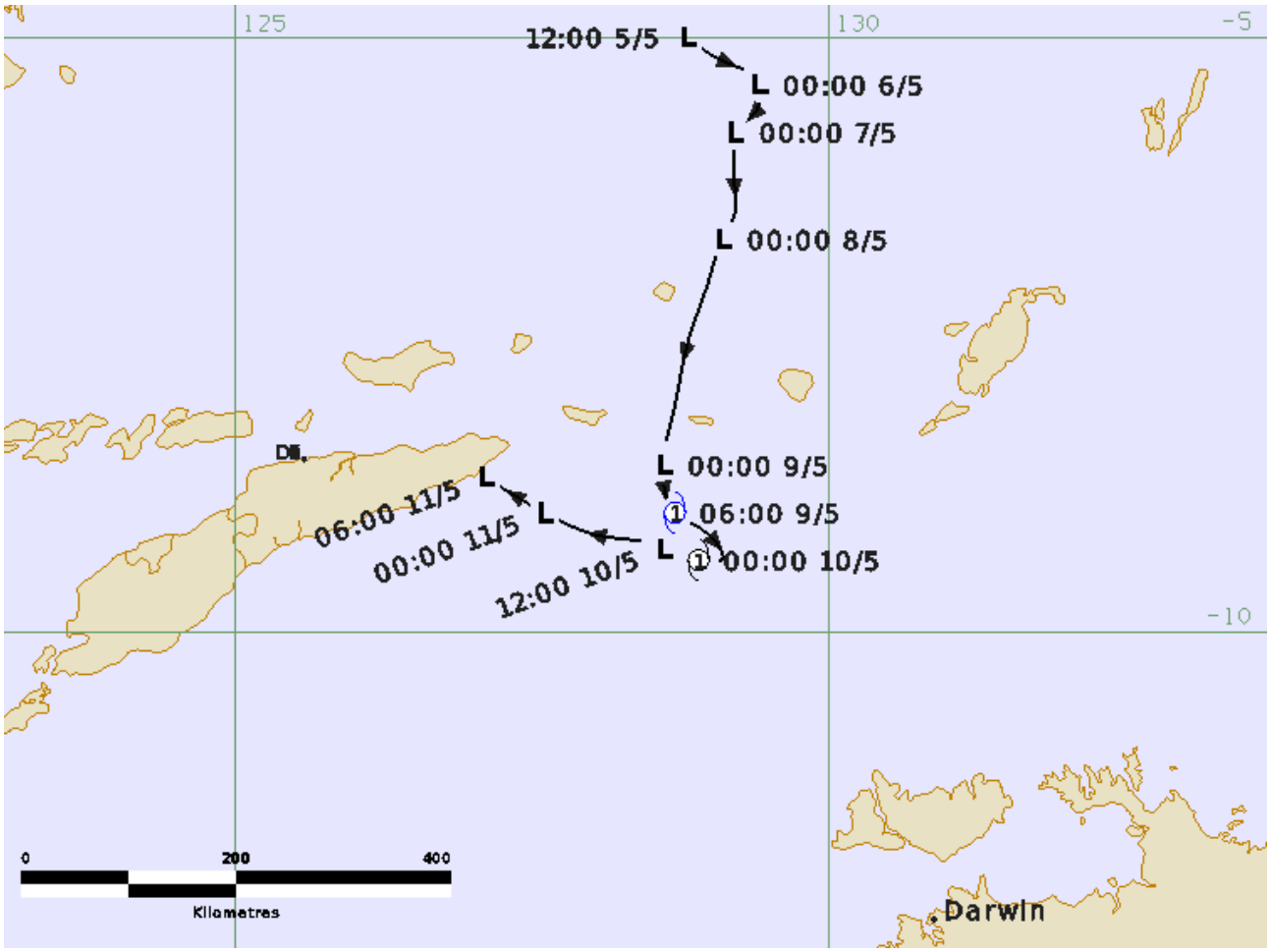
The Bureau of Meteorology

Tropical Cyclone Lili

5 – 11 May 2019

Joe Courtney, Tropical Cyclone Environmental Prediction Services



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Cover image: Track of Tropical Cyclone Lili

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1. Summary

Tropical Cyclone Lili was a short-lived, small, late season, category one tropical cyclone that moved from the Banda Sea into the Timor Sea causing heavy rain to some islands in Indonesia's eastern District and to Timor Leste.

Lili originated from a tropical low that formed over the Banda Sea on 5 May. It moved to the south and gradually developed, passing through the southern Maluku Islands of Leti, Sermata and Babar overnight on 8 to 9 May. Heavy rainfall caused significant flooding in some parts. The circulation intensified during 8 May and tropical cyclone intensity is estimated at 0600 UTC 9 May in the Timor Sea. Scatterometry confirmed the small region of gales about the centre, concurrent with development of deep convection near the centre. Lili weakened quickly on 10 May due to dry air eroding deep convection on the northern side. A low to mid-level ridge to the south steered the weakening circulation to the west northwest towards Timor Leste where it dissipated upon landfall on 11 May. Flooding was reported in parts of Timor Leste resulting in three deaths, one missing person, 72 damaged houses and three damaged bridges.

Lili was named by Jakarta Tropical Cyclone Warning Centre (TCWC) on 9 May just prior to moving into the Australian region near 9°S 129°E. International products were issued by BMKG Indonesia through the Jakarta Tropical Cyclone Warning Centre for the duration of Lili's time as a tropical cyclone.

Table 1. Best track summary for Tropical Cyclone Lili, 5-11 May 2019.

Times in UTC. * not at tropical cyclone intensity.

Year	Month	Day	Hour UTC	Pos. Lat. S	Pos. Long. E	Pos. Acc. nm	Max Wind 10min kn	Max gust kn	Cent. Press. hPa	Rad. of gales (NE/SE/ SW/NW)	Rad. of storm (NE/SE/ SW/NW)	RMW nm
2019	5	5	1200	5.0	128.8	30	15	40	1008	0/0/0/0	0/0/0/0	-
2019	5	5	1800	5.2	129.1	40	15	40	1007	0/0/0/0	0/0/0/0	-
2019	5	6	0000	5.4	129.4	40	15	40	1008	0/0/0/0	0/0/0/0	-
2019	5	6	0600	5.5	129.4	40	15	40	1006	0/0/0/0	0/0/0/0	-
2019	5	6	1200	5.6	129.4	40	20	45	1008	0/0/0/0	0/0/0/0	-
2019	5	6	1800	5.7	129.3	40	20	45	1007	0/0/0/0	0/0/0/0	-
2019	5	7	0000	5.8	129.2	40	25	45	1006	0/0/0/0	0/0/0/0	-
2019	5	7	0600	6.0	129.2	30	25	45	1004	0/0/0/0	0/0/0/0	-
2019	5	7	1200	6.2	129.2	20	30	45	1002	0/0/0/0	0/0/0/0	-
2019	5	7	1800	6.5	129.2	30	30	45	1001	0/0/0/0	0/0/0/0	-
2019	5	8	0000	6.7	129.1	20	30	45	1001	0/0/0/0	0/0/0/0	-
2019	5	8	0600	7.0	129.0	25	30	45	1000	0/0/0/0	0/0/0/0	-
2019	5	8	1200	7.6	128.8	30	30	45	1000	0/0/0/0	0/0/0/0	-
2019	5	8	1800	8.1	128.7	30	30	45	1000	0/0/0/0	0/0/0/0	-
2019	5	9	0000	8.6	128.6	20	35*	45	1000	0/20/30/0	0/0/0/0	-
2019	5	9	0600	9.0	128.7	20	40	50	997	20/20/30/30	0/0/0/0	15
2019	5	9	1200	9.2	129.0	20	40	50	997	20/20/30/30	0/0/0/0	15
2019	5	9	1800	9.4	129.1	20	40	55	996	20/30/40/30	0/0/0/0	15
2019	5	10	0000	9.4	128.9	20	40	55	998	20/30/40/30	0/0/0/0	15
2019	5	10	0600	9.4	128.8	20	35*	50	1000	0/30/40/0	0/0/0/0	-
2019	5	10	1200	9.3	128.6	20	30	45	1002	0/0/0/0	0/0/0/0	-
2019	5	10	1800	9.2	128.1	20	30	45	1004	0/0/0/0	0/0/0/0	-
2019	5	11	0000	9.0	127.6	20	25	45	1006	0/0/0/0	0/0/0/0	-
2019	5	11	0600	8.7	127.1	20	20	40	1006	0/0/0/0	0/0/0/0	-

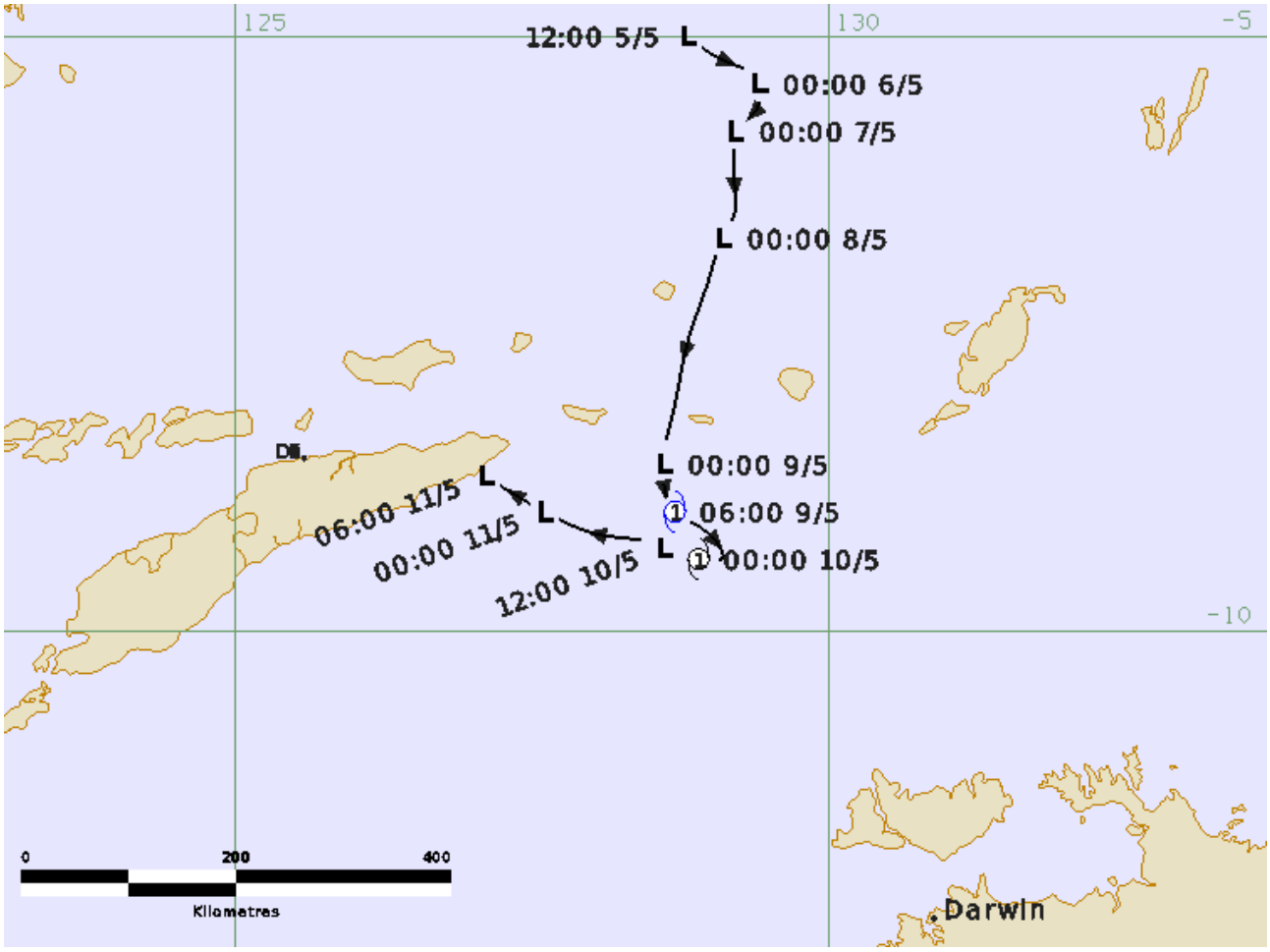

Figure 1a. Best track of Tropical Cyclone Lili (times in UTC).

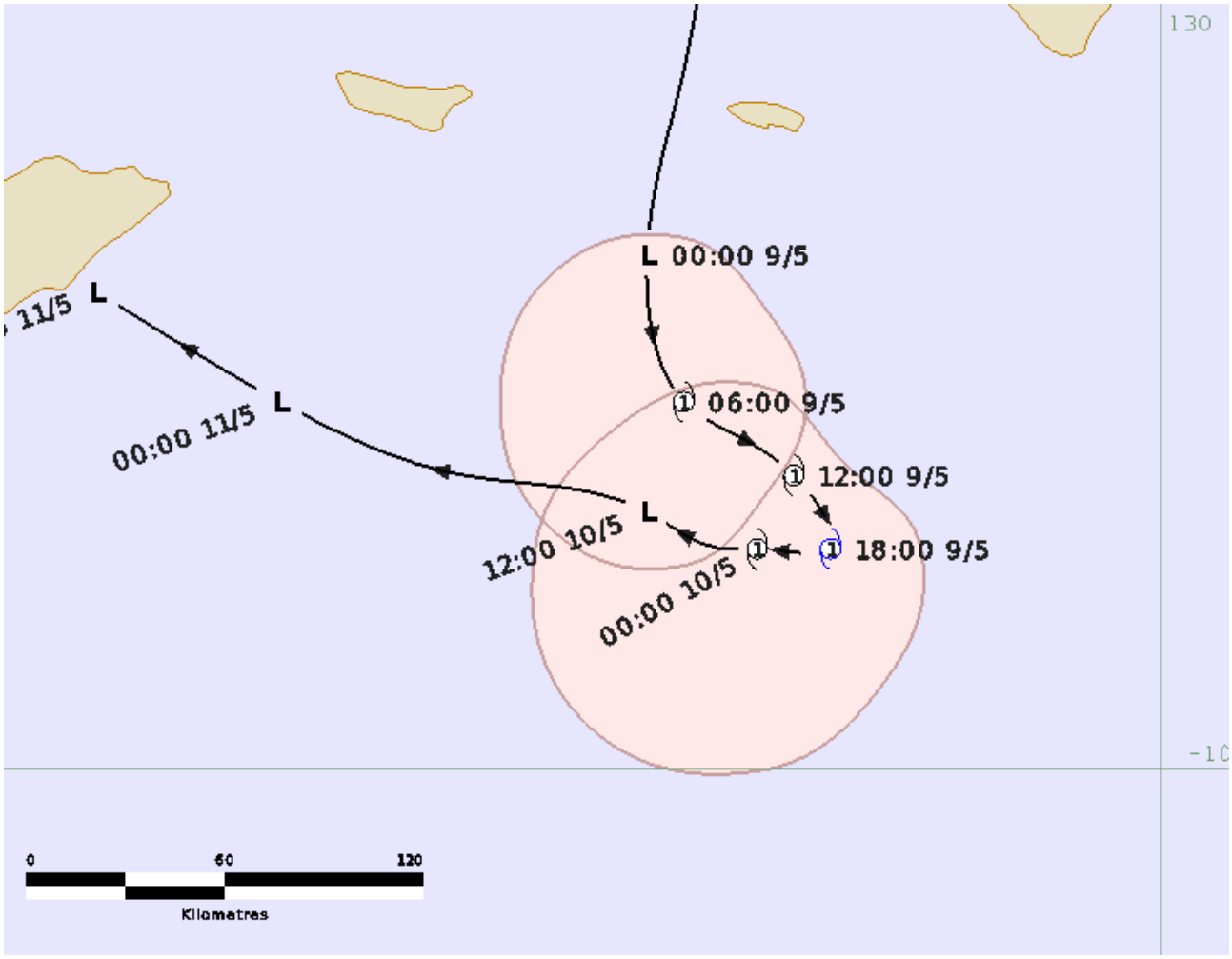

Figure 2b. Detailed best track of Tropical Cyclone Lili showing the extent of gales at 06 UTC 9 May and at 00 UTC 10 May (times in UTC).

2. Meteorological description

1.1. Intensity analysis

A pulse of the Madden-Julian Oscillation moved through the Australian region in early May which enhanced the monsoonal flow. A weak low emerged within the monsoon trough on 5 May, as evidenced by scatterometry (ASCAT-A at 1254 UTC). Deep convection increased near the centre during 6 May, particularly to the west, influenced by vertical easterly wind shear. However, the low-level centre was exposed from deep convection during 7 May and into 8 May. Late on 7 May scatterometry (ASCAT A and B and SCATSAT) indicated a localised region of gale force winds southwest of the centre, although these winds weakened on subsequent scatterometry passes.

Visible imagery on 8 May showed the low-level centre exposed from deep convection initially before convection developed near the centre during the day. The centre tracked to the south through Leti, Sermata and Babar Islands of the southern Maluku Islands overnight on 8 May into the Timor Sea.

An OSCAT image at 2359 UTC 8 May showed gales just south of the centre although possibly these were rain enhanced. Renewed deep convection developed during 9 May and tropical cyclone intensity is estimated at 0600 UTC 9 May. The 0600 UTC visible image, shown in Figure 2, shows the centre obscured by the dense cloud but the 0716 UTC SSMIS 91GHz microwave image in Figure 3 shows tight curvature in the deep convection near the centre. Gales were then evident on the ASCAT-B at 1244 UTC 9 May shown in Figure 4. No further scatterometry passed over the centre during the event although ASCAT winds to 30 kn (55 km/h) were observed on the western periphery of the circulation around 0000 UTC 10 May suggesting gales were still occurring closer to the centre. The maximum 10-minute mean winds were estimated at 40 kn (75 km/h) from 0600 UTC 9 May to 0000 UTC 10 May. This was consistent with ASCAT, Dvorak (CI=3.0) and the objective SATCON and ADT guidance.

Deep convection was sustained south of the centre. Despite the fact that the vertical wind shear remained low, dry air eroded convection north of the centre early on 10 May and the system was estimated to be below tropical cyclone intensity at 0600 UTC 10 May. At this time the Dvorak intensity was estimated to have reduced to 2.5 while gales are estimated to have persisted south of the centre until 1200 UTC.

The circulation weakened further on 11 May reaching the eastern end of Timor Leste at 0600 UTC as it dissipated.

1.2. Structure

Lili was a small system having gales generally extending only 20 to 40 nm (37 to 74 km) from the centre, the largest to the southwest of the centre. Peak winds were likely southwest of the centre corresponding to the main region of deep convection. The radius to maximum winds (RMW) was 15 nm (28 km) in the time Lili was at tropical cyclone intensity.

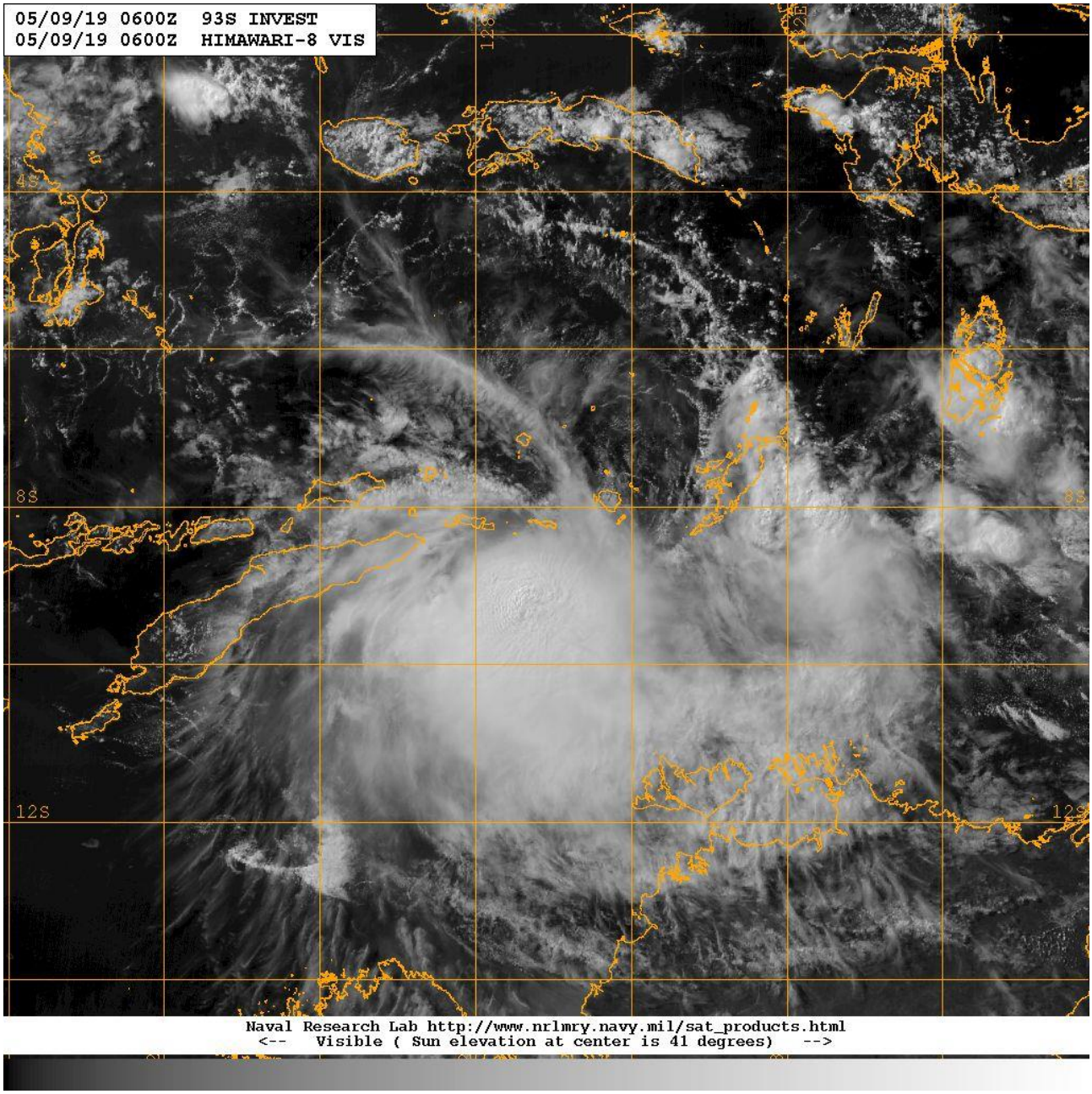

Figure 2. Visible image at 0600 UTC 9 May 2019 when Lili reached tropical cyclone intensity. Image courtesy NRL: https://www.nrlmry.navy.mil/TC.html

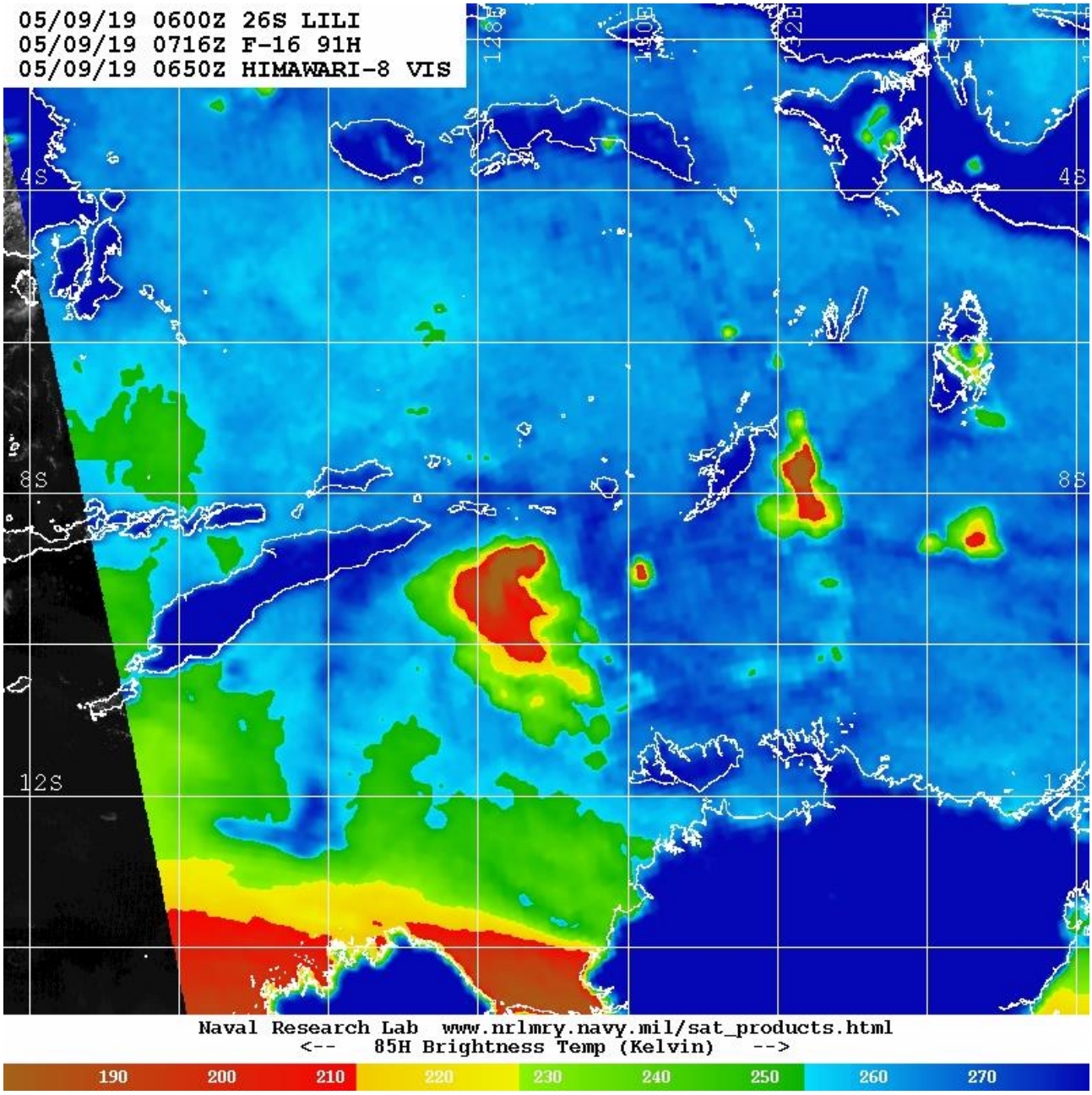

Figure 3. SSMIS 91 GHz microwave image at 0716 UTC 9 May, showing tight curvature in the deep convection. Image courtesy NRL: https://www.nrlmry.navy.mil/TC.html

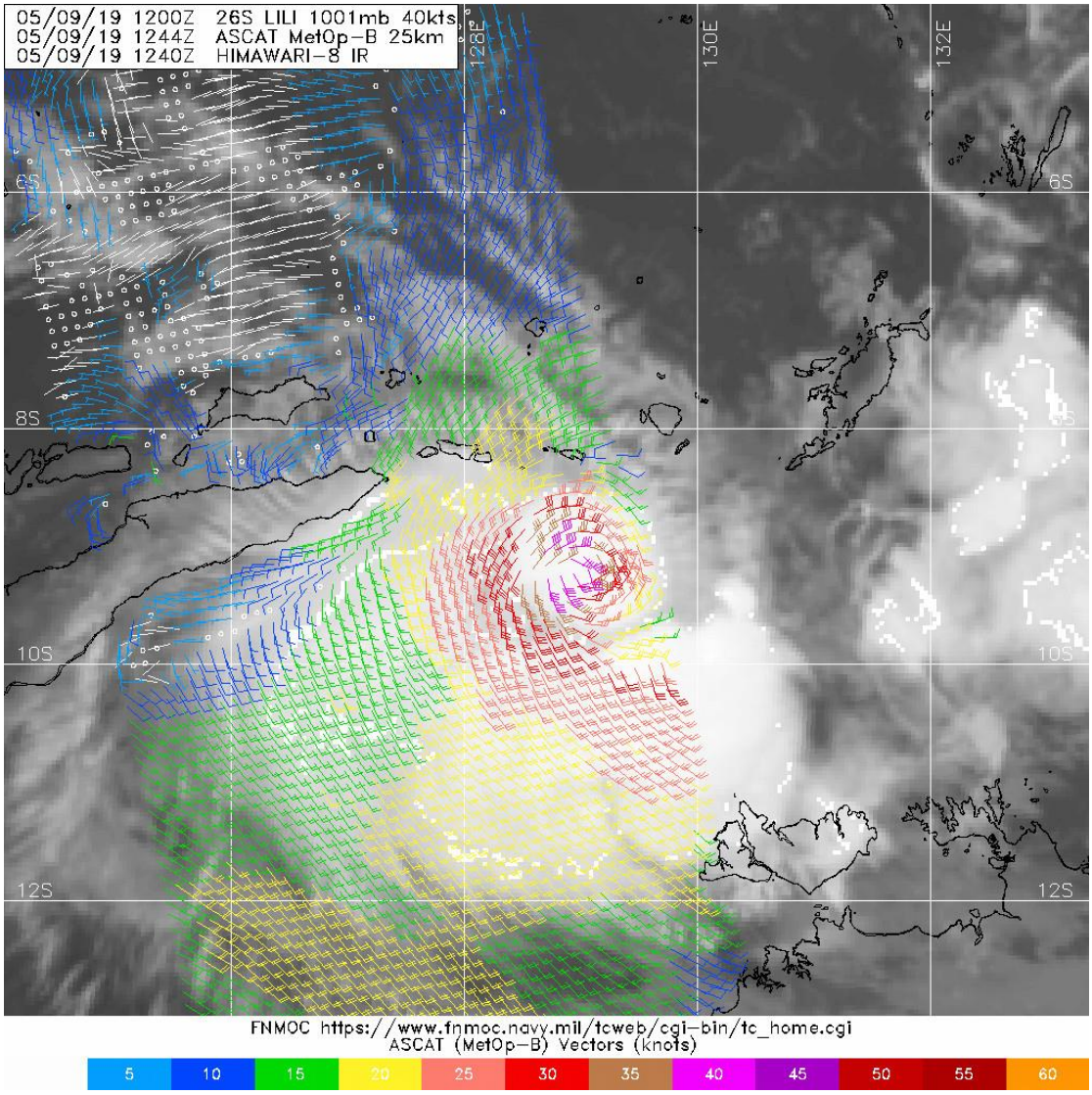

Figure 4. ASCAT-B scatterometer pass at 1244 UTC 9 May showing a small region of gales around the centre. Image courtesy NRL: https://www.nrlmry.navy.mil/TC.html

1.3. Motion

In the early stages the low initially moved on a general south south-west track under the influence of a ridge to the east. As Lili reached tropical cyclone intensity it became slow moving before a ridge which developed to the southwest steered the circulation to the west north-west until its demise near Timor Leste.

3. Impacts

The developing low caused heavy rainfall and significant flooding to the southern Maluku Islands including Leti, Sermata and Babar Islands. Heavy rainfall caused significant flooding in some parts while strong winds reportedly damaged a few houses. High waves also caused problems and one ship was reportedly sunk.

Flooding was reported in parts of Timor Leste resulting in three deaths, one missing person, 72 damaged houses and three damaged bridges. Areas near Baucau and Lospalos were among the worst hit. Source: https://floodlist.com/asia/indonesia-east-timor-cyclone-lili-may-2019

4. Observations

There were no known surface observations of significance for this system.

5. Forecast performance

While official Advisories were issued for Timor Leste and for the Aviation industry, there were no public products issued. Official public and marine products were issued by Jakarta Tropical Cyclone Warning Centre. In general terms the small-scale nature of the circulation made it difficult to predict its intensification, although proximity to dry air was a factor in forecasting its weakening on 10 May.

6. Appendix: List of abbreviations

Abbreviation	Term
ADT	Advanced Dvorak Technique
ACST	Australian Central Standard Time
AEST	Australian Eastern Standard Time
AMSR2	Advanced Microwave Scanning Radiometer
ASCAT	Advanced Scatterometer
ATMS	Advanced Technology Microwave Sounder
AWS	automatic weather station
AWST	Australian Western Standard Time
C	Celsius
CI	Current intensity
CIMSS	Cooperative Institute for Meteorological Satellite Studies (USA)
CIRA	Cooperative Institute for Research in the Atmosphere (USA)
EIR	Enhanced InfraRed
ERC	eyewall replacement cycle
FNMOC	Fleet Numerical Meteorology and Oceanography Centre (USA)
FT	Final T-number
GCOM	Global Change Observation Mission
GHz	Gigahertz
GMI	Global Precipitation Measurement Microwave Imager
h	hour
hPa	hectopascal
HSCAT	Hai Yang 2 Scatterometer (HY-2B, HY-2C)
km	kilometres
km/h	kilometres per hour
kn	knot
LLCC	LLCC
MET	Model Expected T-number

METOP	Meteorological Operational Satellite
MJO	Madden-Julian Oscillation
mm	millimetres
MSLP	mean sea level pressure
nm	nautical mile
NOAA	National Oceanic and Atmospheric Administration
NRL	Navy Research Lab (USA)
PAT	Pattern T-number
RH	relative humidity
RMW	radius of maximum winds
RSMC	Regional Specialised Meteorological Centre
SAR	Synthetic Aperture Radar
SATCON	satellite Consensus
SMAP	Soil Moisture Active Passive
SMOS	Soil Moisture and Ocean Salinity
SSMIS	Special Sensor Microwave Imager/Sounder
TC	Tropical Cyclone
TCWC	Tropical Cyclone Warning Centre
UTC	Universal Time Co-ordinated