



BMKG

BMKG ACTIVITIES ON SUPPORTING THE WEATHER MODIFICATION MISSION IN INDONESIA



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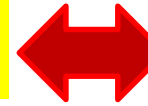
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ASEAN Workshop on Weather Modification, 6-9 August 2018

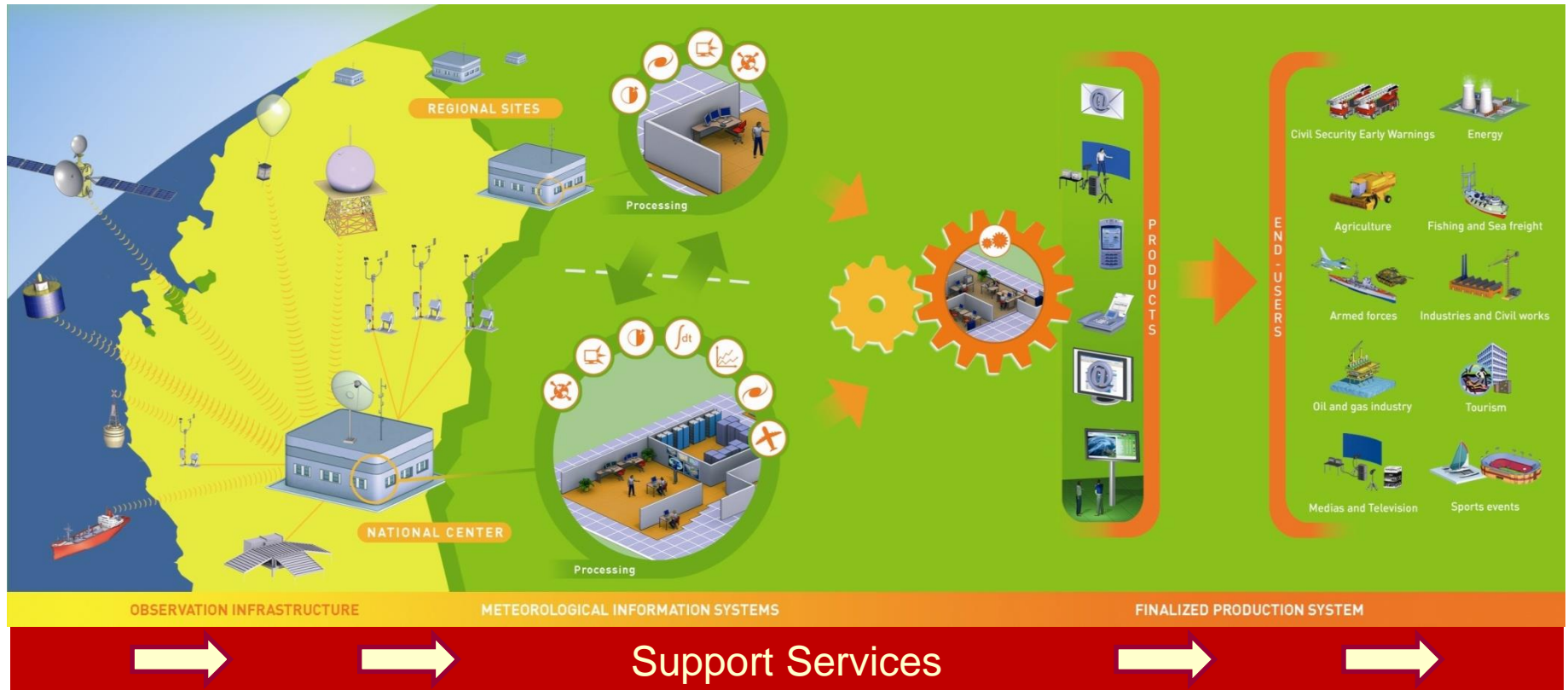
Observation Systems



Information System

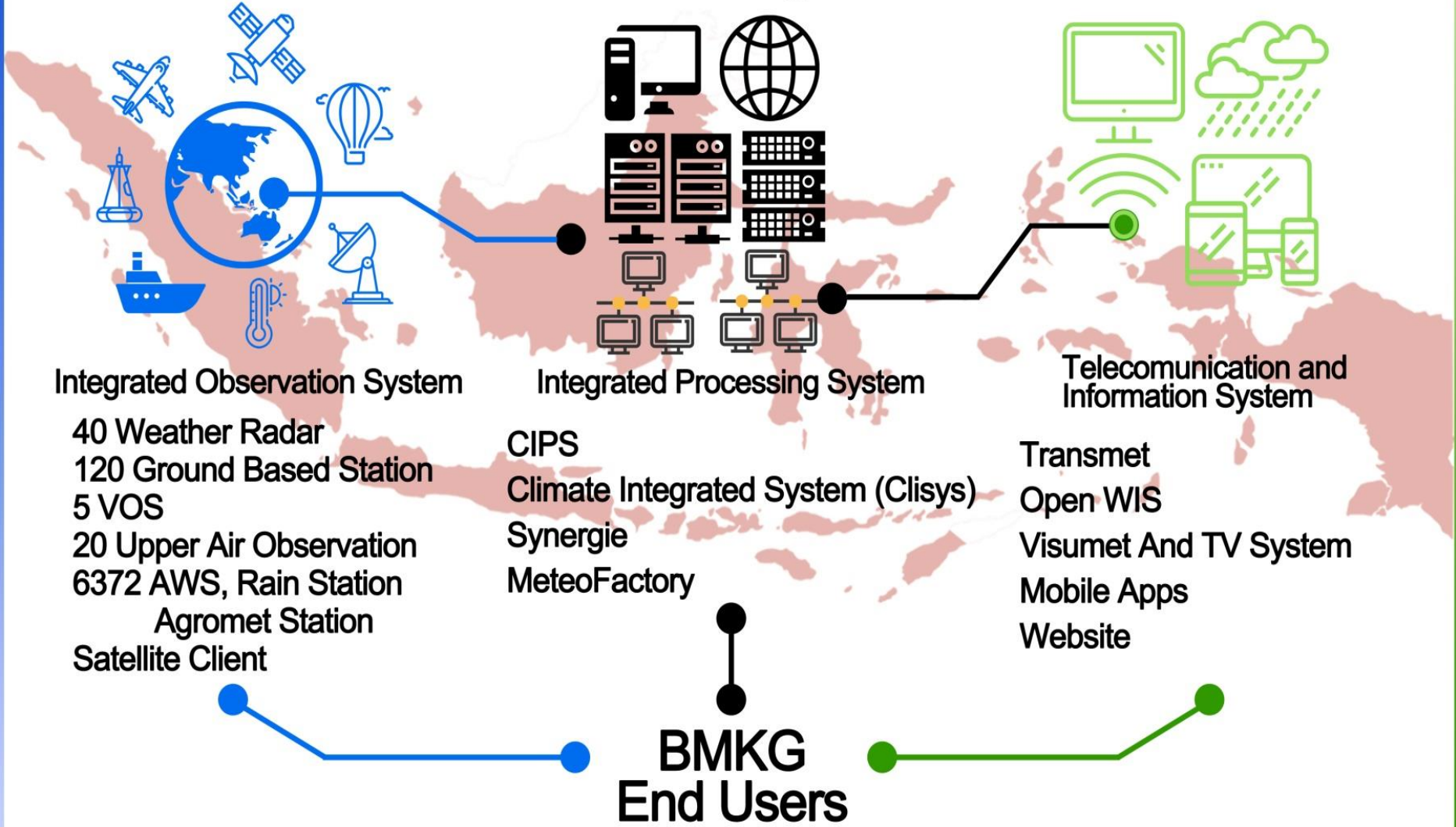


Public Weather Services / Early Warning System





National Digital Forecasting



Integrated Observation System

- 40 Weather Radar
- 120 Ground Based Station
- 5 VOS
- 20 Upper Air Observation
- 6372 AWS, Rain Station
- Agromet Station
- Satellite Client

Integrated Processing System

- CIPS
- Climate Integrated System (Clisys)
- Synergie
- MeteoFactory

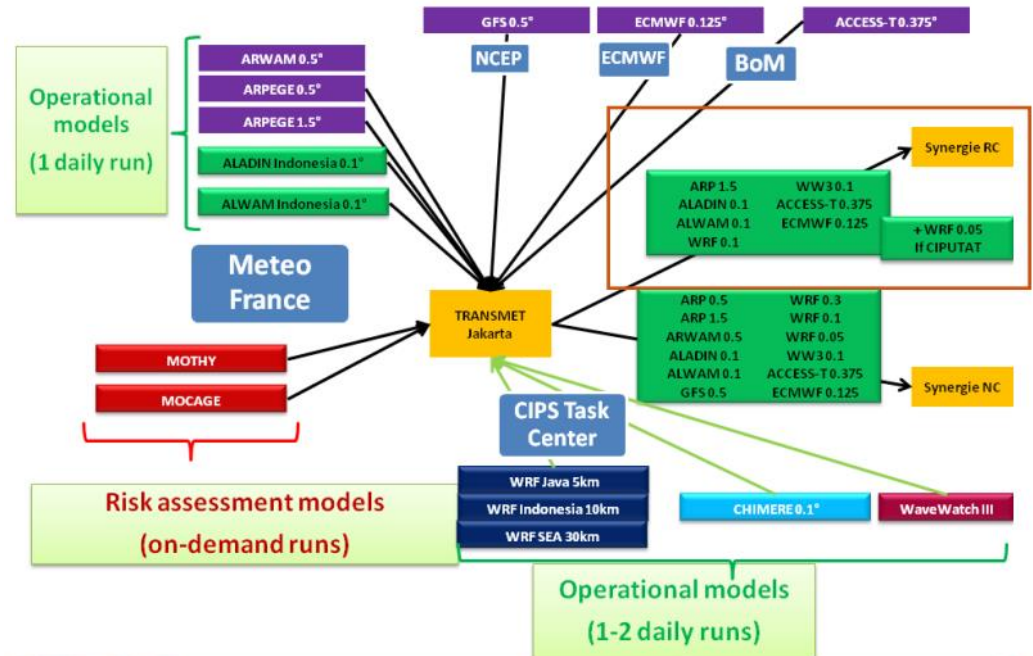
Telecommunication and Information System

- Transmet
- Open WIS
- Visumet And TV System
- Mobile Apps
- Website

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End Users



INTEGRATED EXTERNAL MODEL

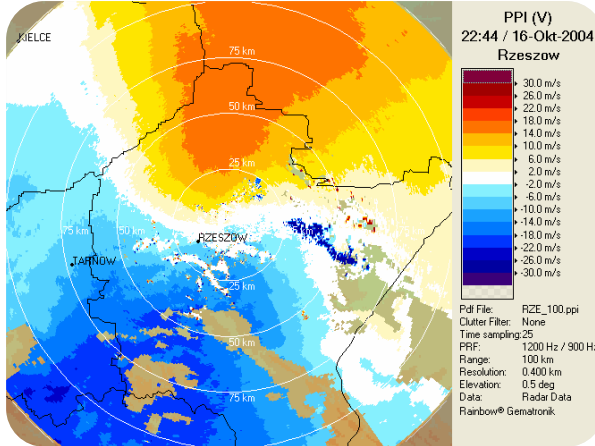


Model	Resolution	Forecast Time
WRFULL	0.1° 0.03° Java domain	120 hrs, hourly until 12 hr then 3 hourly 2 initial runs at 00 and 12
WRFDY	0.1°	120hrs, 3 hourly 2 initial runs at 00 and 12
WRFASSIM (assimilated with obs data)	0.1° 0.03° Java domain	120 hrs, hourly until 12 hr then 3 hourly 2 initial runs at 00 and 12
WRFDA (assimilated with obs data)	0.1°	120hrs, 3 hourly 2 initial runs at 00 and 12

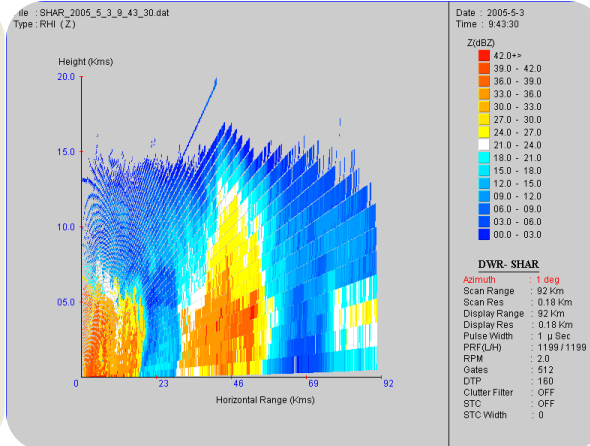
Model	Resolution	Forecast Time
IFS	0.125°	Up To 240 hrs 2 Initial runs at 00 UTC and 12 UTC
ACCESS-R	0.11°	Up to 72 hrs 4 initial runs at 00, 06, 12, 18 UTC
ARPEGE	0.5°	Up to 72 hrs 4 initial runs at 00, 06, 12, 18 UTC
GFS	0.5°	Up to 192 hrs 4 initial runs at 00, 06, 12, 18 UTC
UK-GLOB	1.5°	For Aviation Services only



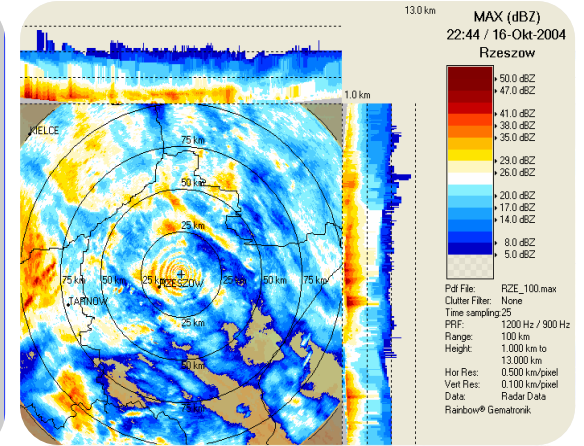
WEATHER RADAR ANALYSIS



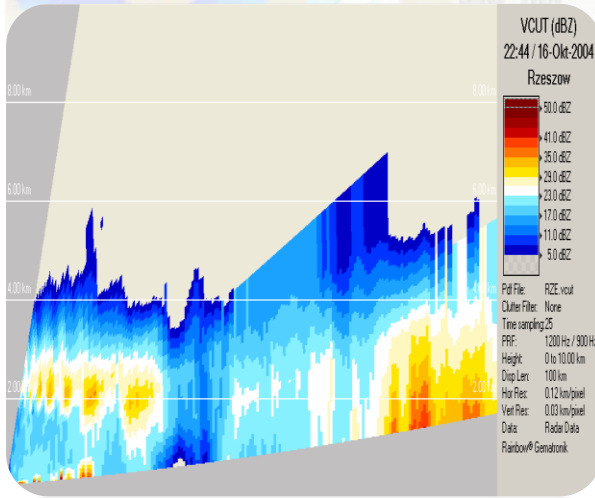
Radial Velocity



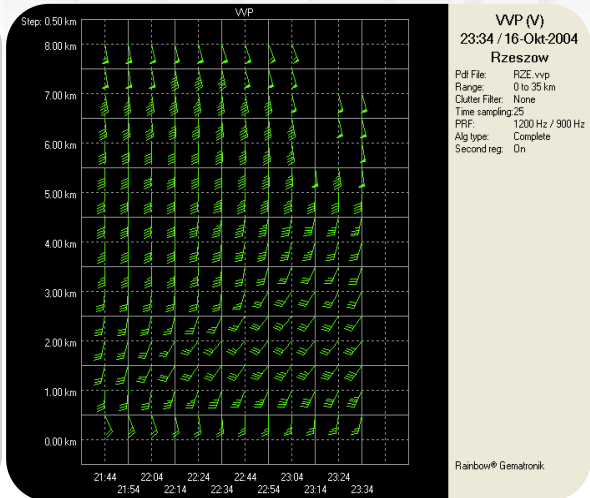
Range Height Indicator



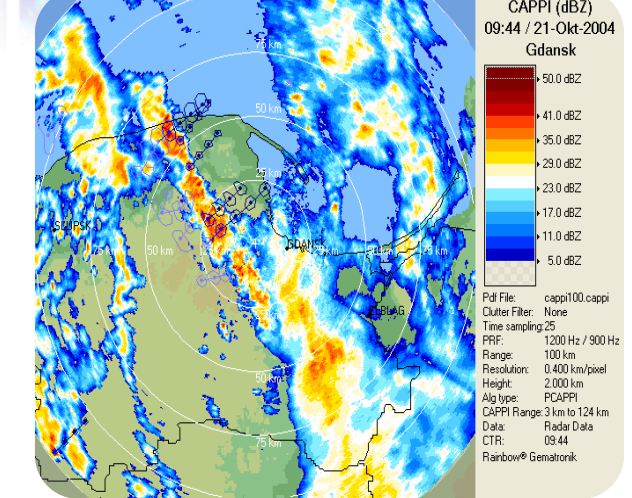
Max Capii



VCUT



Volume velocity Processing

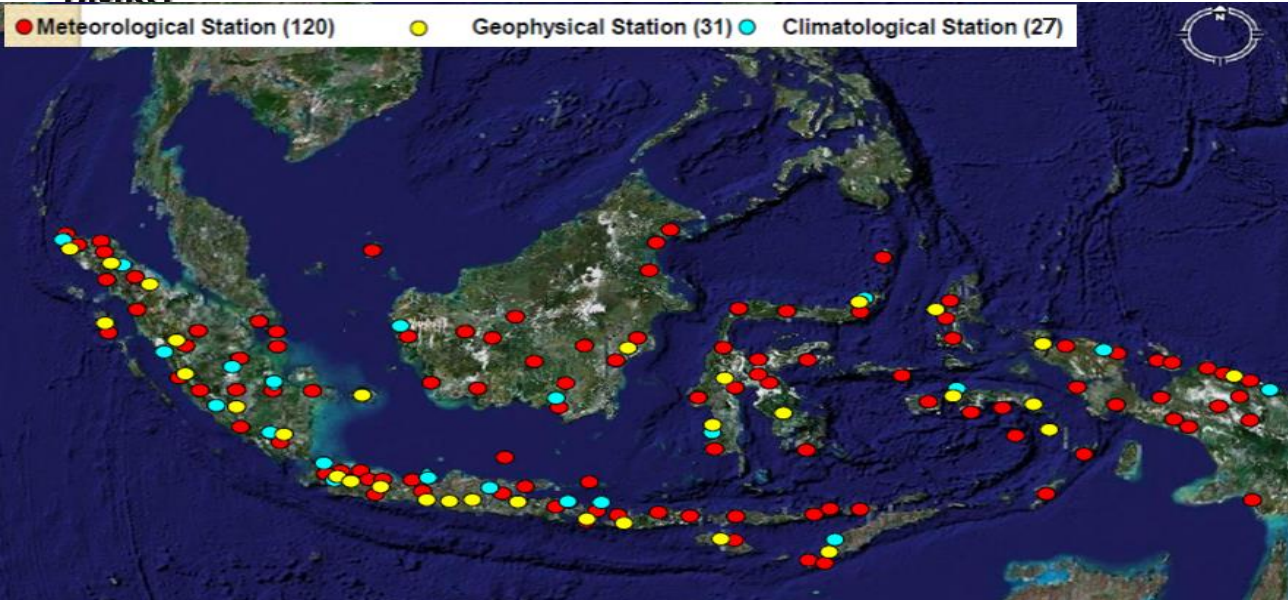


Cell Centroid Tracking

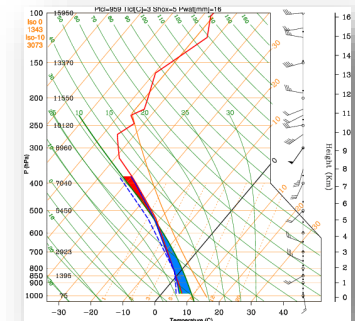


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OBSERVATION

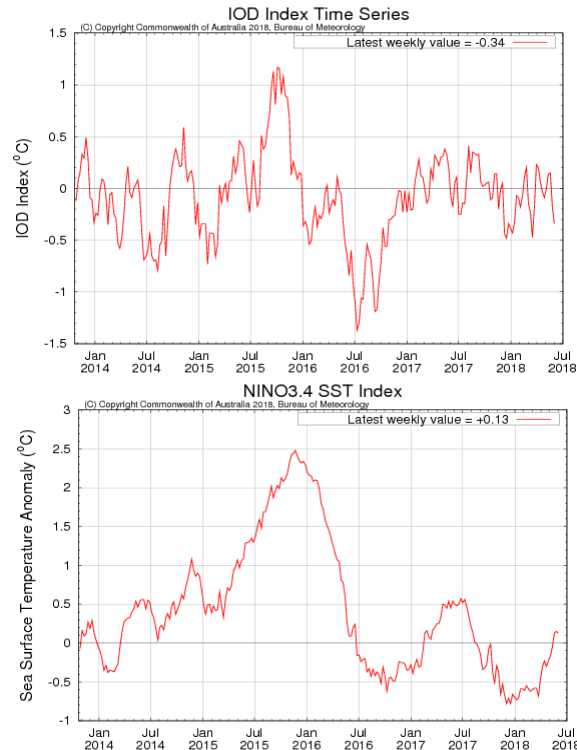
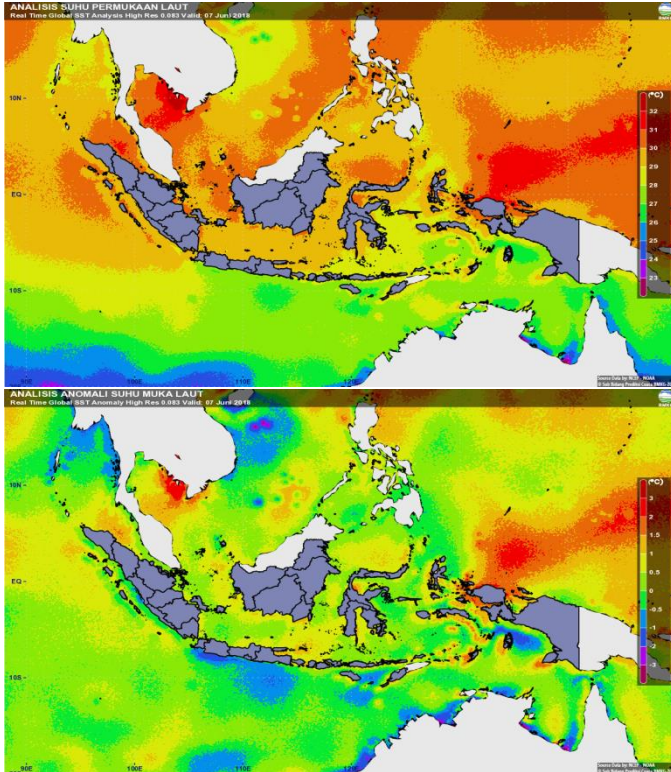


“the most used in supporting weather modification are weather radar data, synoptic and upper air observation”

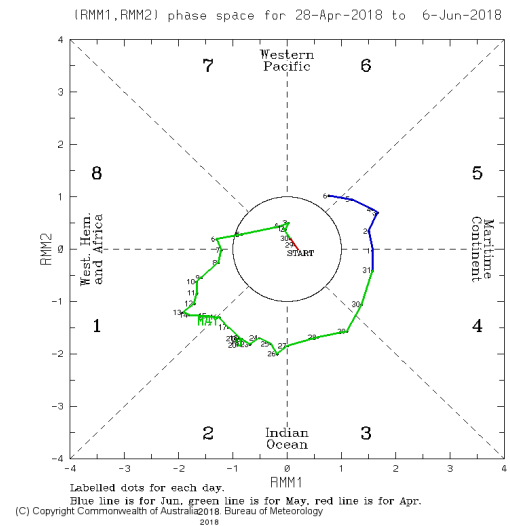


CASE STUDY 7 JUNE 2018

WEATHER MODIFICATION MISSION IN PALEMBANG SUMATERA



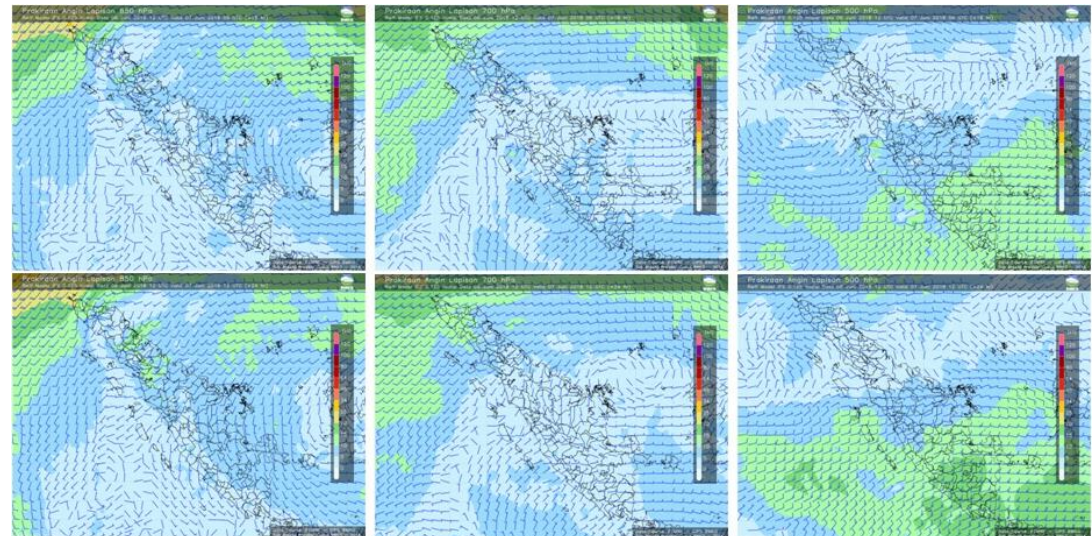
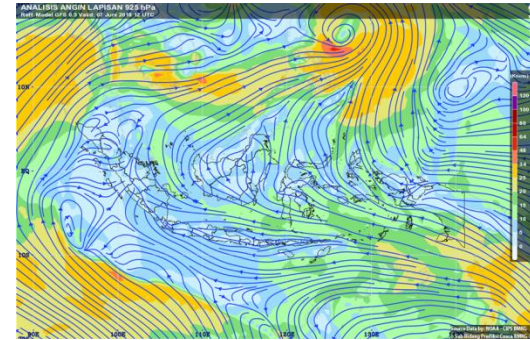
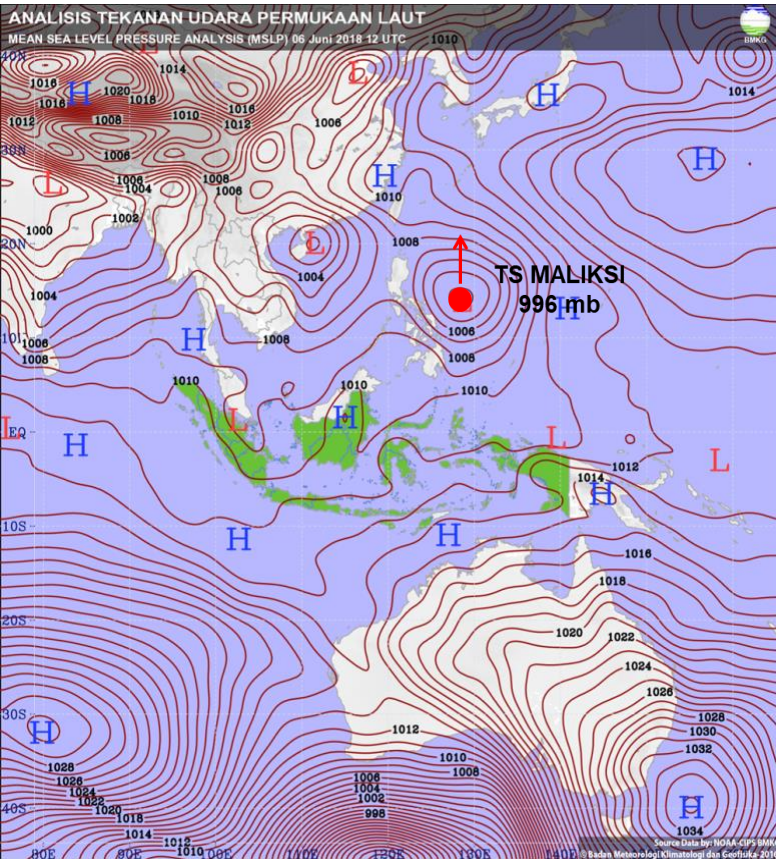
Global Condition



- Temperature of the sea ≥ 29 °C in around South Sumatera \rightarrow increase local evaporation (convective cloud).
- Wet air masses supply from Indian Ocean and Pacific Ocean is not significant to South Sumatera region \rightarrow cloud growth in large scale is less intense.

CASE STUDY 7 JUNE 2018

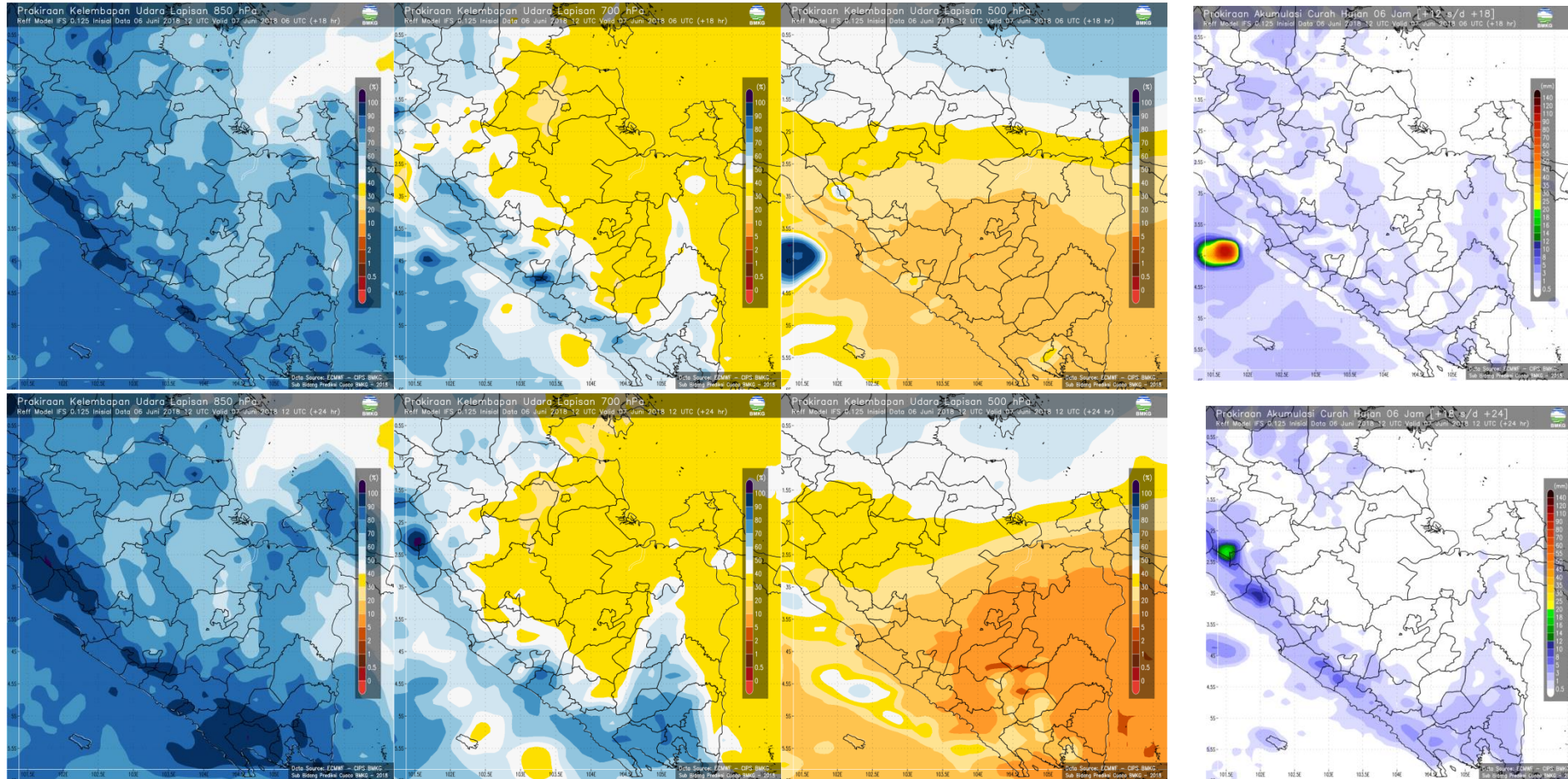
AIR MASSES, STREAMLINE, CYCLONE



- Air pressure in northern hemisphere is lower than southern hemisphere → air masses (dry and cold) move from south to north (Australian Monsoon).
- There is Tropical Storm MALIKSI in Pacific Ocean eastern of Phillipines → movement of air masses (wind) from south to north is quite strong.

CASE STUDY 7 JUNE 2018

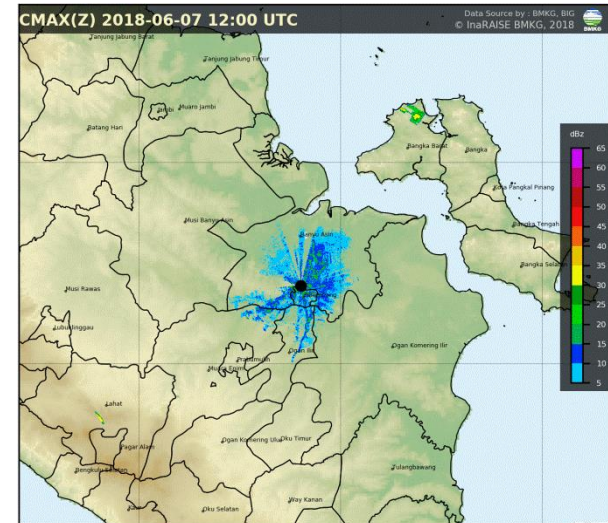
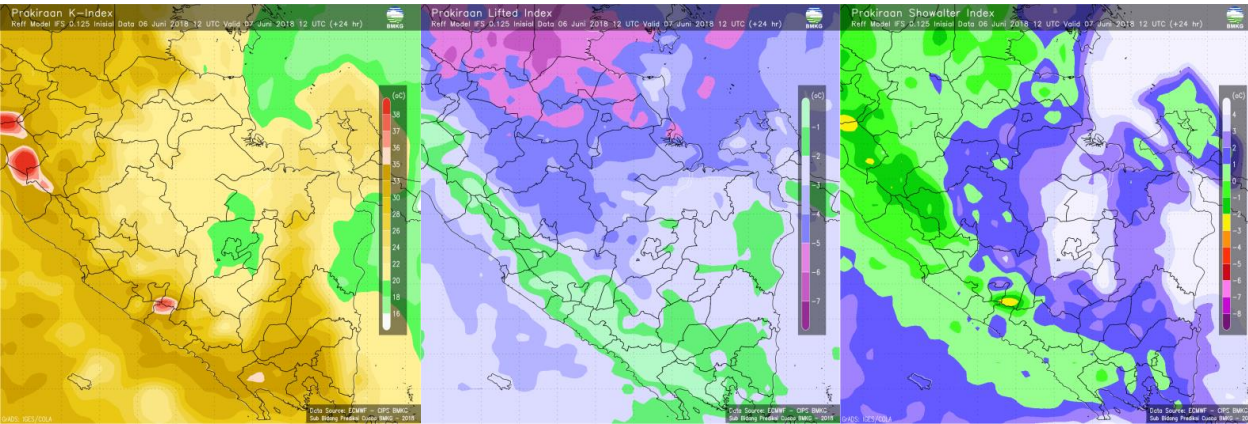
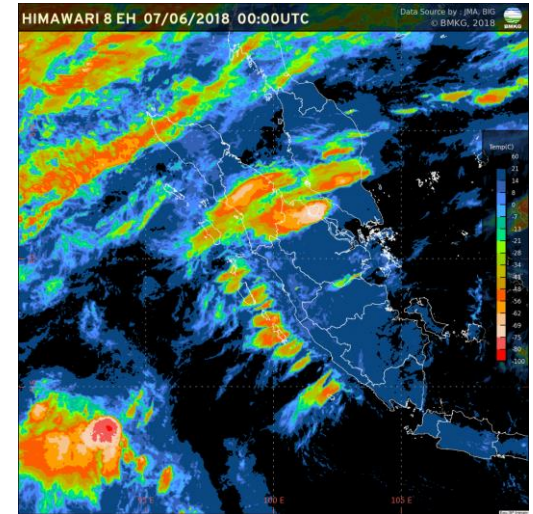
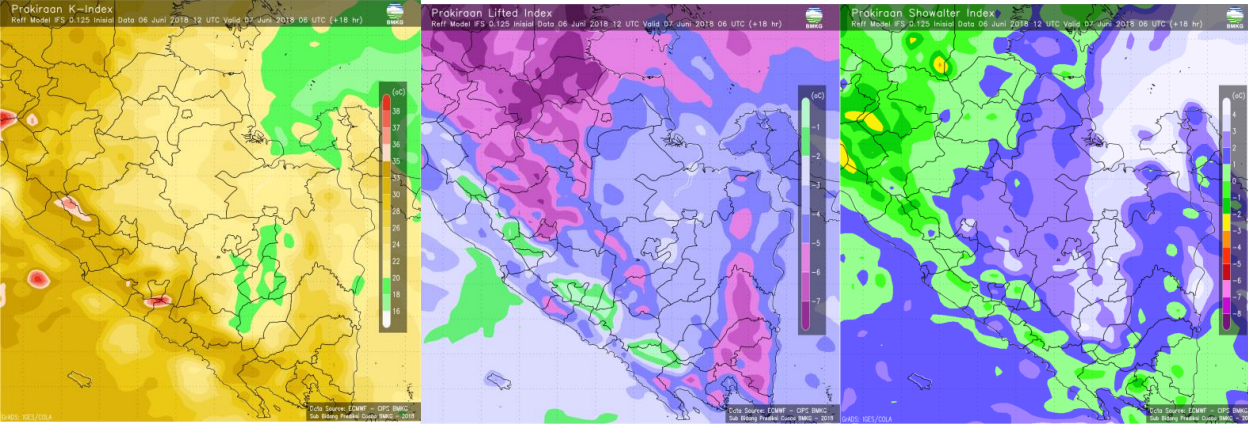
RELATIVE HUMIDITY



- Low level → 70-90 %
- Medium level → 30-60 %
- High level → < 40 %

- Rainfall : < 3 mm/6 hours
- # South Sumatera

ATMOSPHERE STABILITY



South Sumatera

- K-Index : 20 – 33 → medium TS probability
- Lifted Index : (-2) – (-5) → moderate instability
- Showalter Index : (-1) – 3 → potentiality for shower/TS
- CAPE : 500 – 2500 J/kg → stable to moderate unstable air masses

SUMMARY

- BMKG as a Indonesia meteorological agency supports weather modification activities carried out by BPPT-BBTMC in all regions of Indonesia for many purposes.
- The assigned meteorologist on weather modification mission has attended basic meteorological analysis courses and is proficient in the use of weather observation tools.
- The common tools and analysis to support weather modification mission are hires NWP, weather radar, upper air observation, lightning detector also surface observation.



Thank You...



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