTC on 18 September and reached its peak intensity with maximum sustained winds of 70 kt and a central pressure of 970 hPa over the sea southeast of Japan at 00 UTC the next day. Accelerating east-northeastward, Sonca transformed into an extratropical cyclone over the sea far east of Hokkaido at 12 UTC on 20 September. Continuing east-northeastward, it crossed longitude 180 degrees east over the sea south of the Aleutian Islands before 06 UTC the next day.

NESAT (1117)

Nesat formed as a tropical depression (TD) over the sea north of Yap Islands at 00 UTC on 23 September 2011. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity northwest of Yap Islands at 00 UTC the next day. Turning westward, Nesat was upgraded to typhoon (TY) intensity east of Luzon Island at 00 UTC on 26 September and reached its peak intensity with maximum sustained winds of 80 kt and a central pressure of 950 hPa at 18UTC that day just before hitting Luzon Island. After crossing the northern part of Luzon Island, it turned west-northwestward and kept its TY intensity in the South China Sea. Nesat passed around the northern coast of Hainan Island and entered the Gulf of Tonkin on 29 September. Keeping its west-northwestward track, it was downgraded to TS intensity at 06 UTC on 30 September just after hitting Viet Nam. Nesat weakened to TD intensity at 18 UTC that day and dissipated six hours later.

HAITANG (1118)

Haitang formed as a tropical depression (TD) over the sea south of Hainan Island in the South China Sea at 00 UTC on 24 September 2011. Moving in a counterclockwise direction, it was upgraded to tropical storm (TS) intensity and reached its peak intensity with maximum sustained

winds of 35 kt and a central pressure of 996 hPa 24 hours later. Moving westward to Viet Nam, Haitang weakened to TD intensity at 18 UTC on 26 September and dissipated near the coast of Viet Nam 12 hours later.

NALGAE (1119)

Nalgae formed as a tropical depression (TD) over the sea west of the Mariana Islands at 12 UTC on 26 September 2011. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity southeast of Okinotorishima Island at 18 UTC the next day. Turning west-southwestward, Nalgae was upgraded to typhoon (TY) intensity southwest of Okinotorishima Island at 06 UTC on 29 September and reached its peak intensity with maximum sustained winds of 95 kt and a central pressure of 935 hPa at 00 UTC on 1 October just before hitting Luzon Island. After it crossed the northern part of Luzon Island and turned west-northwestward over the South China Sea, it was downgraded to TS intensity north of the Paracel Islands at 18 UTC on 3 October. Moving westward, Nalgae passed around the southern coast of Hainan Island and entered the Gulf of Tonkin where it weakened to TD intensity at 18 UTC on 4 October and dissipated 24 hours later.

BANYAN (1120)

Banyan formed as a tropical depression (TD) near the Palau Islands at 06 UTC on 9 October 2011. Moving westward, it was upgraded to tropical storm (TS) intensity east of Mindanao Island at 18 UTC the next day when it reached its peak intensity with maximum sustained winds of 35 kt and a central pressure of 1002 hPa. Keeping its TS intensity for only twelve hours, Banyan was downgraded to TD intensity near the eastern coast of Mindanao Island. Keeping its TD intensity, it moved westward across the Visayan Islands and entered the South China Sea. Turning northward there, it dissipated west of Luzon Island at 12 UTC on 14 October.

WASHI (1121)

Washi formed as a tropical depression (TD) over the sea southeast of Yap Islands at 06 UTC on 13 December 2011. Moving westward, it was upgraded to tropical storm (TS) intensity west of the Palau Islands at 06 UTC on 15 December. It reached its peak intensity with maximum sustained winds of 50 kt and a central pressure of 992 hPa east of Mindanao Island of the Philippines at 06 UTC on 16 December. Keeping its westward track, Washi crossed Mindanao Island that day and the Sulu Sea the next day. Keeping its westward track, it was downgraded to TD intensity in the South China Sea at 00 UTC on 19 December and dissipated over the same waters six hours later.