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SUMMARY OF THE 2009 TYPHOON SEASON

(Item 6 of the Provisional Agenda)

Submitted by the RSMC Tokyo - Typhoon Center

SUMMARY

Over the western North Pacific and the South China Sea, 22 named tropical cyclones (TCs) formed in 2009, 13 of which reached typhoon intensity (see Table 1). This total is less than the 30-year average* frequency of 26.7. The monthly formation numbers for the year are shown in Figure 1. Although the formation of the first named TC in 2009 was relatively late, the number of formation (21) from May to October was almost the same as the 30-year average* frequency of 21.3. Only one TC formed from November, which is slightly less than the 30-year average* frequency of 3.7.

From May to July, convective activity was enhanced around the Philippines and over the South China Sea. Six named TCs formed there (shown by the green lines in Figure 2). Kujira (0901) and Chan-hom (0902) moved northeastward and caused damage to the Philippines, while the others moved westward and hit southern China.

Of six named TCs forming east of longitude 135 degrees east from August to September (shown by the red lines in Figure 2), five moved northward over the sea south or southeast of Japan except Parma (0917) due to weaker expansion of North Pacific High to Japan. Etau (0909) and Melor (0918) affected Japan, while Parma (0917) caused damage to the Philippines. Another six named TCs formed west of longitude 135 degrees east during this period (shown by the blue lines in Figure 2). Morakot (0908) damaged China and the Philippines, and Ketsana (0916) affected Lao, the Philippines and Viet Nam.

All three named TCs in October formed east of longitude 140 degrees east, where convective activities were more enhanced than usual (shown by the grey lines in Figure 2). Mirinae (0921) moved westward and hit the Philippines and Viet Nam, causing damage to these countries.

From November, only one named TC formed due to inactive convection east of the Philippines and over the South China Sea (shown by the purple line in Figure 2).

Figure 3 shows the genesis points of the 22 named TCs in 2009 superimposed onto the frequency distribution (1951 – 2008). The mean formation latitude** and longitude** were 16.1°N and 132.3°E – almost the same as the 30-year average values* (16.2°N and 136.9°E).

* The 30-year average covers data from 1971 to 2000.

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

Table 1 List of tropical cyclones reaching TS intensity or higher in 2009

| Tropical cyclones | Duration | | Peak intensity | | | | |
|--------------------|------------|--------------|----------------|------|-------|------------------------|-------------------|
| | (UTC) | (UTC) | (UTC) | (°N) | (°E) | Central pressure (hPa) | Max. wind (knots) |
| TY Kujira (0901) | 021800 May | - 071800 May | 041800 | 17.1 | 131.0 | 940 | 85 |
| TY Chan-hom (0902) | 031200 May | - 090000 May | 061200 | 14.4 | 114.6 | 975 | 65 |
| STS Linfa (0903) | 180000 Jun | - 220600 Jun | 200600 | 20.5 | 117.3 | 975 | 60 |
| TS Nangka (0904) | 230600 Jun | - 261800 Jun | 231200 | 12.3 | 124.2 | 994 | 40 |
| TS Soudelor (0905) | 110000 Jul | - 120000 Jul | 110600 | 19.8 | 114.0 | 992 | 35 |
| TY Molave (0906) | 160600 Jul | - 190600 Jul | 171800 | 21.0 | 119.6 | 975 | 65 |
| TS Goni (0907) | 031200 Aug | - 080600 Aug | 040600 | 21.3 | 114.0 | 990 | 40 |
| TY Morakot (0908) | 030000 Aug | - 101800 Aug | 061500 | 23.4 | 124.6 | 945 | 75 |
| TS Etau (0909) | 090600 Aug | - 130000 Aug | 100000 | 30.0 | 134.4 | 992 | 40 |
| TY Vamco (0910) | 171800 Aug | - 260000 Aug | 200000 | 18.6 | 157.4 | 945 | 90 |
| STS Krovanh (0911) | 281200 Aug | - 011200 Sep | 301800 | 32.7 | 140.0 | 975 | 60 |
| STS Dujan (0912) | 031800 Sep | - 100600 Sep | 050000 | 20.0 | 132.4 | 980 | 50 |
| TS Mujigae (0913) | 100000 Sep | - 120000 Sep | 110000 | 19.8 | 109.0 | 994 | 40 |
| TY Choi-wan (0914) | 121800 Sep | - 201200 Sep | 151200 | 17.9 | 145.0 | 915 | 105 |
| TY Koppu (0915) | 131800 Sep | - 151200 Sep | 141800 | 21.5 | 113.1 | 975 | 65 |
| TY Ketsana (0916) | 260000 Sep | - 300600 Sep | 280600 | 15.8 | 111.9 | 960 | 70 |
| TY Parma (0917) | 290600 Sep | - 140000 Oct | 010000 | 11.8 | 131.1 | 930 | 100 |
| TY Melor (0918) | 300000 Sep | - 081200 Oct | 040600 | 17.0 | 140.9 | 910 | 110 |
| TS Nepartak (0919) | 090600 Oct | - 140000 Oct | 120000 | 23.5 | 144.3 | 992 | 45 |
| TY Lupit (0920) | 151200 Oct | - 270000 Oct | 181800 | 18.0 | 134.2 | 930 | 95 |
| TY Mirinae (0921) | 270600 Oct | - 021800 Nov | 281200 | 16.2 | 135.5 | 955 | 80 |
| TY Nida (0922) | 231200 Nov | - 030000 Dec | 251800 | 13.6 | 141.4 | 905 | 115 |

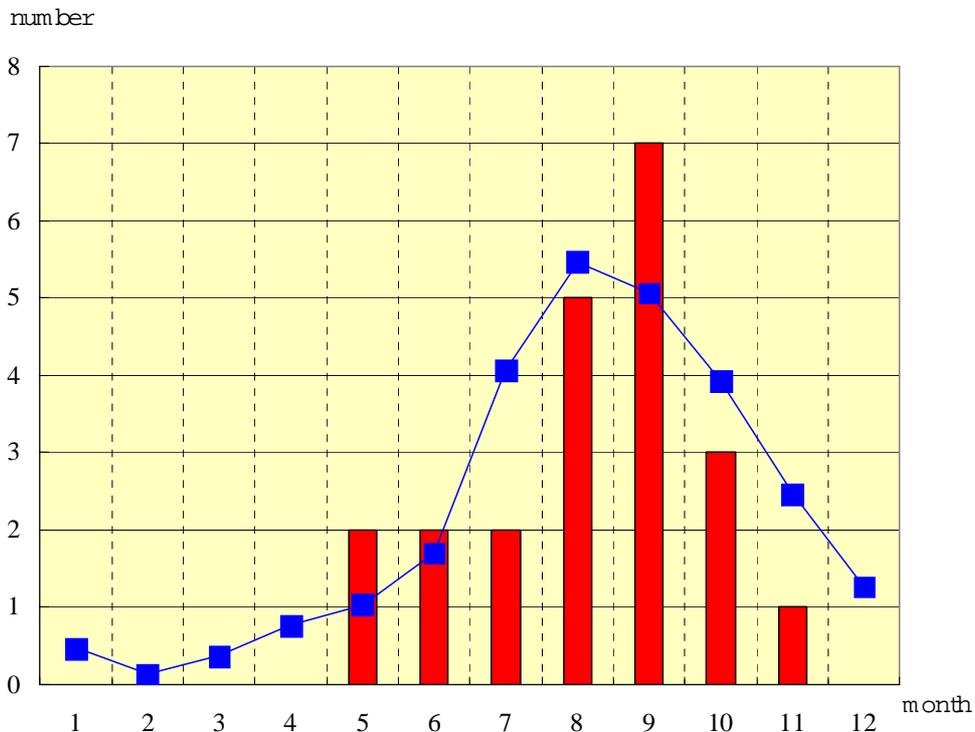


Figure 1 Monthly numbers of named TCs forming in 2009

Red bars: number forming in 2009; blue line: 30-year average from 1971 to 2000

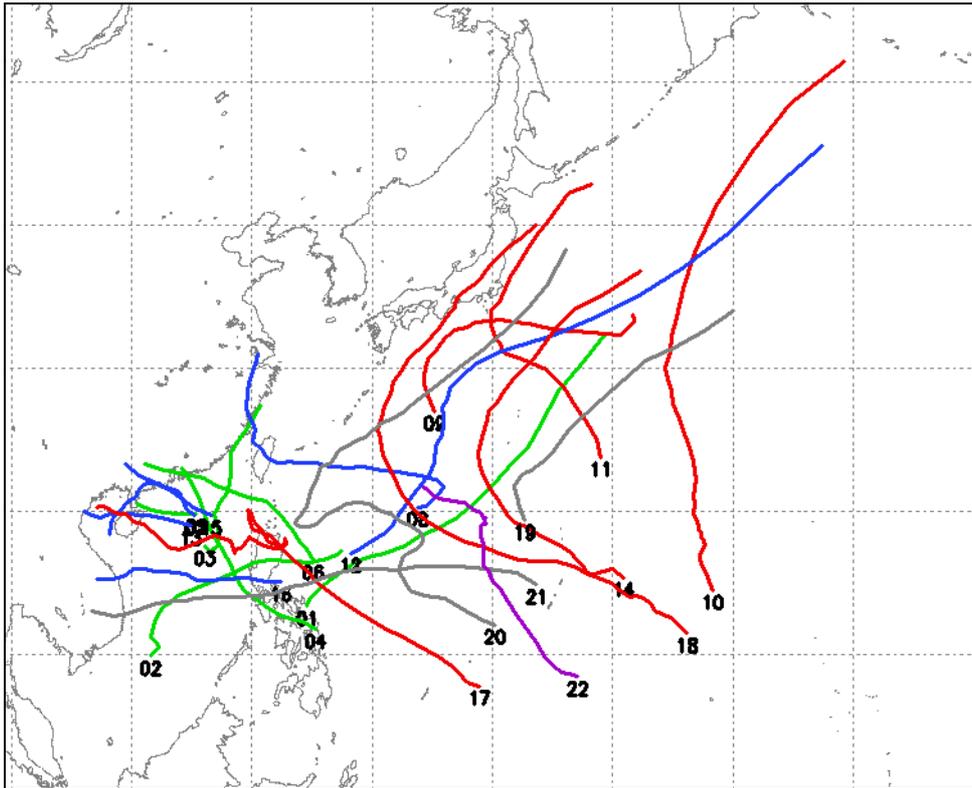


Figure 2 Tracks of tropical cyclones in 2009

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

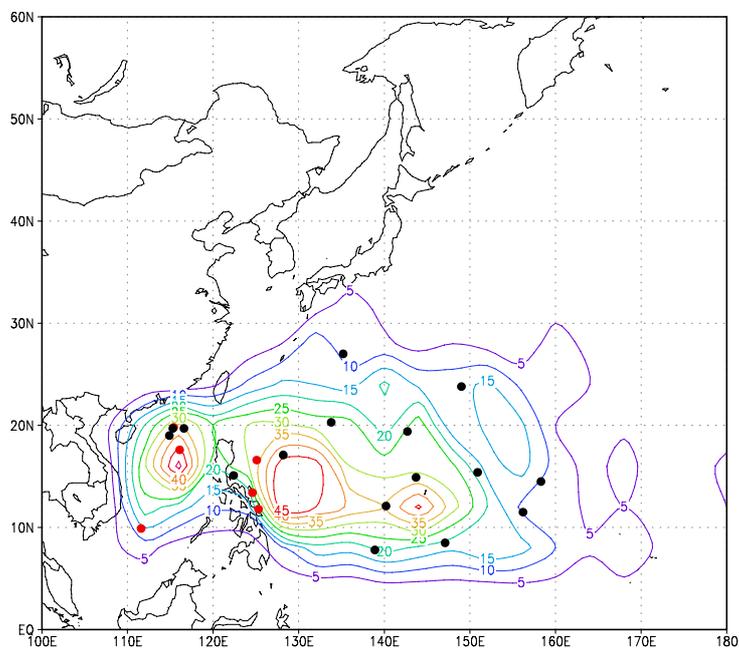


Figure 3 Genesis points of the 22 named TCs in 2009 (dots) and frequency distribution of genesis points for 1951 – 2008 (contours). Red circles: TCs forming from May to July; black circles: TCs forming from August to November.

Narrative Accounts of the 22 Named Tropical Cyclones in 2009

Kujira (0901)

Kujira formed as a tropical depression (TD) near the south-eastern coast of Luzon Island at 12 UTC on 1 May 2009. Moving slowly northeastward, it was upgraded to tropical storm (TS) intensity over the same waters at 18 UTC the next day. Keeping its northeastward track, it was upgraded to typhoon (TY) intensity and reached its peak intensity with maximum sustained winds of 85 kt and a central pressure of 940 hPa over the sea east of the Philippines at 18 UTC on 4 May. Weakening in intensity, it was downgraded to severe tropical storm (STS) intensity over the sea east of the Ogasawara Islands at 00 UTC on 7 May. Keeping its northeastward track, Kujira transformed into an extratropical cyclone east of Japan at 18 UTC that day before dissipating east of the Kamchatka Peninsula at 12 UTC on 13 May.

Chan-hom (0902)

Chan-hom formed as a tropical depression (TD) over the South China Sea at 18 UTC on 2 May 2009. It remained almost stationary until 12 UTC on 3 May, when it was upgraded to tropical storm (TS) intensity. Moving east-northeastward over the South China Sea, it reached its peak intensity with maximum sustained winds of 65 kt and a central pressure of 975 hPa when it was upgraded to typhoon (TY) intensity at 18 UTC on 6 May. Soon after being downgraded to severe tropical storm (STS) intensity at 12 UTC the next day, it hit Luzon Island. Chan-hom crossed the Island eastward and was then downgraded to TD intensity over the sea east of the Philippines at 00 UTC on 9 May. It turned sharply to the north at 12 UTC that day. Keeping its northward track, it dissipated south of Okinawa at 06 UTC on 13 May.

Linfa (0903)

Linfa formed as a tropical depression (TD) over the South China Sea at 06 UTC on 17 June 2009. Remaining almost stationary, it was upgraded to tropical storm (TS) intensity at 00 UTC the next day. It started moving northward and was upgraded to severe tropical storm (STS) intensity over the same waters at 12 UTC on 19 June. Linfa reached its peak intensity with maximum sustained winds of 60 kt and a central pressure of 975 hPa over the same waters at 06 UTC the next day. Moving northeastward along the coast of southern China, it was downgraded to TD intensity at 06 UTC on 22 June. Crossing the East China Sea east-northeastward, it transformed into an extratropical cyclone at 06 UTC on 23 June. Keeping the same direction, it passed along the southern coast of the Japanese islands. Gradually turning its direction to the north, it dissipated east of the Kamchatka Peninsula at 18 UTC on 30 June.

Nangka (0904)

Nangka formed as a tropical depression (TD) over the sea east of the Philippines at 12 UTC on 22 June 2009. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity around Samar Island at 06 UTC the next day, and reached its peak intensity with maximum sustained winds of 40 kt and a central pressure of 994 hPa over the west of the island six hours later. Passing over the Philippines, it kept its west-northwestward track before turning northwestward when it entered the South China Sea late on 24 June. Soon after Nangka hit east of Hong Kong, it was downgraded to TD intensity at 18 UTC on 26 June and dissipated over southern China six hours later.

Soudelor (0905)

Soudelor formed as a tropical depression (TD) off the northern coast of Luzon Island at 18 UTC on 9 July 2009. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity over the sea south of Hong Kong at 00 UTC on 11 July and reached its peak intensity with maximum sustained winds of 35 kt and a central pressure of 992 hPa six hours later. Keeping its west-northwestward track, Soudelor was downgraded to TD intensity when it hit the Leizhou Peninsula at 00 UTC on 12 July before dissipating over northern Viet Nam at 00 UTC the next day.

Molave (0906)

Molave formed as a tropical depression (TD) east of the Philippines at 00 UTC on 15 July 2009. Moving northwestward, it was upgraded to tropical storm (TS) intensity east of Luzon Island at 06 UTC the next day. Soon after turning to the west-northwest over Luzon Island, it was upgraded to typhoon (TY) intensity, reaching its peak intensity with maximum sustained winds of 65 kt and a central pressure of 975 hPa at 18 UTC on 17 July. It moved over the South China Sea holding its west-northwestward track and TY intensity before hitting the north of Hong Kong late the next day. Molave weakened rapidly and was downgraded to TD intensity at 06 UTC on 19 July, then dissipated over southern China six hours later.

Goni (0907)

Goni formed as a tropical depression (TD) over the sea east of the Philippines at 06 UTC on 1 August 2009. Moving westward, it crossed Luzon Island and turned northwestward 24 hours before being upgraded to tropical storm (TS) intensity over the South China Sea at 12 UTC on 3 August. It reached its peak intensity with maximum sustained winds of 40 kt and a central pressure of 990 hPa off the coast of Hong Kong at 06 UTC the next day. Goni hit the coast west of Macao early on 5 August, and was downgraded to TD intensity at 06 UTC the next day. After crossing the Leizhou Peninsula in southern China, it turned in a counterclockwise direction to circle around Hainan Island, where it was re-upgraded to TS intensity at 06 UTC on 7 August before being re-downgraded to TD intensity over the Gulf of Tonkin 24 hours later. Moving northeastward over the South China Sea, it dissipated south of Hong Kong at 06 UTC

on 10 August.

Morakot (0908)

Morakot formed as a tropical depression (TD) southeast of Minamidaitojima Island at 18 UTC on 2 August 2009 and was upgraded to tropical storm (TS) intensity six hours later. After changing from eastward to westward movement on 4 August, it was upgraded to typhoon (TY) intensity southeast of Okinawa Island at 18 UTC the next day before reaching its peak intensity with maximum sustained winds of 75 kt and a central pressure of 945 hPa south of Ishigakijima Island at 15 UTC on 6 August. Maintaining its westward track and TY intensity, Morakot hit Taiwan Island late the next day. Turning gradually to the north, it hit Fujian Province on 9 August. After moving northward with diminishing intensity, it was downgraded to TD intensity southwest of Shanghai at 18 UTC on 10 August. Turning to the northeast and passing over the Yellow Sea, it transformed into an extratropical cyclone at 18 UTC on 11 August and dissipated around the Korean Peninsula 12 hours later.

Etau (0909)

Etau formed as a tropical depression (TD) over the sea southwest of Iwoto Island at 00 UTC on 8 August 2009. Moving northwestward, it was upgraded to tropical storm (TS) intensity over the sea south of Japan at 06 UTC the next day and reached its peak intensity with maximum sustained winds of 40 kt and a central pressure of 992 hPa at 00 UTC on 10 August. After recurving south of Honshu Island, Etau moved eastward and was downgraded to TD intensity over the sea east of Japan at 00 UTC on 13 August just after turning northward. Moving gradually eastward again, it transformed into an extratropical cyclone far east of Japan at 12 UTC the next day and crossed longitude 180 degrees east over the sea south of the Aleutian Islands before 00 UTC on 16 August.

Vamco (0910)

Vamco formed as a tropical depression (TD) over the sea west of the Marshall Islands at 12 UTC on 16 August 2009. Moving northwestward, it was upgraded to tropical storm (TS) intensity far east of the Mariana Islands at 18 UTC the next day. Moving slowly northward, it was upgraded to typhoon (TY) intensity at 00 UTC on 19 August and reached its peak intensity 24 hours later with maximum sustained winds of 90 kt and a central pressure of 945 hPa. Vamco kept its northward track and TY intensity until 12 UTC on 25 August. Gradually accelerating northeastward, it transformed into an extratropical cyclone east of the Kamchatka Peninsula at 00 UTC on 26 August and crossed longitude 180 degrees east before 18 UTC on the same day.

Krovanh (0911)

Krovanh formed as a tropical depression (TD) east of the Northern Mariana Islands at 00 UTC on 28 August 2009. It moved northward and was upgraded to tropical storm (TS) intensity

southeast of the Ogasawara Islands 12 hours later. Turning to the northwest, it was upgraded to severe tropical storm (STS) intensity at 18 UTC the next day before reaching its peak intensity with maximum sustained winds of 60 kt and a central pressure of 975 hPa 24 hours later. It turned to the north again and passed east of Hachijojima Island early on 31 August. Krovanh accelerated northeastward along the eastern coast of Honshu and transformed into an extratropical cyclone east of Hokkaido at 12 UTC on 1 September. Moving eastward, it dissipated over the sea south of the Kuril Islands at 12 UTC the next day.

Dujuan (0912)

Dujuan formed as a tropical depression (TD) over the sea east of Luzon Island at 18 UTC on 2 September 2009. It moved slightly westward and was upgraded to tropical storm (TS) intensity at 18 UTC the next day soon after taking on an eastward direction. Turning northeastward over the same waters, it was upgraded to severe tropical storm (STS) intensity at 00 UTC on 5 September, reaching its peak intensity with maximum sustained winds of 50 kt and a central pressure of 980 hPa. Maintaining its intensity, Dujuan turned gradually northward, moved over the sea south of Japan and accelerated as it turned east-northeastward then northeastward over the sea east of Japan. It transformed into an extratropical cyclone south of the Aleutian Islands at 06 UTC on 10 September and crossed longitude 180 degrees east before 12 UTC the next day.

Mujigae (0913)

Mujigae formed as a tropical depression (TD) off the western coast of Luzon Island at 00 UTC on 9 September 2009. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity over the sea south of Hong Kong at 00 UTC on 10 September and reached its peak intensity with maximum sustained winds of 40 kt and a central pressure of 994 hPa over the Gulf of Tonkin at 00 UTC the next day, just after crossing Hainan Island. Keeping its westward track, Mujigae was downgraded to TD intensity at 00 UTC on 12 September soon after hitting northern Viet Nam, then dissipated over northern Laos 18 hours later.

Choi-wan (0914)

Choi-wan formed as a tropical depression (TD) east of Saipan Island at 00 UTC on 12 September 2009. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity over the same waters at 18 UTC that day. After turning to the west, it was rapidly upgraded to typhoon (TY) intensity at 00 UTC on 14 September. Moving west-northwestward again, it reached its peak intensity with maximum sustained winds of 105 kt and a central pressure of 915 hPa north of Saipan Island at 12 UTC on 15 September. After recurving west of Iwoto Island on 18 September, Choi-wan accelerated northeastward passing north of the Ogasawara Islands with TY intensity, and transformed into an extratropical cyclone east of Japan at 12 UTC on 20 September soon after being downgraded to severe tropical storm (STS) intensity. It dissipated over the same waters 12 hours later.

Koppu (0915)

Koppu formed as a tropical depression (TD) off the northern coast of Luzon Island at 00 UTC on 13 September 2009. Moving westward then west-northwestward, it was upgraded to tropical storm (TS) intensity over the South China Sea at 18 UTC that day. It was then upgraded to typhoon (TY) intensity, reaching its peak intensity with maximum sustained winds of 65 kt and a central pressure of 975 hPa at 18 UTC on 14 September. Shortly after, Koppu hit southern China, weakened rapidly and was downgraded to TD intensity at 12 UTC on 15 September before dissipating over southern China 12 hours later.

Ketsana (0916)

Ketsana formed as a tropical depression (TD) east of the Philippines at 00 UTC on 25 September 2009 and moved westward for the whole of its existence. It was upgraded to tropical storm (TS) intensity at 00 UTC on 26 September just before crossing Luzon Island. Moving westward over the South China Sea, it was upgraded to typhoon (TY) intensity at 06 UTC on 28 September, reaching its peak intensity with maximum sustained winds of 70 kt and a central pressure of 960 hPa. Ketsana hit Viet Nam the next day with a strength almost equivalent to its peak intensity, then weakened rapidly and was downgraded to TD intensity at 06 UTC on 30 September before dissipating 18 hours later.

Parma (0917)

Parma formed as a tropical depression (TD) over the sea south of Guam Island at 18 UTC on 27 September 2009. Moving west-southwestward, it was upgraded to tropical storm (TS) intensity southeast of Yap Island at 06 UTC on 29 September. After turning to the west-northwest, it was upgraded to typhoon (TY) intensity north of Palau at 06 UTC on 30 September and reached its peak intensity with maximum sustained winds of 100 kt and a central pressure of 930 hPa over the sea east of the Philippines 18 hours later. It moved northwestward and hit northern Luzon Island on 3 October and then remained in the same area for as long as six days, slowly moving back and forth across the island. Parma was downgraded to TD intensity west of the island at 00 UTC on 10 October. However, while moving westward over the South China Sea, it was re-upgraded to TS intensity at 00 UTC the next day. Moving west-northwestward, it crossed Hainan Island and was re-downgraded to TD intensity over the Gulf of Tonkin at 00 UTC on 14 October before dissipating there 18 hours later.

Melor (0918)

Melor formed as a tropical depression (TD) west of the Marshall Islands at 06 UTC on 29 September 2009. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity north of Pohnpei Island at 00 UTC on 30 September. Keeping its west-northwestward track, it was rapidly upgraded to typhoon (TY) intensity east of the Mariana Islands 24 hours later before reaching its peak intensity with maximum sustained

winds of 110 kt and a central pressure of 910 hPa west of the same islands at 06 UTC on 4 October. After recurving northward west of Minamidaitojima Island late on 6 October, it moved northeastward south of Japan. Keeping its northeastward track, Melor made landfall on Honshu late the next day with TY intensity, and transformed into an extratropical cyclone over the sea east of Honshu at 12 UTC on 8 October. Turning to the east, it dissipated south of the Aleutian Islands at 06 UTC on 11 October.

Nepartak (0919)

Nepartak formed as a tropical depression (TD) west of Saipan at 00 UTC on 8 October 2009. Moving north-northwestward, it was upgraded to tropical storm (TS) intensity west of the northern Mariana Islands at 06 UTC the next day. After turning to the northeast, it reached its peak intensity with maximum sustained winds of 45 kt and a central pressure of 992 hPa east of the Ogasawara Islands at 00 UTC on 12 October. Accelerating northeastward to east-northeastward, Nepartak was transformed into an extratropical cyclone east of Japan at 00 UTC on 14 October and crossed longitude 180 degrees east over the sea south of the Aleutian Islands before 18 UTC the next day.

Lupit (0920)

Lupit formed as a tropical depression (TD) southeast of Guam at 12 UTC on 14 October 2009. Moving westward to west-northwestward, it was upgraded to tropical storm (TS) intensity northeast of Yap Island at 12 UTC on 15 October and to typhoon (TY) intensity east of the Philippines at 18 UTC the next day. Lupit slowly moved in a clockwise direction northward before reaching its peak intensity with maximum sustained winds of 95 kt and a central pressure of 930 hPa at 18 UTC on 18 October. After turning west-northwestward then west-southwestward and weakening slowly in intensity, Lupit was downgraded to severe tropical storm (STS) intensity off the northeastern coast of Luzon Island at 06 UTC on 23 October. After changing direction slowly but sharply northeastward, it moved to the south of the Okinawa Islands. Maintaining its STS intensity, it accelerated northeastward along south of the Japanese archipelago and transformed into an extratropical cyclone east of Japan at 00 UTC on 27 October. It dissipated north of the Aleutian Islands at 00 UTC on 31 October, 16.5 days after its formation.

Mirinae (0921)

Mirinae formed as a tropical depression (TD) over the sea north of Chuuk Island at 18 UTC on 25 October 2009. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity northwest of Guam at 06 UTC on 27 October. Keeping its west-northwestward track, Mirinae was upgraded to typhoon (TY) intensity over the sea east of the Philippines at 00 UTC on 28 October and reached its peak intensity with maximum sustained winds of 80 kt and a central pressure of 955 hPa over the same waters 12 hours later. Moving west-southwestward, it was downgraded to severe tropical storm (STS) intensity off the

eastern coast of Luzon Island at 12 UTC on 30 October and crossed the island that day. Soon after hitting Viet Nam with TS intensity, Mirinae was downgraded to TD intensity over Cambodia at 18 UTC on 2 November and dissipated six hours later.

Nida (0922)

Nida formed as a tropical depression (TD) west of the Truk Islands at 18 UTC on 21 November 2009. Moving northward then northwestward, it was upgraded to tropical storm (TS) intensity over the same waters at 12 UTC on 23 September. Keeping its northwestward track, it was rapidly upgraded to typhoon (TY) intensity south of Guam 18 hours later before reaching its peak intensity with maximum sustained winds of 115 kt and a central pressure of 905 hPa west of Guam at 18 UTC on 25 November. After reaching the area southeast of Okinotorishima Island at 00 UTC on 28 November, Nida remained almost stationary for two days. At 06 UTC on 30 November, it began to move west-northwestward while weakening in intensity. It was downgraded to severe tropical storm (STS) intensity at 18 UTC on 1 December and then to TD intensity northwest of Okinotorishima Island at 00 UTC on 3 December. Turning to the east, it dissipated over the same waters 18 hours later.