

Typhoon Weather Analysis for Tokyo

Typhoon WP24 (DUJUAN): synoptic situation and forecast for 20–22 September 2026

Based on the numerical forecasts, soundings and observations in Xue’s public STAC catalog (dataset.rin

Issued 19 September 2026, 16:20 JST (07:20 UTC). English translation of the Chinese report

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1 Summary

Typhoon WP24 (the JTWC number; DUJUAN in ECMWF’s track product) was at 09 JST on 19 September about 1 050 km south of Tokyo, over the sea west of the Ogasawara Islands, at 65 kt (33 m/s, one-minute mean). It is moving north along the western edge of the subtropical high, will turn north-east on the 21st, **pass from the northern Izu Islands to the waters off the Bōsō Peninsula on the night of the 21st (21 JST to 03 JST on the 22nd), coming within about 100–200 km of central Tokyo**, then accelerate away and become extratropical on the 22nd.

For Tokyo the event has three stages:

Period (JST)	Weather	Basis
19th (today) to 20th	Overcast, persistent light to moderate rain, north wind 3–6 m/s; stratiform rain on the north side of the autumn front	Haneda METAR: light rain and MVFR all day; Tateno sounding saturated from the surface to 700 hPa
Daytime 21st	Mostly moderate rain, locally heavy (IFS HRES puts a 20–30 mm/h band at 11–13 JST), north wind 4–7 m/s	Moisture transport north of the typhoon converging with the front
Night of the 21st to early 22nd	The core of heavy rain and gales: grid-cell wind at central Tokyo 11–16 m/s, gusts 18–24 m/s, hourly rain 10–25 mm; stronger on the coast and over Tokyo Bay	The centre passes offshore of Kantō, the right-front quadrant sweeps Bōsō, central Tokyo is inside the 34 kt wind radius
Daytime 22nd	Wind and rain end quickly, wind turns north-west then south, skies clear, temperature back above 30 °C	The typhoon moves east out to sea; dry cool air wraps in

The three models give the central-Tokyo cell 71–169 mm on the 21st and 120–200 mm for the event (20th–22nd); the windward slopes of the mountains (Okutama, Tanzawa) will get more. The track uncertainty is mainly “east of Bōsō” versus “through Sagami Bay”, with about ± 3 h in timing; in intensity GFS is 10–15 hPa deeper than ECMWF. The models’ initial states agree with the 13 soundings of 00Z on the 19th (500 hPa height: mean difference -2 gpm, largest 16 gpm), so the starting point is trustworthy.

This report is a reading of public numerical forecasts and observations, not an official forecast. For decisions about safety use the Japan Meteorological Agency’s typhoon information, its warnings and advisories, and the Tokyo Metropolitan Government’s evacuation information.

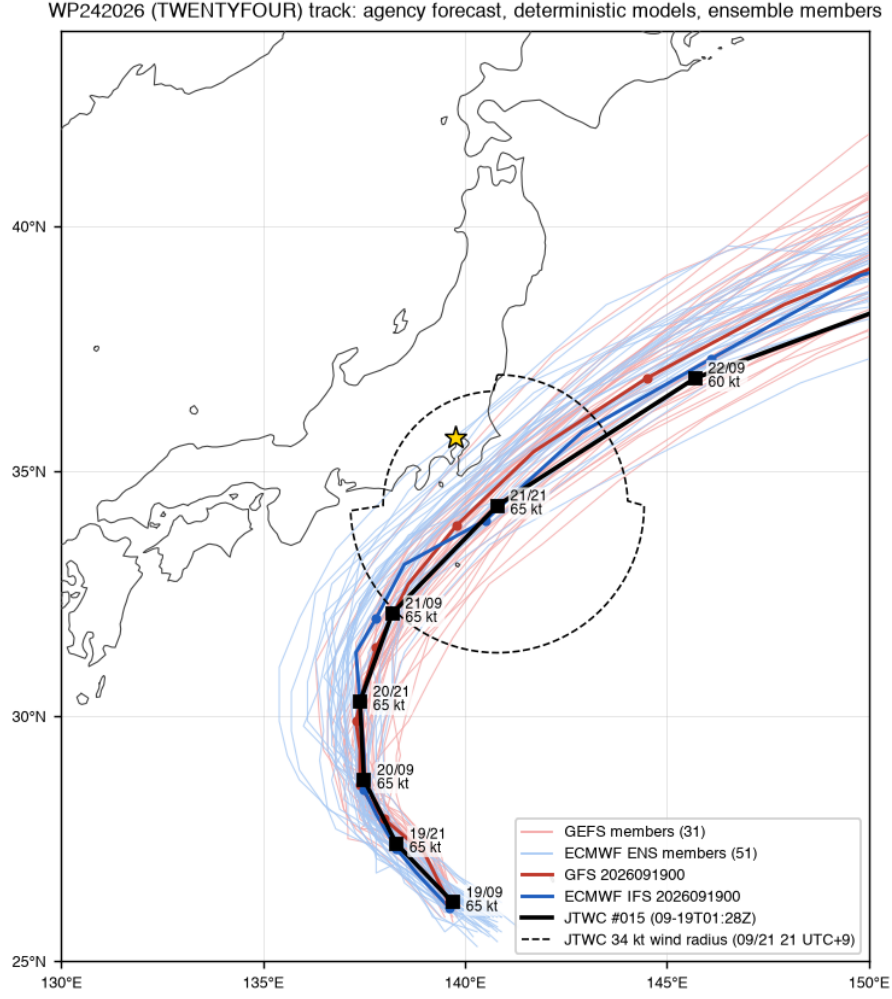


Figure 1: Track of Typhoon WP24: JTWC warning 15 (black), the GFS and ECMWF deterministic tracks (red, blue), GEFS/ENS ensemble members (pale); the dashed circle is JTWC’s 34 kt wind radius at 21 JST on the 21st, the star is central Tokyo

2 Current state of the typhoon and track forecast

Current state. JTWC warning of 00Z on 19 September (09 JST): centre 26.2°N 139.7°E, maximum wind 65 kt, 34 kt wind radius 407 km in the north-east quadrant and 185 km in the south-west — the circulation is clearly larger on its eastern side. The Chichijima sounding (27.1°N 142.2°E, 250 km east of the centre) confirms it: south-easterly 29–30 m/s from 850 to 500 hPa, precipitable water 71.6 mm, near saturation through the column. In the Himawari-9 infrared the coldest cloud tops, 194 K, lie east of the centre (26.0°N 145.3°E), and the outer spiral bands have already passed Hachijōjima.

Track. JTWC keeps the intensity at 65 kt through the 22nd, with a track turning from north-north-west to north and then north-east:

Time JST	JTWC position	Intensity	GFS, 00Z 19th run	ECMWF, 00Z 19th run
09 JST 20th	28.7°N 137.5°E	65 kt	28.6°N 137.4°E, 973 hPa	—
21 JST 20th	30.3°N 137.4°E	65 kt	29.9°N 137.3°E, 971 hPa	30.3°N 137.4°E, 977 hPa
09 JST 21st	32.1°N 138.2°E	65 kt	31.4°N 137.8°E, 965 hPa	32.0°N 137.8°E, 973 hPa
15 JST 21st	(interpolated) about 33.2°N 139.5°E	65 kt	32.7°N 138.6°E, 958 hPa	33.1°N 138.5°E, 969 hPa

Time JST	JTWC position	Intensity	GFS, 00Z 19th run	ECMWF, 00Z 19th run
21 JST 21st	34.3°N 140.8°E	65 kt	33.9°N 139.8°E, 962 hPa	34.0°N 140.5°E, 971 hPa
03 JST 22nd	—	—	35.4°N 141.7°E, 963 hPa	35.8°N 142.9°E, 970 hPa
09 JST 22nd	36.9°N 145.7°E	60 kt	36.9°N 144.5°E, 966 hPa	37.3°N 146.1°E, 971 hPa
09 JST 23rd	41.2°N 159.8°E	50 kt	41.8°N 159.2°E, 985 hPa	—

The three tracks are within 120 km of each other at 21 JST on the 21st. JTWC is slightly east (passing east of the Bōsō Peninsula), GFS is west (across the mouth of Sagami Bay), ECMWF between them. **Central Tokyo’s closest distance to the three is 100–200 km, and all three keep it inside JTWC’s 34 kt wind radius (259 km in the north-west quadrant).** What the difference means for Tokyo: on the eastern track the city is on the typhoon’s western side, the wind north to north-west and the rain bands ending earlier; on the western track the mouth of Tokyo Bay sits on the north side of the eyewall, where wind and rain are strongest.

Speed. Between 09 JST on the 21st and 09 JST on the 22nd the centre moves north and east by about 900 km, 38 km/h on average, accelerating to over 60 km/h on the 22nd once in the westerlies. The fast motion means the worst wind and rain last hours (4–6 h at central Tokyo), not all night.

3 Synoptic analysis

3.1 Upper levels: the subtropical high, the westerly trough and the jet

The pattern at 09 JST on the 19th (00Z) is made of three systems (figure 3, the sounding figures):

- **The subtropical high** is centred over the ocean east of Japan, with a 500 hPa maximum of 5 932 gpm at 31.8°N 150.5°E (GFS analysis). Its western ridge axis crosses central and western Honshū: Tateno 5 908, Shionomisaki 5 920 and Kagoshima 5 920 gpm in the soundings. The 5 880 line still reaches north to 38–40°N on the 21st; the high does not retreat.
- **A mid-latitude westerly trough** lies from the Yellow Sea towards north-east China: Qingdao 500 hPa 5 877 gpm with a north-westerly wind, a dry region with a 25 K dew-point depression at 500 hPa, and a 250 hPa north-westerly of 32 m/s; Akita 5 868 and Sapporo 5 834 gpm. The 250 hPa jet axis is at 40–44°N at 25–36 m/s (Akita 254°/30, Sapporo 224°/30, Kushiro 226°/36 m/s).
- **The typhoon** sits on the south-west flank of the high, ahead of the trough. South of 35°N the 250 hPa wind already has a southerly component (Hachijōjima 194°/21, Chichijima 158°/20 m/s), the signature of the typhoon’s outflow.

The typhoon will move north along the western edge of the high and join the south-westerly flow ahead of the trough — the standard configuration for a recurving track. GFS forecasts the 250 hPa jet maximum to strengthen from 60 to 75 m/s between 00Z and 12Z on the 21st (44–47°N, 143–149°E), ECMWF from 61 to 70 m/s: the typhoon’s outflow feeds the right side of the jet entrance, and the region of ascent extends north-east to Tōhoku and Hokkaidō, which is the cause of the rain in Tōhoku on the 22nd.

500 hPa height (contours gpm, red = 5880) and 250 hPa jet (shading, barbs)

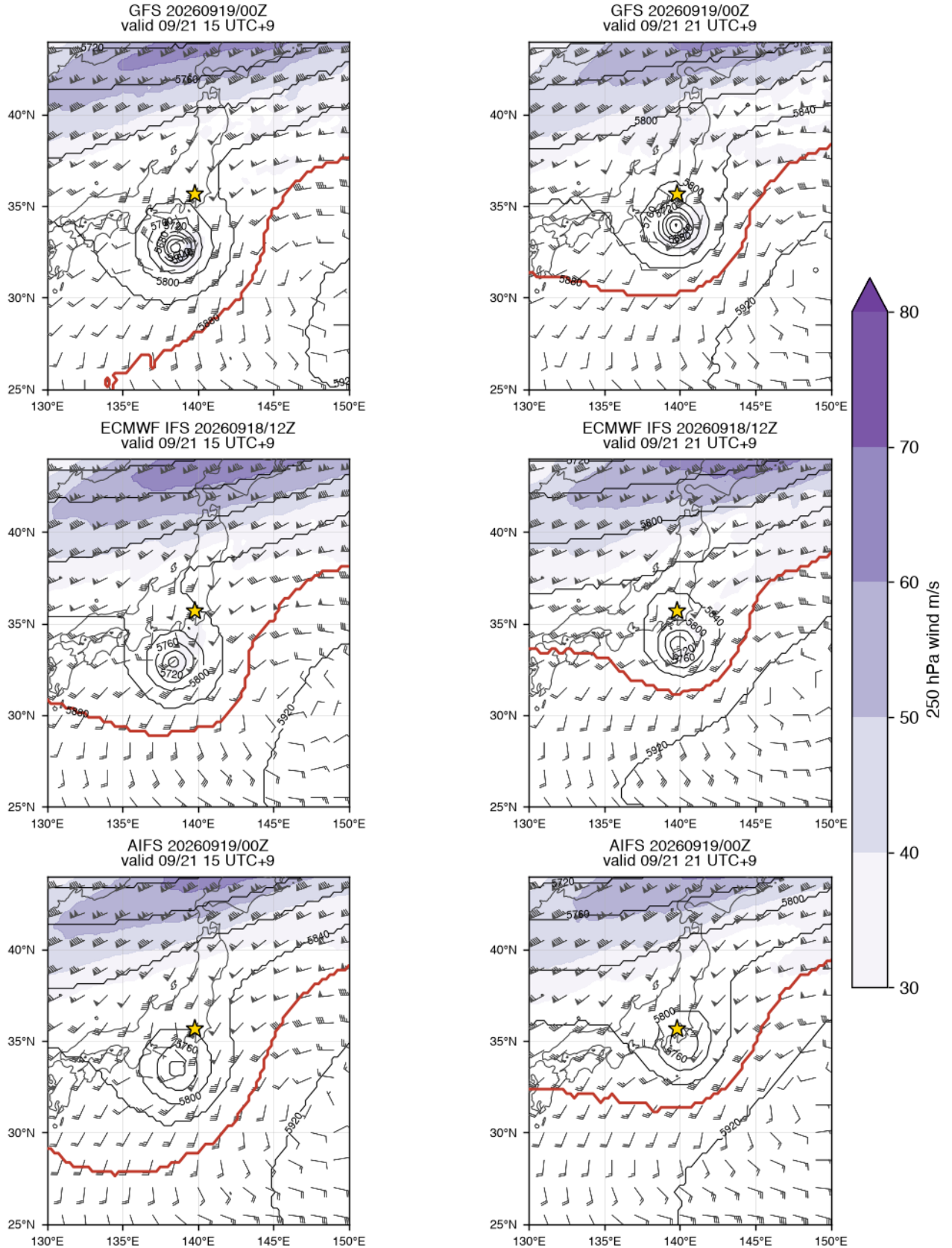


Figure 2: 500 hPa geopotential height (contours gpm, red line 5 880) and the 250 hPa jet (shading): GFS and ECMWF forecasts for 15 and 21 JST on the 21st

The typhoon at 500 hPa. In GFS the typhoon’s 500 hPa minimum is 5 524 gpm (32.8°N 138.5°E) at 06Z on the 21st and 5 556 gpm (34.0°N 139.8°E) at 12Z; ECMWF is far weaker, 5 668 → 5 684 gpm, and AIFS 5 708 → 5 732 gpm. The three positions agree within 60 km; the intensity spread reflects GFS making the typhoon deeper (958 hPa against ECMWF’s 974 and AIFS’s 984 hPa).

3.2 Check against the soundings: the initial states are trustworthy

GFS 20260919/00Z analysis: 500 hPa height + 250 hPa wind (numbers/barbs = soundings 09/19 09 UTC+9) GFS 20260919/00Z analysis: 850 hPa wind + 500 hPa height (numbers = 850 hPa T °C / PW mm)

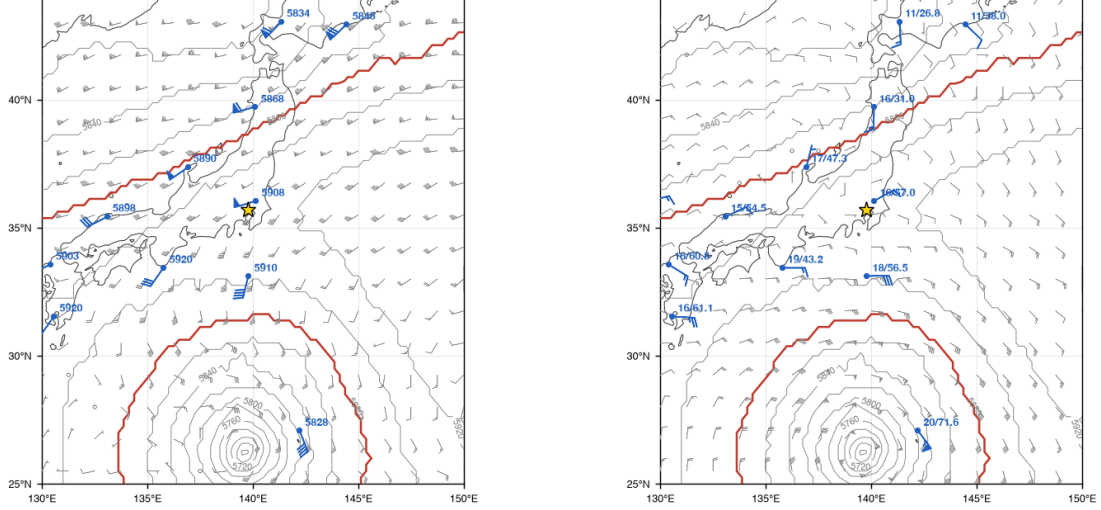


Figure 3: The GFS analysis of 00Z on the 19th against the soundings of the same time: left, 500 hPa height (numbers) and 250 hPa wind (barbs); right, 850 hPa temperature / precipitable water and 850 hPa wind

The 12 soundings of 00Z on the 19th (10 Japanese stations, Qingdao and Chichijima) against the three models at the stations:

Station	Obs z500	GFS	ECMWF	AIFS	Obs T500	GFS	ECMWF	Obs 250 hPa wind	GFS	ECMWF
Sapporo	5834	5828	5828	5836	−14.9	−15.5	−14.5	224/30	226/29	226/29
47412										
Akita	5868	5860	5860	5868	−8.0	−8.5	−9.0	254/30	247/33	253/31
47582										
Wajima	5890	5884	5884	5892	−7.6	−6.5	−8.0	235/25	240/24	245/23
47600										
Tateno	5908	5916	5916	5924	−5.6	−5.5	−5.5	253/25	225/23	233/20
47646										
Shionomisaka	5920	5908	5916	5916	−4.9	−5.0	−5.5	215/14	214/14	223/18
47778										
Hachijōjima	5910	5908	5908	5916	−5.6	−4.5	−5.0	194/21	186/20	189/20
47678										
Chichijima	5828	5828	5828	5836	−1.5	−1.0	−0.5	158/20	152/19	162/16
47971										

Over the 12 stations the 500 hPa height difference (model minus observed) averages −2 gpm with a largest of 16 gpm; the 500 hPa temperature averages +0.2 K with a largest of 1.6 K; the jet speeds are within 3 m/s. ECMWF here is the 12 h forecast from the 12Z run of the 18th and agrees just as well.

12 h changes (12Z 18th → 00Z 19th). Tateno’s z500 fell from 5 927 to 5 908 gpm, Hachijōjima’s from 5 925 to 5 910; precipitable water rose at Tateno from 50 to 57 mm, Wajima 38 → 47 mm, Akita 26 → 31 mm. The western edge of the high is weakening and the moist tongue ahead of the typhoon has already reached Honshū. Chichijima’s 850 hPa wind turned from 103°/34 m/s to 143°/29 m/s, showing the centre has moved from its south-west to due west.

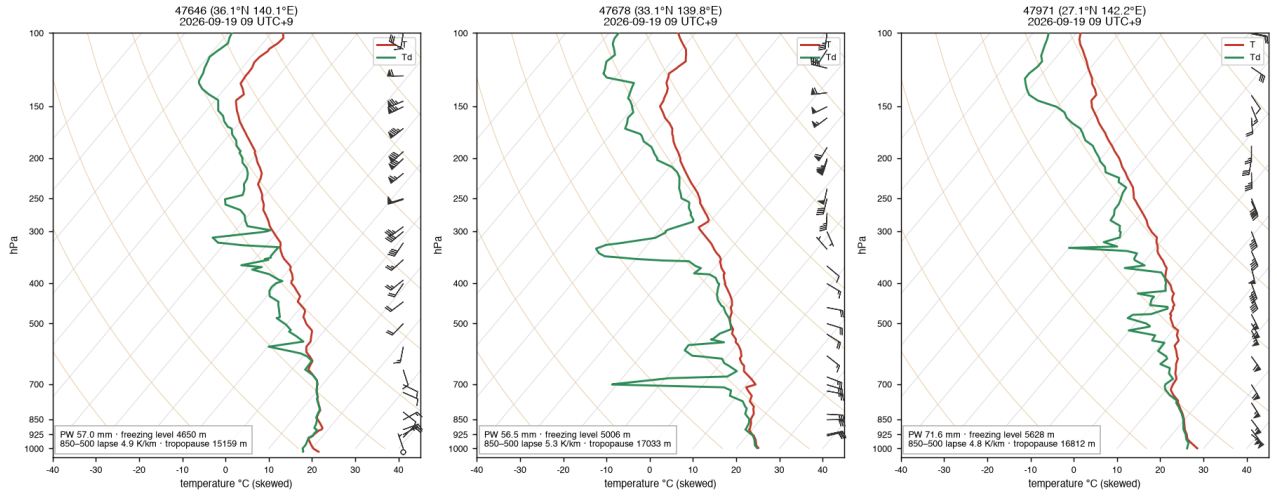


Figure 4: Soundings of 00Z on the 19th at Tateno, Hachijōjima and Chichijima (skew-T; wind barbs on the right in kt)

The structure of the three ascents:

- **Tateno** (65 km north-east of Tokyo): saturated from the surface to 700 hPa ($T = T_d = 15.6^\circ\text{C}$ at 850 hPa), a dry layer with an 8–9 K dew-point depression at 570–500 hPa, moist again near 300 hPa; the 850–500 hPa lapse rate is 4.9 K/km, close to moist adiabatic, CAPE near zero. This is stratiform rain on the north side of the autumn front — the all-day light rain and north wind in Tokyo on the 19th.
- **Hachijōjima** (270 km south of Tokyo): the easterly 14–15 m/s at 925–850 hPa is already the circulation north of the typhoon; the dry layer with a -21°C dew point at 700 hPa is the subsidence between the front and the typhoon.
- **Chichijima**: near saturation through the column, PW 71.6 mm, south-easterly 29–30 m/s from 850 to 500 hPa — a sounding inside the typhoon’s outer rain bands.

3.3 Surface systems, moisture and precipitation

MSLP (contours hPa), 10 m wind (barbs kt), rain rate (shading); red dashed = 10 m wind ≥ 17.2 m/s

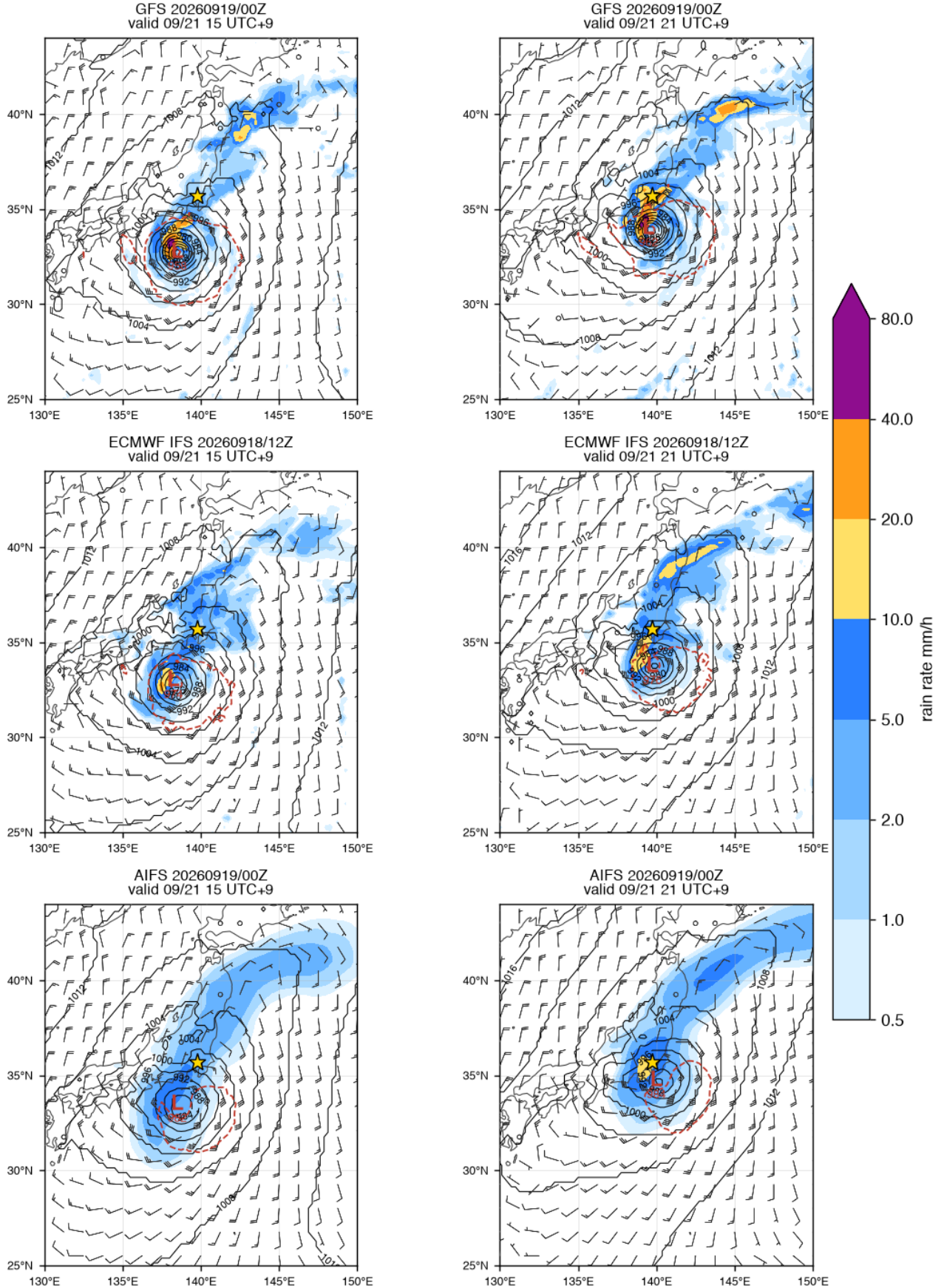


Figure 5: Sea-level pressure (contours), 10 m wind (barbs) and rain rate (shading): GFS and ECMWF forecasts for 15 and 21 JST on the 21st; the red dashed line encloses 10 m wind ≥ 17.2 m/s

Valid JST	GFS centre / max sea wind / gust	ECMWF centre / max sea wind / gust	AIFS centre / max sea wind
09 JST 21st	966 hPa · 32 / 40 m/s	976 hPa · 25 / 34 m/s	980 hPa · 21 m/s
15 JST 21st	958 hPa · 33 / 40 m/s	974 hPa · 26 / 36 m/s	—
21 JST 21st	962 hPa · 39 / 44 m/s	976 hPa · 29 / 43 m/s	984 hPa · 23 m/s

GFS's 44 m/s sea gust at 21 JST on the 21st is at 33.5°N 140.5°E (the sea north of the Izu Islands), ECMWF's 43 m/s at 33.0°N 139.5°E. The gale area (10 m wind ≥ 17.2 m/s) covers Sagami Bay and the mouth of Tokyo Bay out to the sea off the Bōsō Peninsula at 21 JST on the 21st.

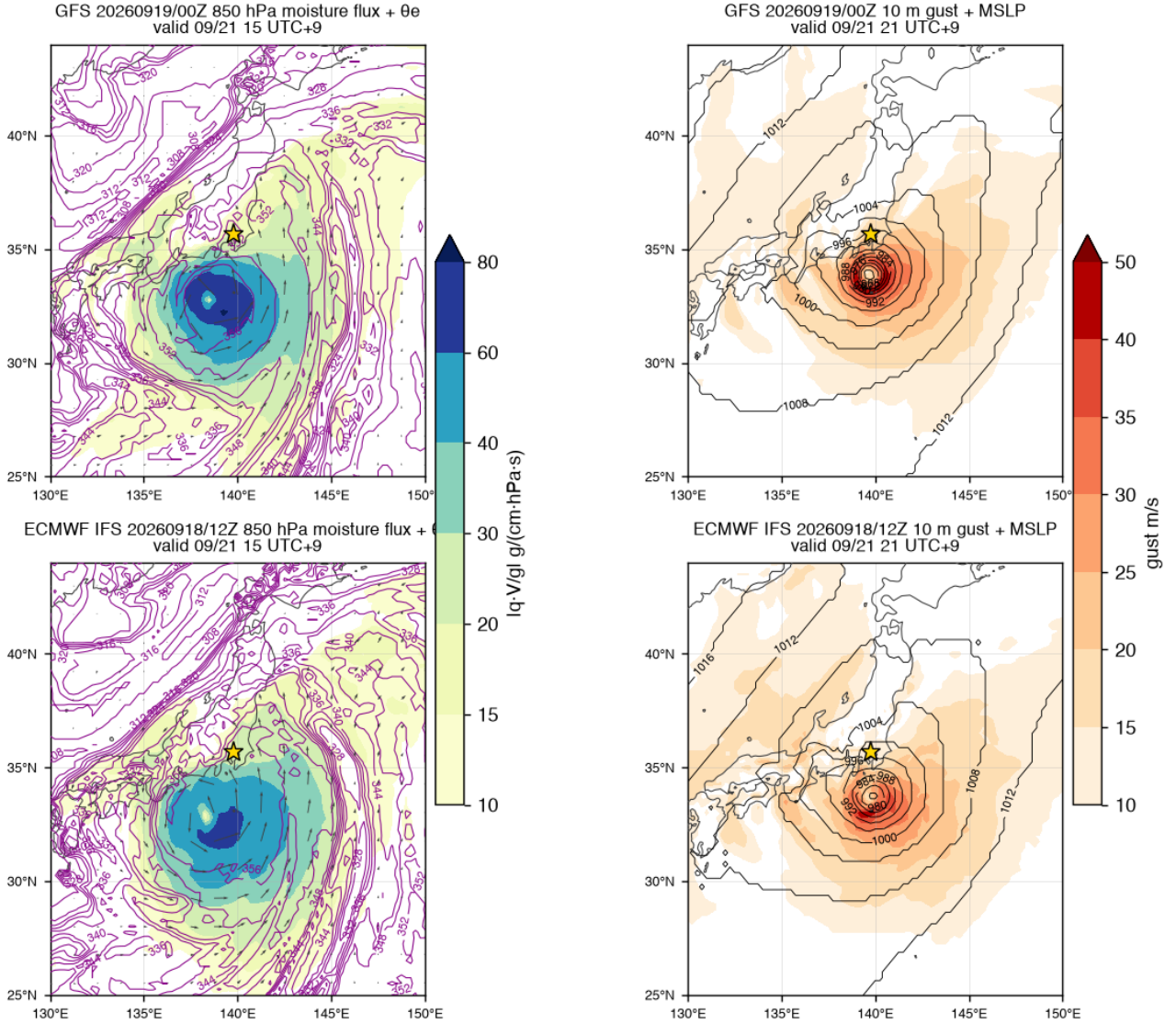


Figure 6: Left: 850 hPa moisture flux (shading) and equivalent potential temperature θ_e (contours, K), 15 JST on the 21st; right: 10 m gust and sea-level pressure, 21 JST on the 21st

Moisture and ascent. At 15 JST on the 21st the GFS 850 hPa moisture flux peaks at 84.6 g/(cm · hPa · s) (32.2°N 139.2°E, from 223°), ECMWF at 69.0 and AIFS at 57.8; the θ_e maximum of 357 K sits right over southern Kantō. The 700 hPa vertical velocity reaches the encoding floor of -6.35 Pa/s at 34.5°N 139.2°E (GFS; the true value is stronger). This south-west-to-north-east moisture transport aims straight at the Kantō plain and the Sagami Bay coast from the afternoon into the night of the 21st and, converging with the typhoon's northern flank and the autumn front, is the source of Tokyo's 100–170 mm that night. The 850 hPa temperature gradient peaks at 28 K/100 km at 34.0°N 136.0°E (21 JST on the 21st): the frontal zone between the dry cool air wrapping in on the typhoon's western side and the warm moist tongue. After the typhoon passes, Tokyo turns to a north-westerly on the 22nd, skies clear, and the temperature climbs back above 30 °C.

4 Day-by-day forecast for Tokyo

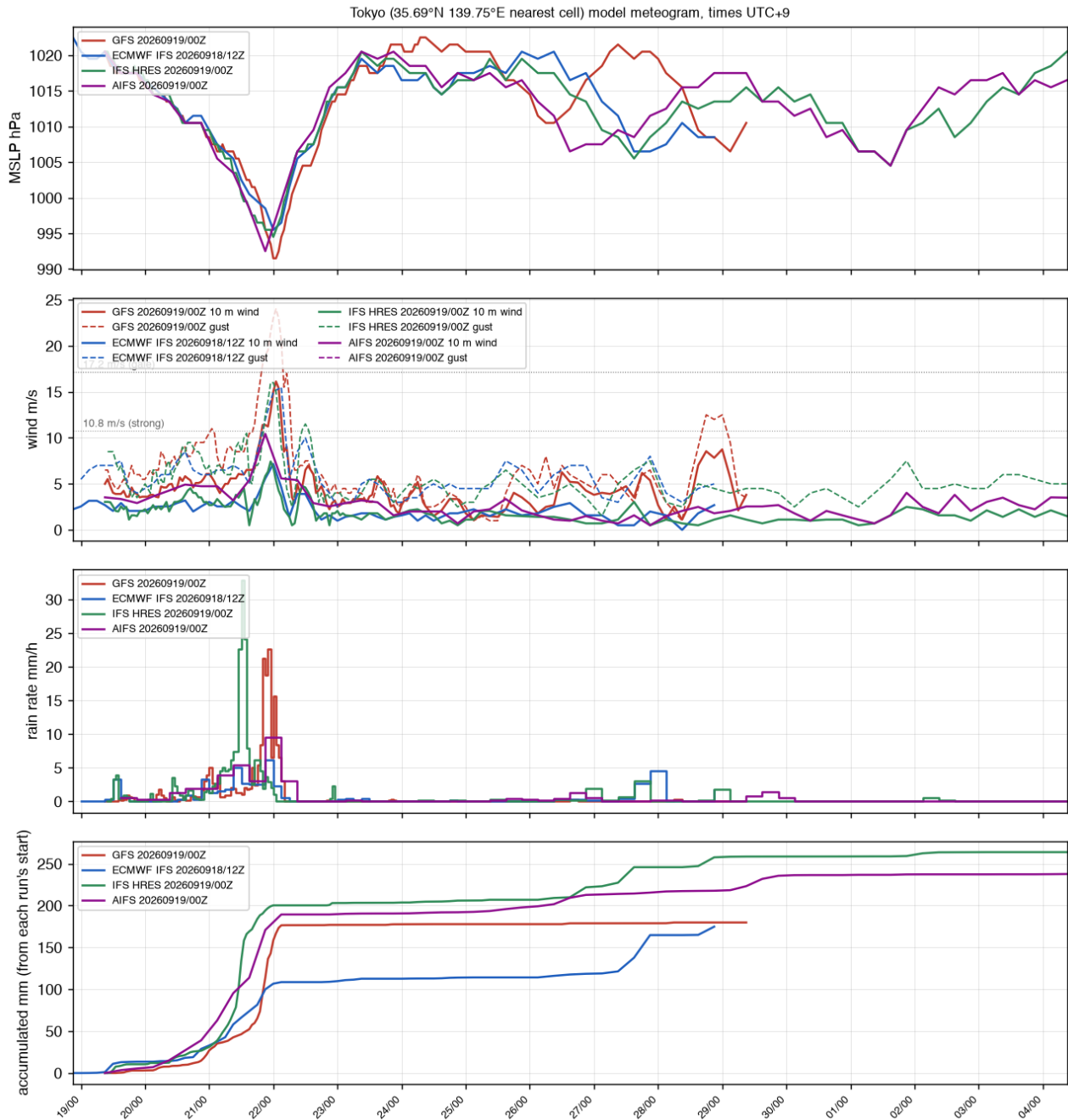


Figure 7: Meteogram of the four models at the grid cell nearest central Tokyo (35.69°N 139.75°E), times in JST

Daily (JST calendar days; rain is the accumulation at the central-Tokyo cell, wind at 10 m):

Date	Weather	Rain mm (GFS / ECMWF / HRES / AIFS)	Temperature °C	Max wind / gust m/s (GFS / ECMWF / HRES)	Direction
19th (today)	Overcast, light rain	3 / 14 / 11 / 6	22–26	6/7 · 3/8 · 3/9	N
20th	Overcast, light to moderate rain	19 / 15 / 19 / 34	21–24	6/10 · 3/9 · 5/10	N–NNE

Date	Weather	Rain mm (GFS / ECMWF / HRES / AIFS)	Temperature °C	Max wind / gust m/s (GFS / ECMWF / HRES)	Direction
21st	Moderate rain in the morning, locally heavy in the afternoon, torrential rain and gales at night	121 / 71 / 169 / 132	21–25	13/22 · 6/12 · 7/16	N → NNE → NW
22nd	Wind and rain ease before dawn, sunny and muggy by day	34 / 9 / 4 / 19	22–31	16/24 · 7/16 · 7/16	NW → S
23rd	Cloudy, occasional showers	1 / 4 / 0 / 1	21–28	6/6 · 2/6 · 2/6	light

Hourly on the 21st (central-Tokyo cell; GFS hourly, ECMWF three-hourly, IFS HRES hourly):

Time JST	GFS pressure	GFS dir/speed	GFS gust	GFS rain mm/h	ECMWF wind / gust	ECMWF rain	HRES wind / gust	HRES rain
06	1006	000°/5.0	8.0	1.0	2.5 / 6.5	1.7	2.5 / 6.0	4.5
09	1006	350°/5.6	8.5	2.0	3.2 / 7.0	5.1	3.0 / 7.0	7.4
12	1004	355°/6.0	8.5	1.1	2.5 / 6.5	2.7	4.0 / 8.5	32.8
15	1002	356°/6.5	10.5	2.0	2.1 / 5.0	2.6	0.5 / 5.5	3.1
18	1000	021°/8.5	14.0	5.4	3.6 / 8.5	2.6	2.7 / 7.0	6.1
20	998	015°/11.4	18.0	21.3	—	—	5.0 / 10.0	2.0
21	996	015°/11.4	19.0	18.8	5.6 / 12.0	6.1	5.9 / 12.5	3.7
22	994	021°/11.2	19.5	22.6	—	—	6.3 / 14.0	2.9
23	994	013°/12.9	21.5	6.5	—	—	7.4 / 16.0	2.1
00 22nd	992	002°/15.0	23.0	15.6	7.2 / 15.0	2.3	6.8 / 16.0	1.1
01 22nd	992	353°/16.1	24.0	8.4	—	—	5.4 / 15.0	0.0
03 22nd	994	330°/12.1	20.5	3.1	4.6 / 15.5	0.6	3.6 / 9.0	0.0

The models’ disagreement on **timing** deserves attention: GFS and ECMWF put the worst wind and rain between 20 JST on the 21st and 02 JST on the 22nd; IFS HRES (00Z 19th run, 0.1° resolution) brings the heaviest rain forward to 11–13 JST on the 21st (20–33 mm/h), with the night dominated by wind instead. What they share: rain all day on the 21st, wind strengthening from the evening, an end before dawn on the 22nd. The central-Tokyo cell is inland; the wind along the Tokyo Bay shore, at Haneda and on the Kōtō coast will be 10–20 % higher than the cell’s and borders the region where GFS has sea gusts above 40 m/s.

Temperature. 21–25 °C all day on the 21st with humidity near saturation; on the 22nd the southerly return flow behind the typhoon lifts the city to 30–31 °C (GFS 31.5, HRES 30.5), muggy.

5 Ensembles and uncertainty

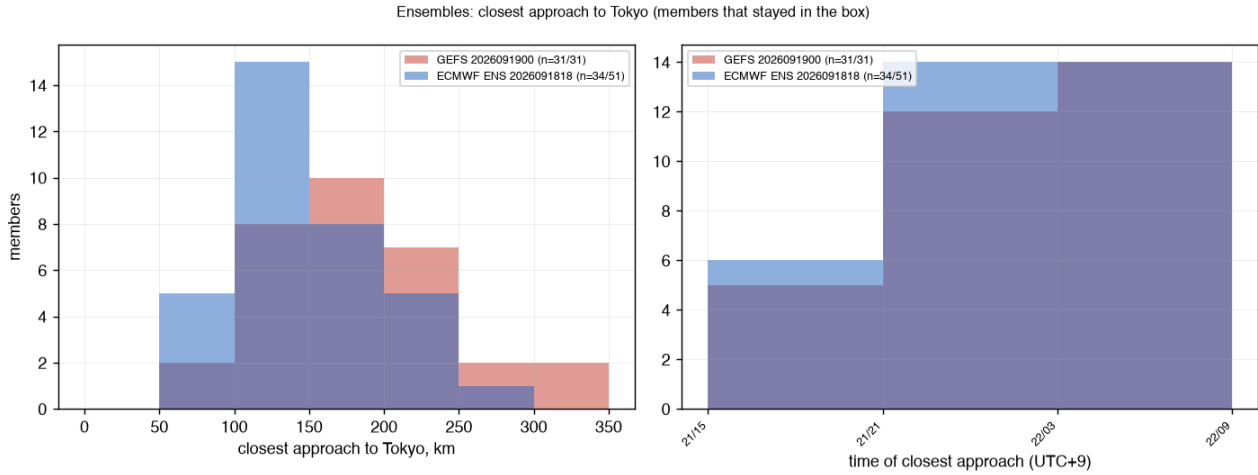


Figure 8: Closest approach of the GEFS and ECMWF ENS member tracks to central Tokyo: distance and time

- Track.** The 31 GEFS members of 00Z on the 19th have the centre at 21 JST on the 21st between 32.0 and 36.6°N and 137.5 and 143.1°E (median 33.9°N 140.2°E, in line with JTWC); the median closest approach to central Tokyo is 178 km, 21 members within 300 km and 3 within 150 km. Of the 51 ECMWF ENS members of 18Z on the 18th, 17 follow another system in the South China Sea (tracking lost, not counted); the other 34 have a median closest approach of 149 km, 27 within 300 km at 21 JST on the 21st and 8 within 150 km. The closest approaches cluster between 21 JST on the 21st and 03 JST on the 22nd; **no member takes the typhoon past Tokyo before 15 JST on the 21st, and none makes landfall west of Kantō and then moves north.**
- Intensity.** JTWC holds 65 kt; GFS has the centre at 958–966 hPa on the 21st, ECMWF 969–976 hPa, AIFS 980–984 hPa, the GEFS median 967 hPa and the ENS median 972–974 hPa. For Tokyo the difference between the ends is “gale” versus “strong wind”, over the same hours.
- Run age.** GFS, AIFS and IFS HRES are the 00Z runs of the 19th (7 h old at issue); the ECMWF open-data grid is the 12Z run of the 18th (19 h), but ECMWF’s 00Z 19th track is available through the tc product (table above) and differs from its previous run by less than 50 km. The trend from run to run has been to push the closest approach slightly later (the HRES of 00Z on the 18th was 6 h earlier). The next inputs that could change the judgement are the ECMWF 12Z 19th run (available around 05 JST on the 20th) and the JTWC 12Z 19th warning.
- Observational check.** The models’ initial states agree with the 12 soundings; Haneda’s METARs show continuous light rain since 00Z on the 19th, north wind 8–14 kt, ceilings 1 100–1 600 ft, and the TAF keeps SHRA BR with ceilings of 300–800 ft to 21 JST on the 20th; the JMA precipitation nowcast at 15:55 JST on the 19th has a 1–10 mm/h band over southern Kantō and the Izu Islands; in the Himawari infrared the northern edge of the typhoon’s cloud has reached Kantō. All three agree with the models’ grid values for the 19th–20th.

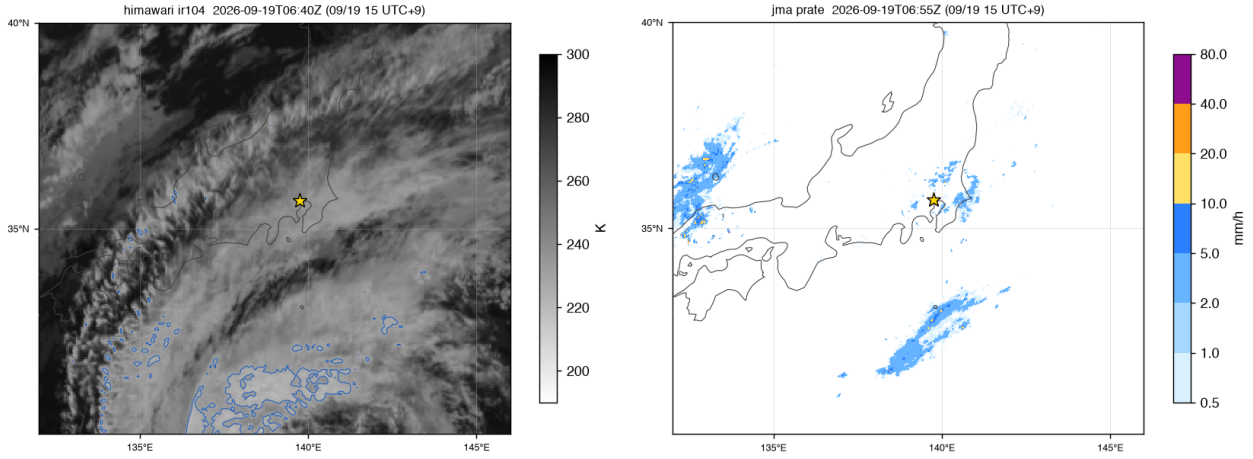


Figure 9: Left: Himawari-9 $10.4\ \mu\text{m}$ infrared, 15:40 JST on the 19th; right: JMA precipitation nowcast, 15:55 JST on the 19th; the star is central Tokyo

6 Safety notes (Tokyo)

1. **Heavy rain.** Continuous rain from the 20th, with 50–100 mm possible in 3–6 h on the night of the 21st; event totals of 120–200 mm at central Tokyo and more in the mountains of western Tama. The rain of the 20th will already have saturated the soil, so the night’s downpour falls on saturated ground: watch the landslide and inundation warnings for the Tama area and for the bluffs and underground spaces of the western wards’ uplands.
2. **Gales.** The wind strengthens clearly from 18 JST on the 21st; between 21 JST on the 21st and 03 JST on the 22nd gusts of 20–25 m/s at central Tokyo and 25–35 m/s on the coast, from the north to north-north-east, turning north-west after the typhoon passes. Secure balcony items, signboards and scaffolding before midday on the 21st.
3. **Storm surge and waves.** The typhoon crosses the mouth of Tokyo Bay on the night of the 21st, when the north to north-east wind pushes water onto the bay’s western shore; although the central pressure is only 960–975 hPa, the water level in the bay will rise noticeably. Coastal Kōtō, Edogawa and Shinagawa should watch for a storm surge advisory. Very high waves around the Izu Islands and off Bōsō all day on the 21st.
4. **Transport.** From the evening of the 21st to before dawn on the 22nd rail, road and air travel may all be restricted by wind and rain; railway companies usually announce planned suspensions a day ahead, so follow their notices. Services recover quickly during the 22nd.
5. **Margin in time.** The three models differ by about ± 3 h on the worst period, and IFS HRES puts the heaviest rain at midday on the 21st; it is safer to treat everything from 12 JST on the 21st as a period in which heavy rain may occur.

7 Data sources and disclaimer

- Numerical forecasts: NOAA GFS 0.25° (gfs.2026091900); ECMWF IFS open data 0.25° (ecmwf.2026091812; track from ecmwf 2026091900); ECMWF AIFS Single 0.25° (aifs.2026091900); ECMWF IFS HRES 0.1° (ifshres.2026091900, via Open-Meteo); GEFS (2026091900) and ECMWF ENS (2026091818) tracks.
- Typhoon: JTWC warning 015 (issued 2026-09-19 01:28Z).
- Observations: TEMP soundings from the WIS2 global cache (sounding.2026091905, 13 stations); METAR/TAF from NOAA AWC (airport.202609190650); Himawari-9 AHI (himawari.2026091901.0632); JMA high-resolution precipitation nowcast (jma.2026091904.0655).
- Contains modified ECMWF data (© ECMWF, CC-BY-4.0). Himawari data from JMA via NOAA. Derived from the JMA precipitation nowcast (気象庁の降水ナウキャストを加工して作成).
- View on the map: [GFS precipitation + 500 hPa height](#), [ECMWF 10 m wind with the typhoon marks](#), [Himawari infrared](#), [multi-model comparison at central Tokyo](#).
- Grid values are rounded to each variable’s quantization step (pressure 2 hPa, temperature $0.5\ ^\circ\text{C}$, wind of the order of $0.5\ \text{m/s}$); the typhoon’s central pressure and maximum wind are JTWC’s, the model grids are used only for comparison. All

times are JST (UTC+9) unless marked UTC. This analysis is not an official forecast.