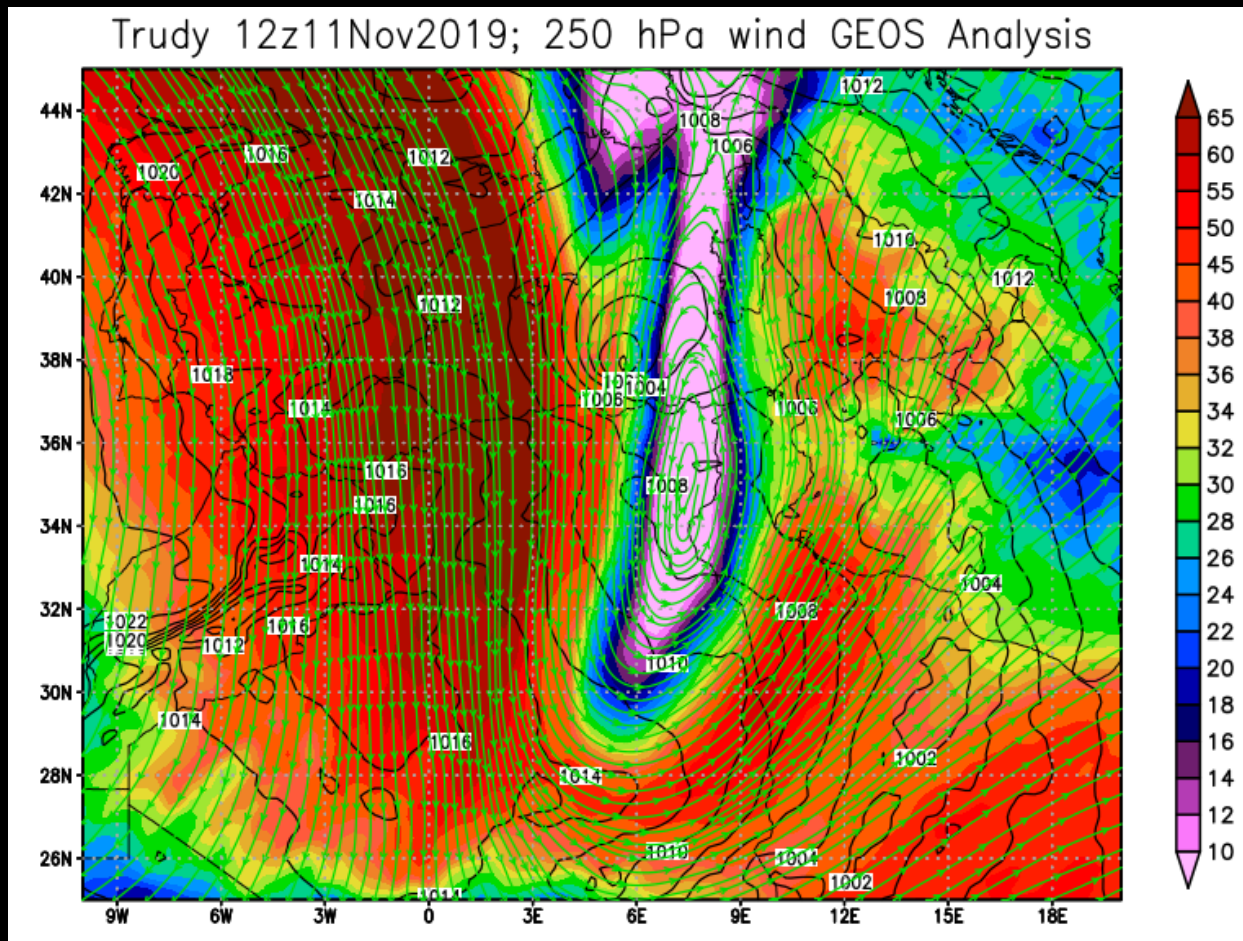


# GEOS Captures Tropical Cyclone-Like System “Trudy” Over the Mediterranean Sea

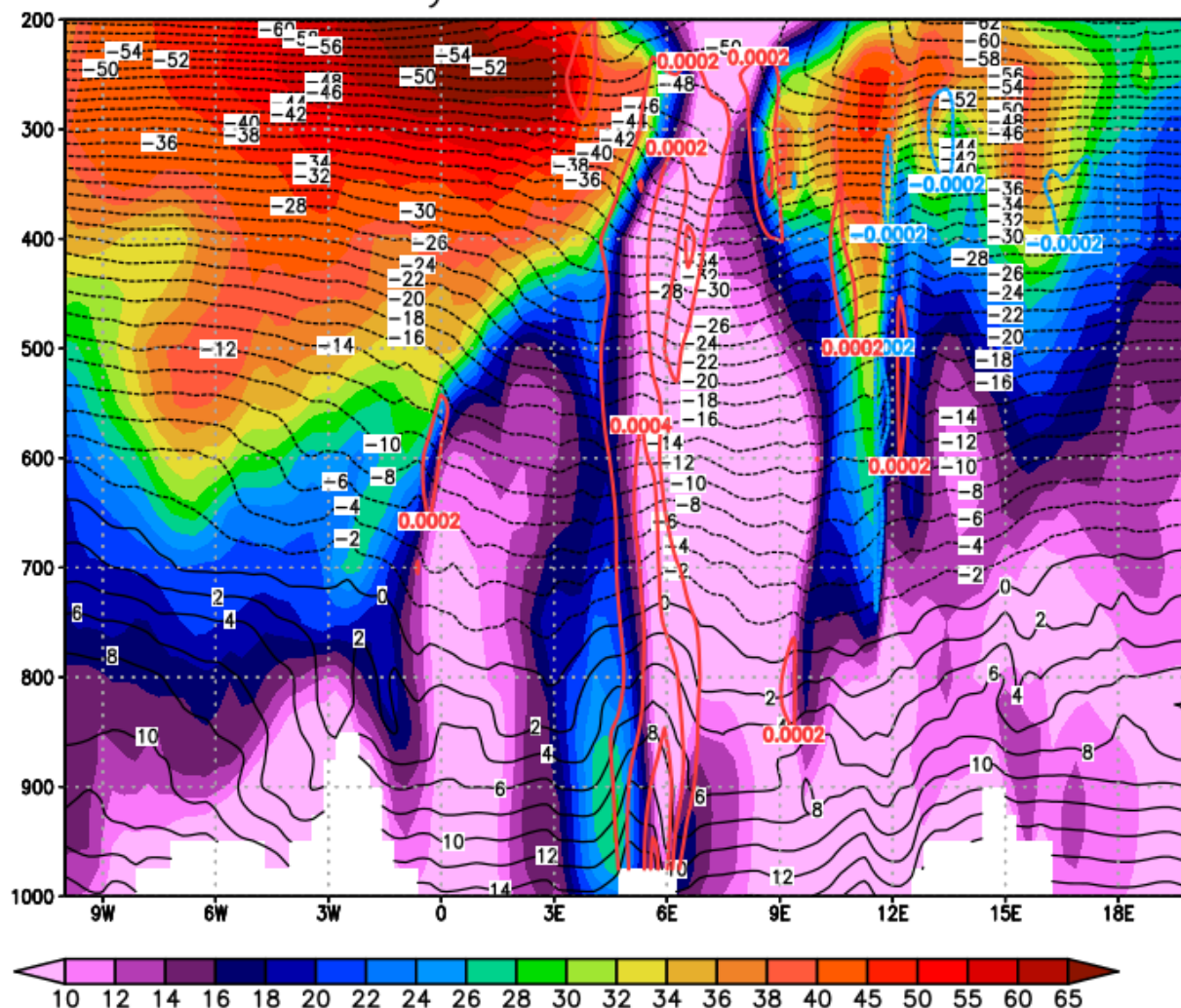


Sea-level pressure (hPa, contour) and 250-hPa wind ( $\text{ms}^{-1}$ , shaded, plus streamlines)

“Medicanes” are a type of short-lived but intense cyclone that form over the Mediterranean Sea. This case study of Medicanes Trudy, which made landfall in northeastern Algeria on 11 November 2019, demonstrates that the GEOS Forward Processing (FP) system is able to analyze and forecast such cyclones.

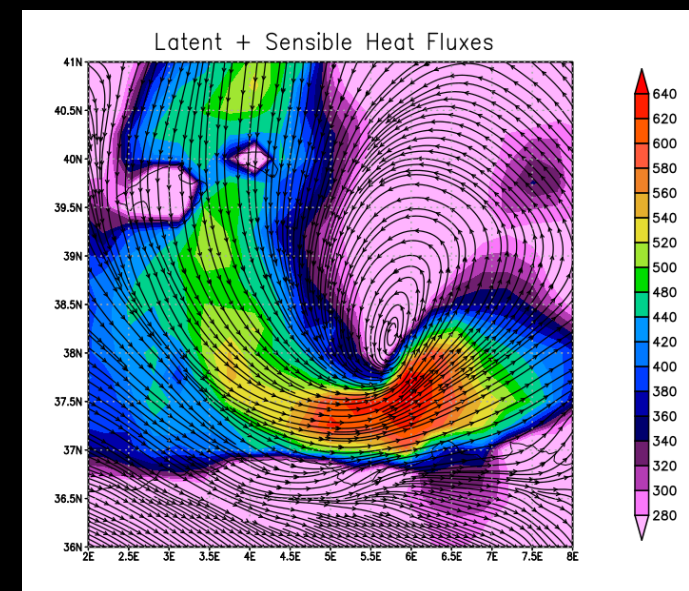
The figure shows the GEOS analysis of upper tropospheric wind and sea level pressure at 1200 UTC on 11 November 2019. The streamlines show a sharp southerly meander of the jet stream, with strong horizontal shear on its western side. The wind speeds in this region change from  $65 \text{ ms}^{-1}$  to less than  $10 \text{ ms}^{-1}$  over a distance of only 250 km.

Trudy 38N 12Z11 Nov 2019

Vorticity ( $\text{s}^{-1}$ , red contour), wind ( $\text{ms}^{-1}$ , shaded) and temperature ( $^{\circ}\text{C}$ , black contour)

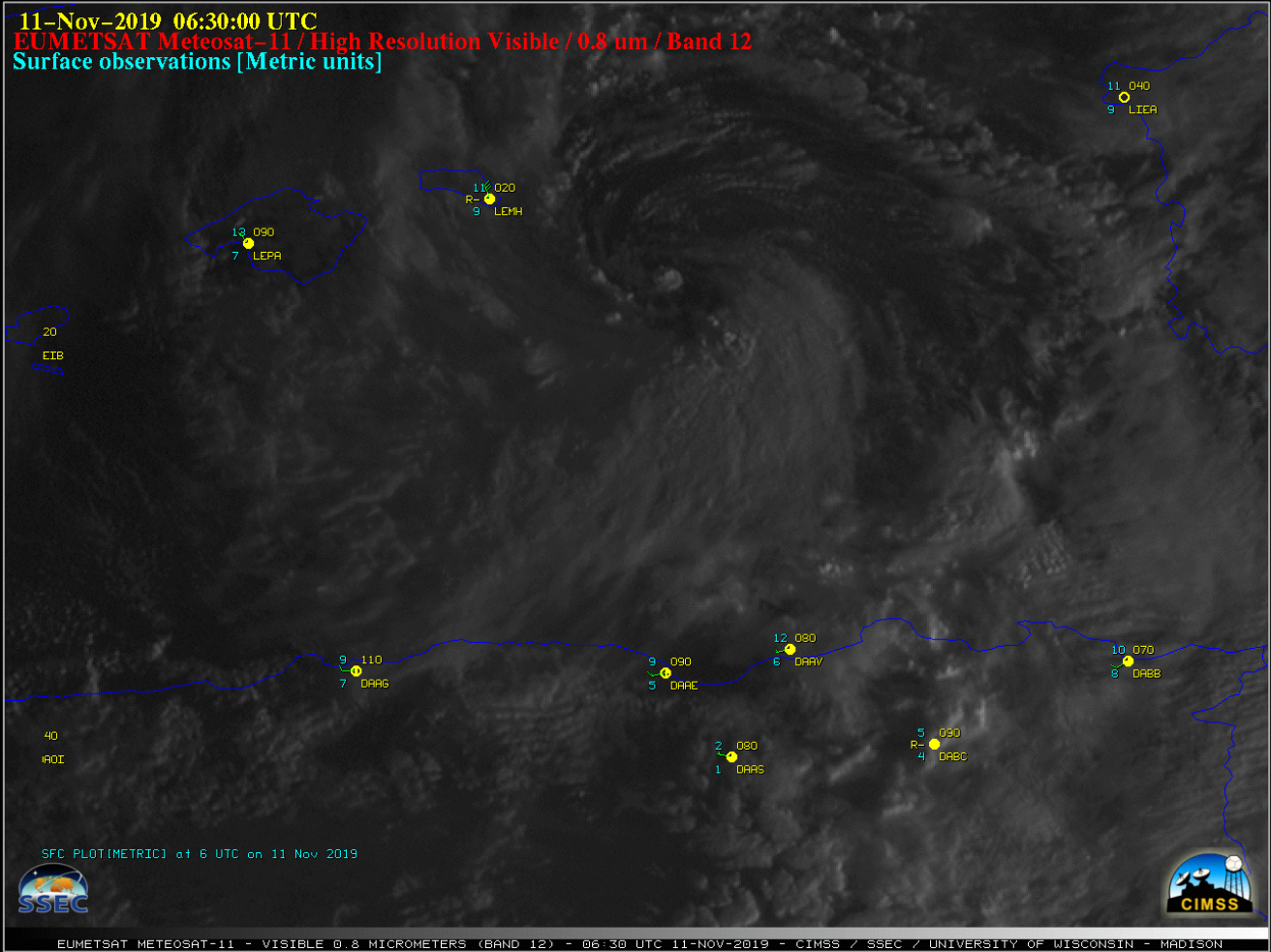
A vertically-aligned column of vorticity provides a dynamic connection between the lower troposphere and the jet stream (left).

The intense heat fluxes are typical of those associated with tropical cyclones, though landfall quickly stops the cyclone from developing further (below).



Latent+Sensible Heat Fluxes ( $\text{Wm}^{-2}$ , shaded) and 2-m wind ( $\text{ms}^{-1}$ )

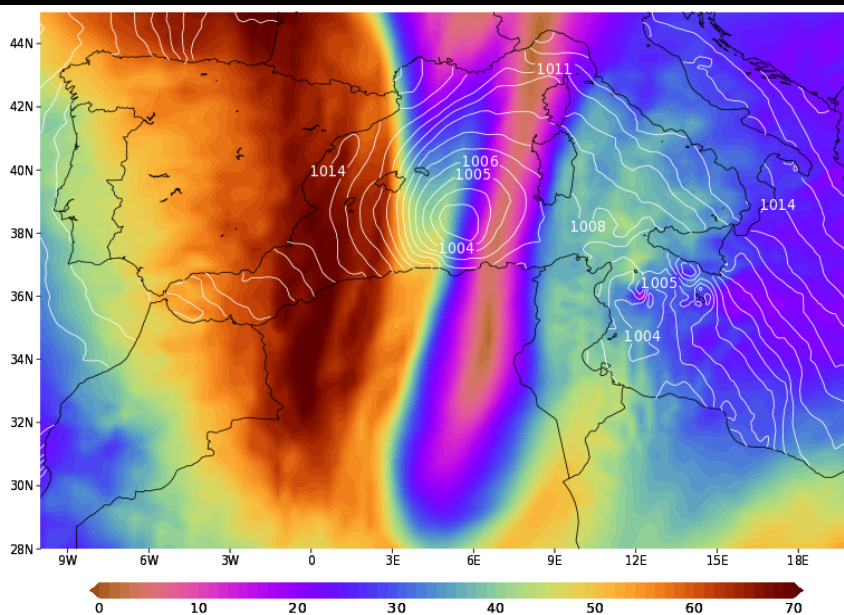




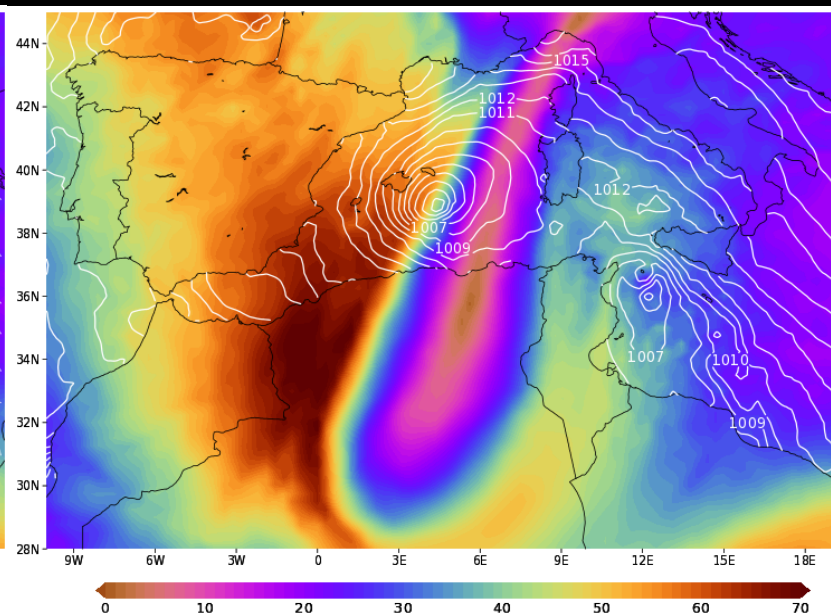
Meteosat-11 visible-spectrum imagery of  
Medicane Trudy on 11 November 2019

GEOS-FP provided skillful forecasts of Medicane Trudy more than three days in advance, including development of the strong upper-level wind shear and other key features that gave rise to the cyclone. Of particular use to forecasters is that GEOS FP consistently placed the surface low pressure center directly beneath the gradient of upper level wind shear and accurately predicted the storm's intensity and horizontal extent. This consistency is evident in the 36-, 60- and 84-hr forecasts shown below, notwithstanding the more northeastward tilt of the jet stream meander at the longer forecast lead times. The analyzed (verification) fields for 1200 UTC 11 Nov 2019 were shown previously.

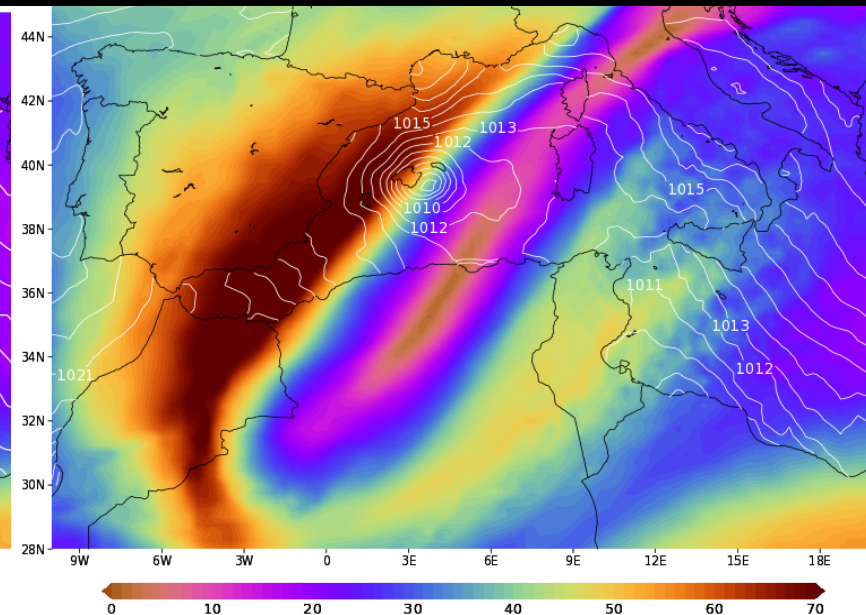
36-hr Forecast



60-hr Forecast



84-hr Forecast



GEOS-FP forecasts of 250 hPa wind ( $\text{ms}^{-1}$ , shaded) and sea-level pressure (hPa, contour) valid 1200 UTC 11 Nov 2019