EVALUATION OF THE WIND FORECAST FROM CPTEC-AGCM DURING THE CATARINA HURRICANE

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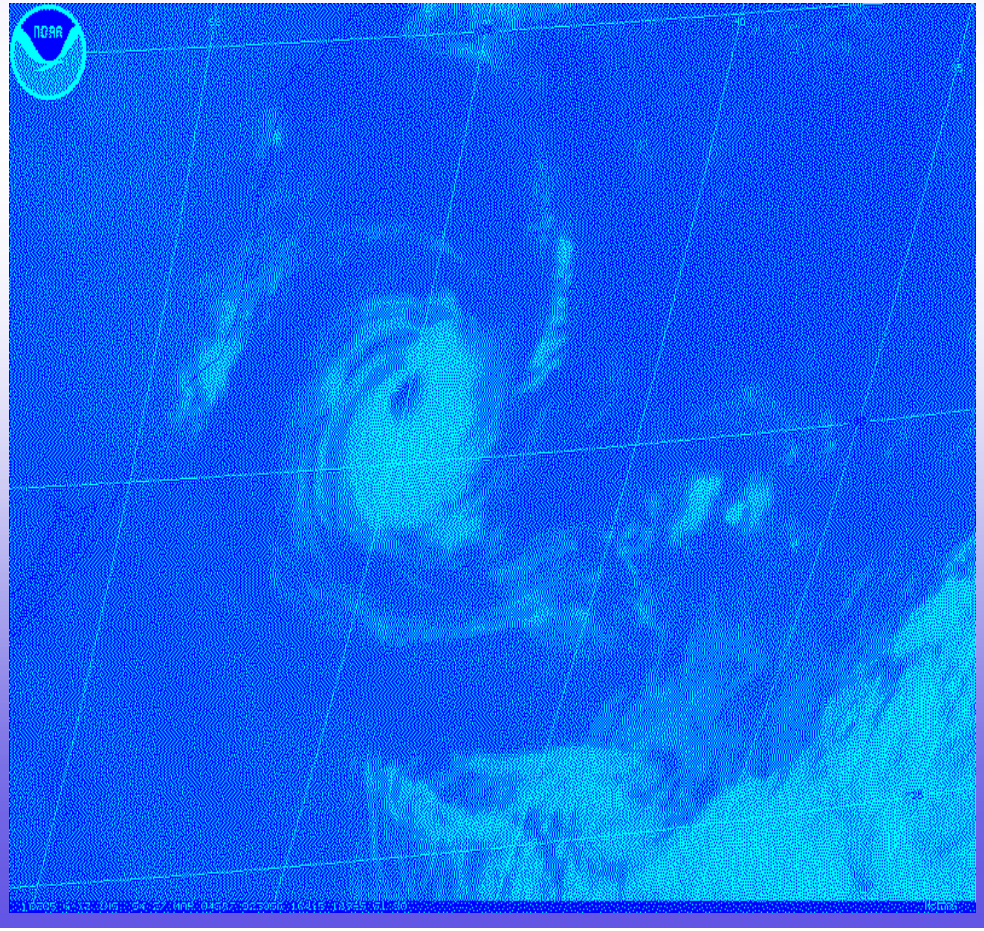
Introduction

Since the advent of the meteorological satellites the occurrence of a hurricane had not been registered in the South Atlantic Ocean (Pezza and Simmonds, 2005).

However, in March 2004 the occurrence of the first hurricane, named Catarina, was registered at South Atlantic. The system begun as an extratropical cyclone and remained quasi-stationary some days over the South Atlantic. Later, the system displaced to the west, acquiring characteristics of a hurricane and hit mainly the Brazilian State of Santa Catarina (SC) between 27th and 28th March, causing destruction and deaths.



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Socioeconomic impacts:

- Residents in Santa Catarina found that up to 95% of homes received damage to roof structures (Núcleo de Amigos da Terra, 2005);

- Almost 40% of which resulted in complete failures (Marcelino et al 2004).

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Objective

The objective of this study is evaluate the performance of the Atmospheric Global Circulation Model (AGCM) from the Center for Weather Prediction and Climate Studies (CPTEC) in predict some synoptic patterns associated with Catarina

Data and Metodology

Model especifications:

In this study was used the AGCM-CPTEC:

Horizontal resolution: T126L28 correnponding to a horizontal grid 1°X1° latitude X longitude.

T126: represents the triangular truncation over the zonal wave number 126 and L28 is the vertical layers in sigma coordinate.

It was used:

sst weekly;

3 hours interval to output;

Eulerian Model;

Grell cumulus convection parametrization;

The AGCM-CPTEC description details and the equations that describe the processes of the atmosphere can be found in Kinter et al., 1997.

Data:

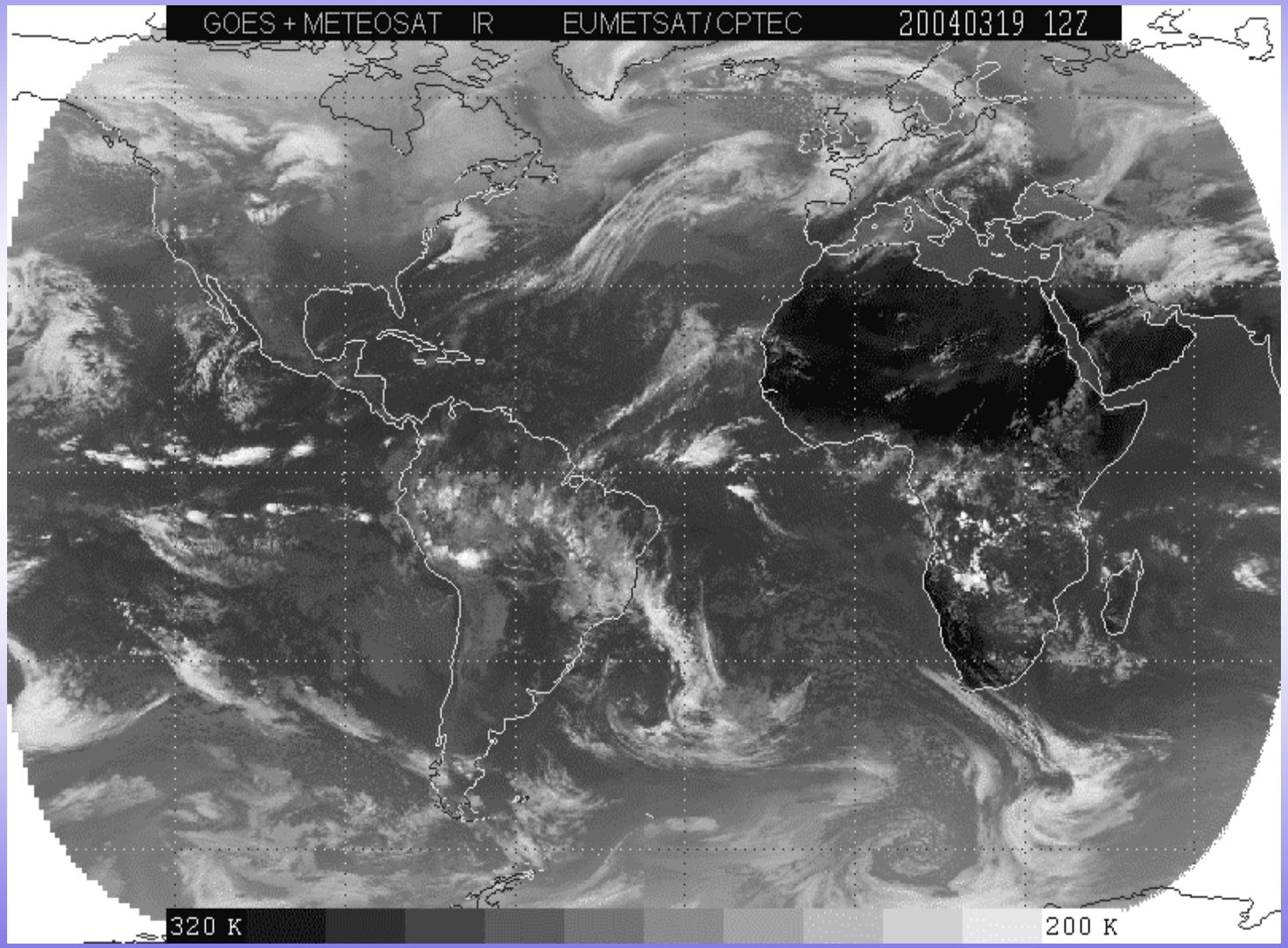
We used GOES-8 satellite imagery to a qualytative analysis of the system from 19 March 2004 to 27 march 2004

The AGCM-CPTEC surface wind and reduced sea level pressure (SLP) were analyzed.

Moreover, 10 meter wind forecasts (V10m), which was not available in the AGCM-CPTEC during the Catarina occurrence, are compared with the wind at the first sigma-level that is near to 40 meters high of the ground.

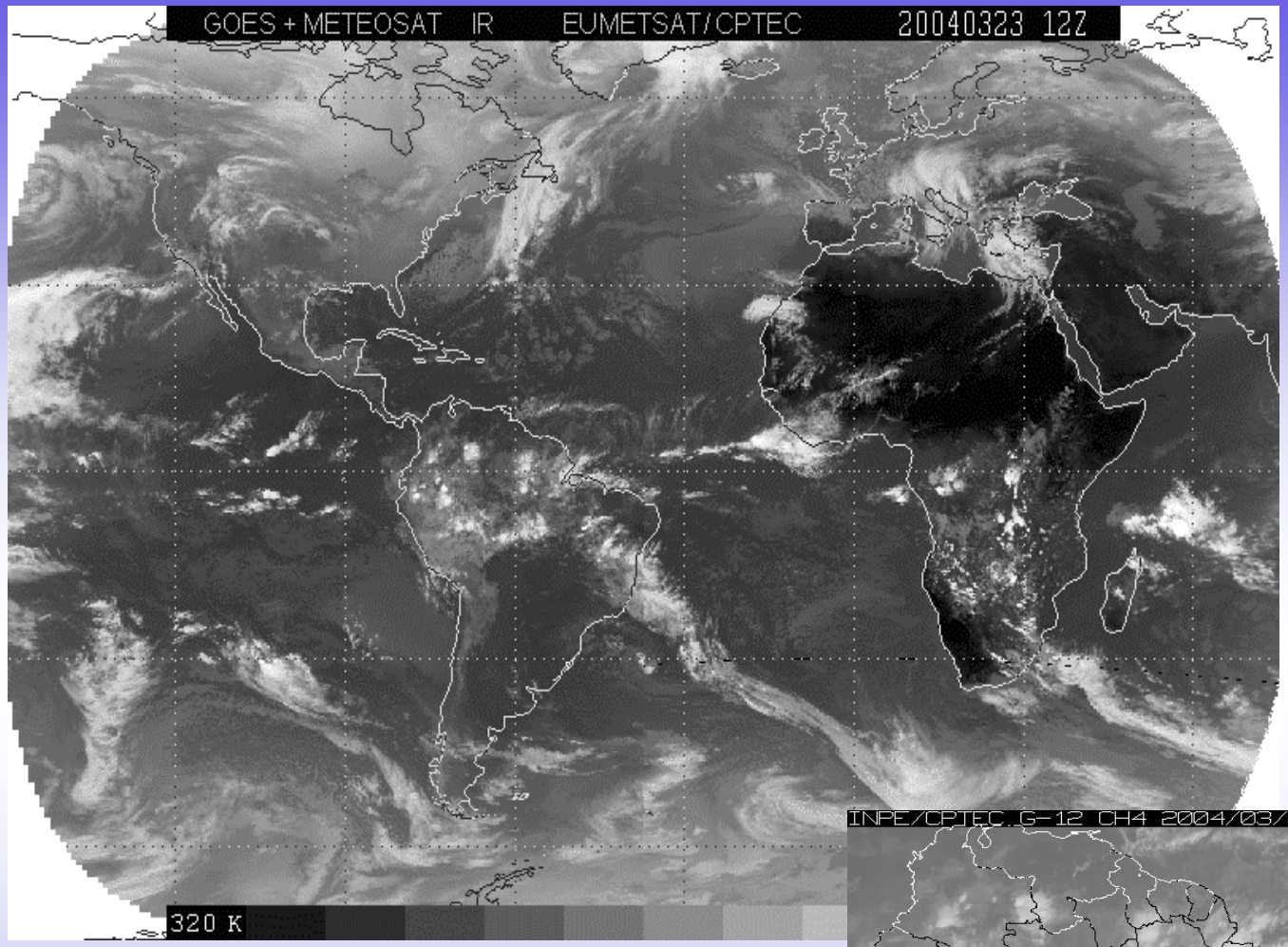
To evaluations the CPTEC-Eta reanalysis, available to period 2000–2005 are used. The variables used were SLP and 10m-wind

Hurricane Catarina: life cicle according to satellite imagery



The hurricane Catarina was originated from a extratropical cyclone associated to a frontal system.

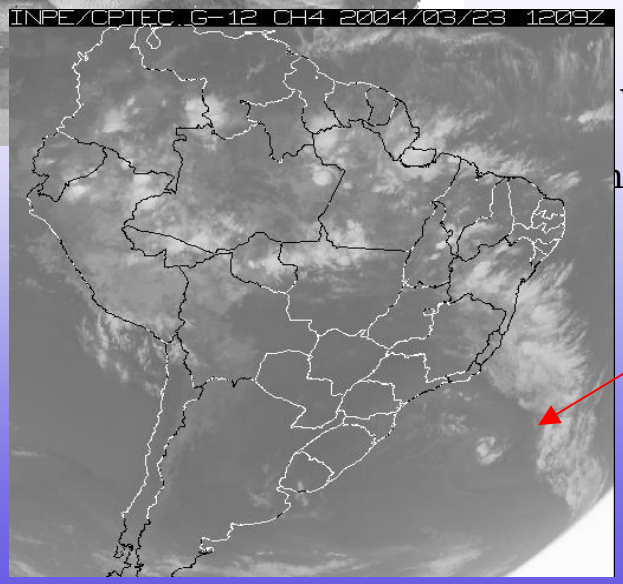
This frontal system born in day 13 March as of a frontogenetic process. This system displaced northeastward and remained quasi-stationary over the Southern Brazil and South Atlantic Ocean from day 19 March to 24 March



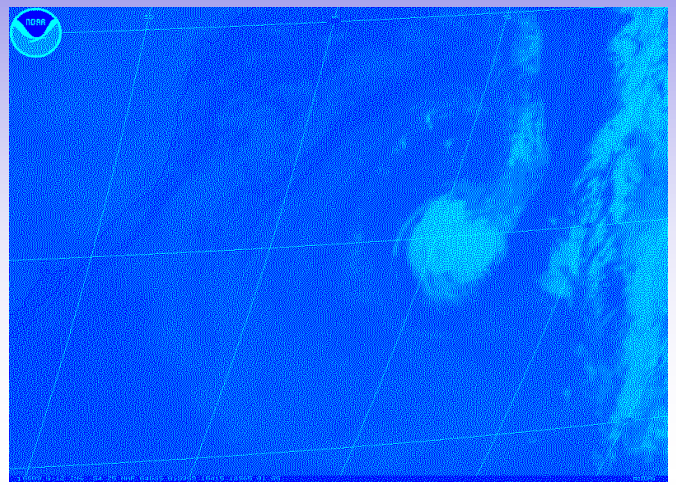
The extratropical cyclone displaced southeastward and cutted off from the synoptic wave and remained quasi-stationary intensifying up to 23 March.

On 23 March, the storm makes an abrupt anticyclonic track reversal and begins to move northward before taking up a westward heading the next day.

During this period, the center of the system was identifiable as a localized area of deep convection to the southwest of wide convective band extending southeastward from he Brazilian coast.

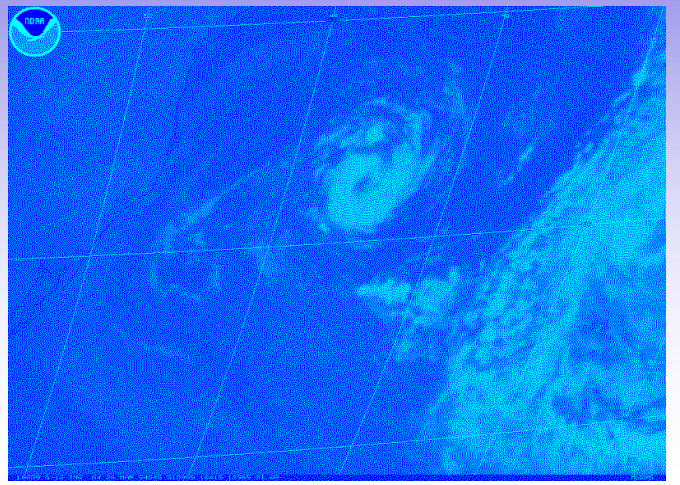


The cyclone already with tropical characteristics started displacing westward and on its westerly course toward the coast, the Catarina intensified steadily, with extensive convection developing along the inflow bands in 25 March.



Visible/IR Loop – 3/25/04 from NOAA

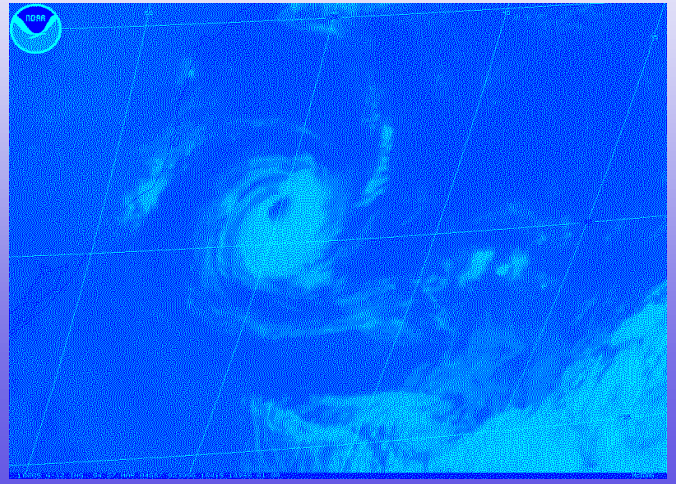
On day 26 March Catarina reached category-1 intensity on the Saffir– Simpson hurricane scale (Simpson 1974).



Visible/IR Loop – 3/26/04 from NOAA

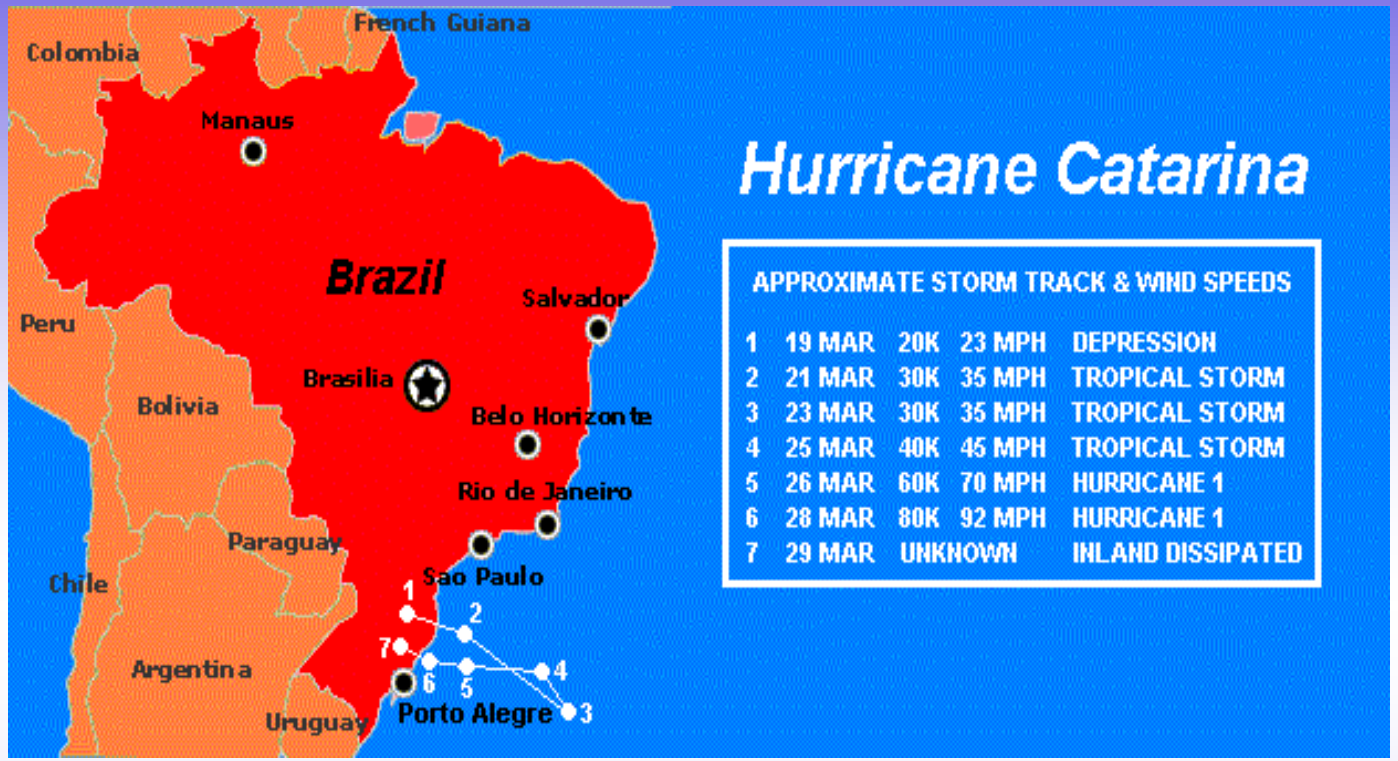
The hurricane's cloud field became more symmetric although the diameter of the cloud shield remained approximately 400 km (McTaggart -Cowan et al., 2006).

The strength of the hurricane increased and Catarina reached its peak intensity at 00UTC 28 March.



Visible/IR Loop – 3/27-28 from NOAA

The approximate Track and Wind Speeds of Hurricane Catarina and the definitions in differend phases of the storm



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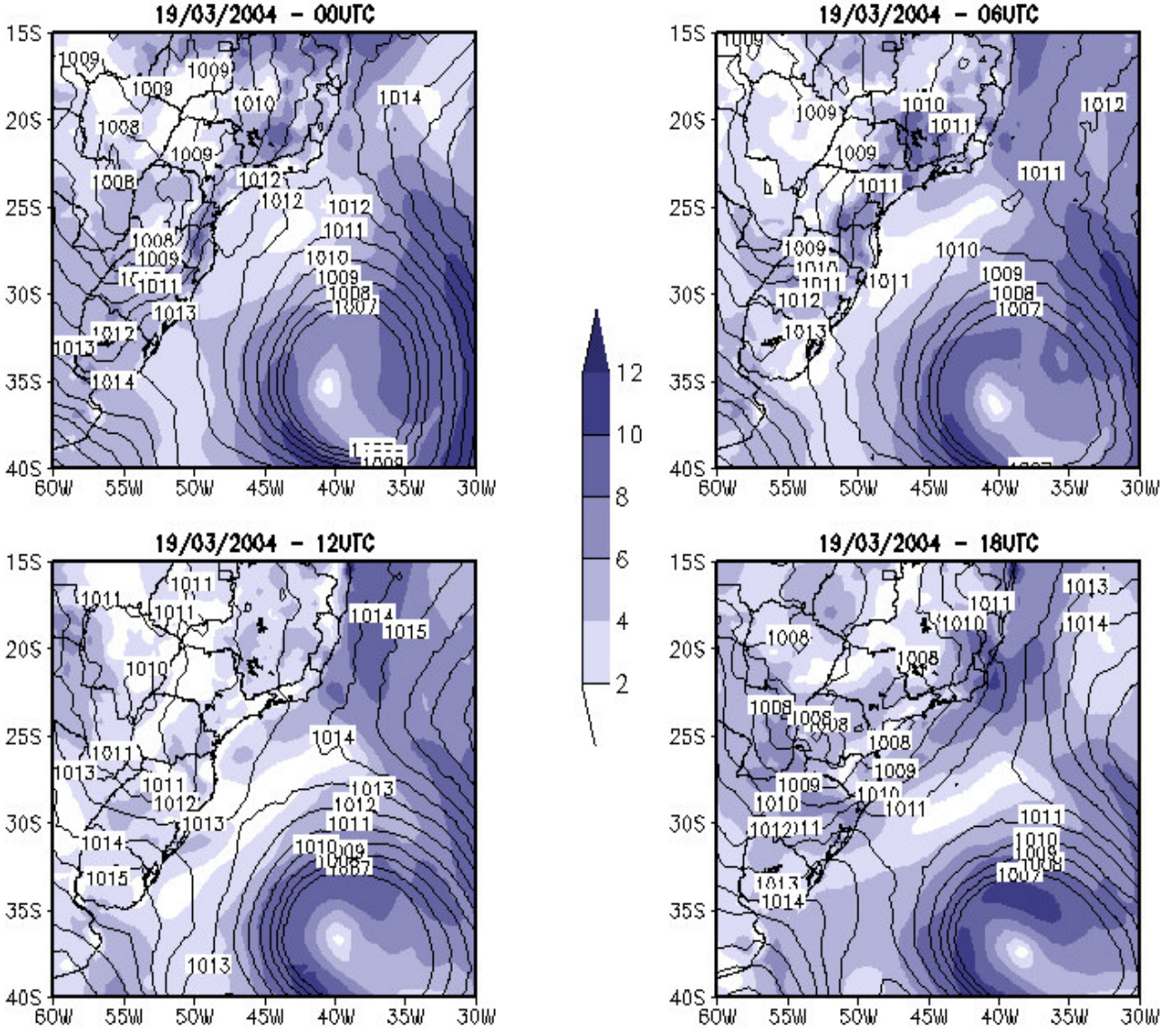
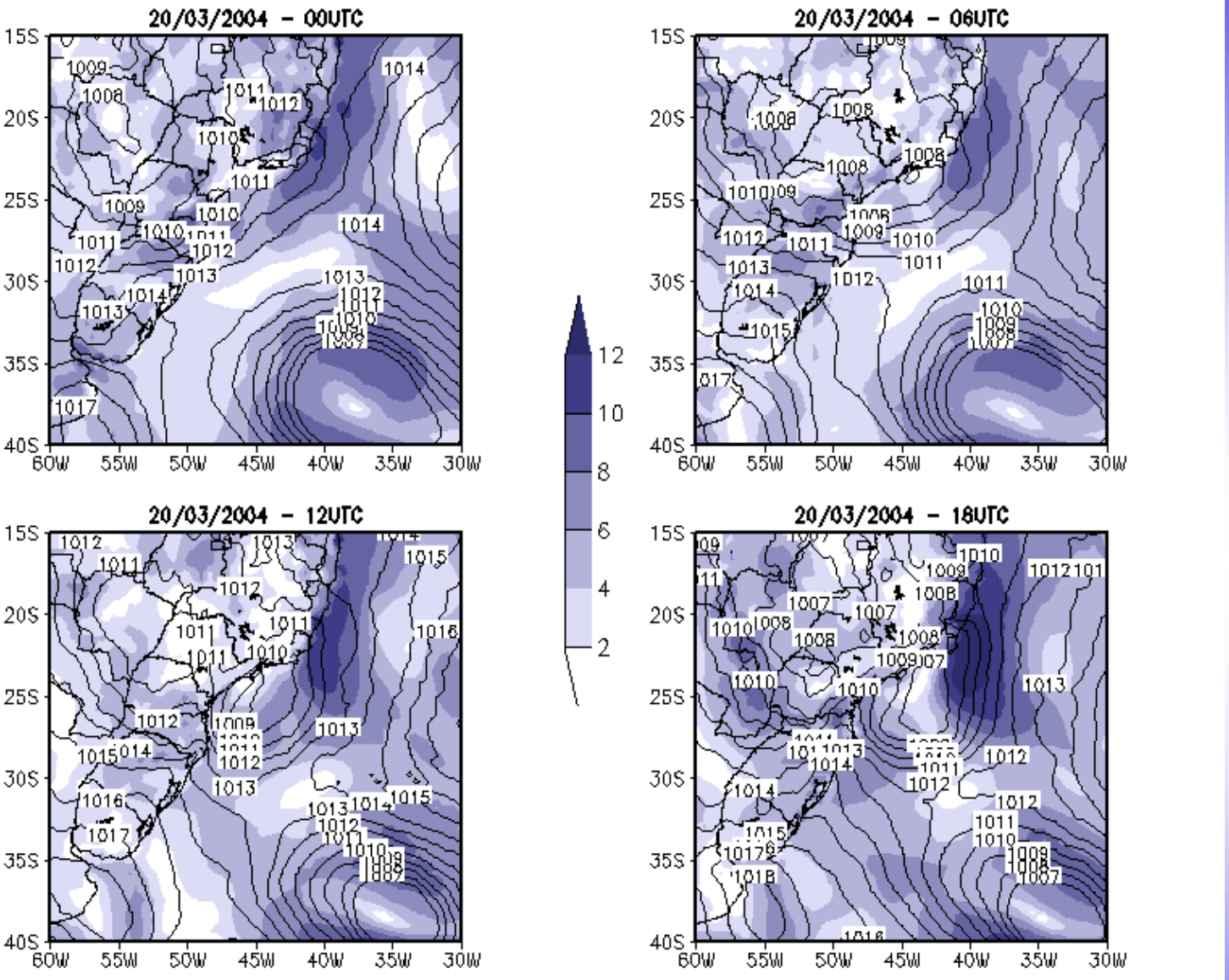
Eta-Reanalyses SLP and 10m-wind field



The system first originated as a classical EC embedded in the baroclinic wave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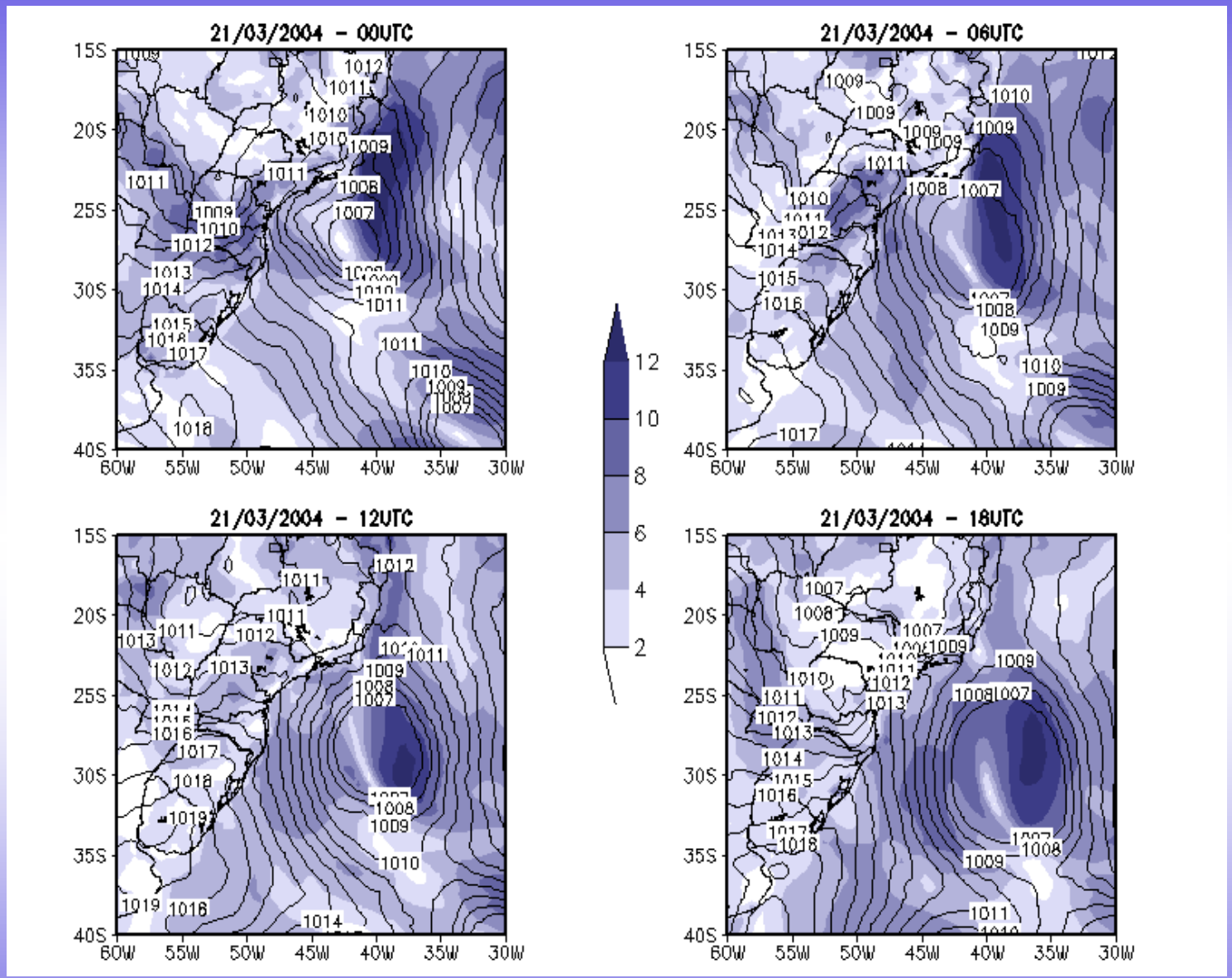
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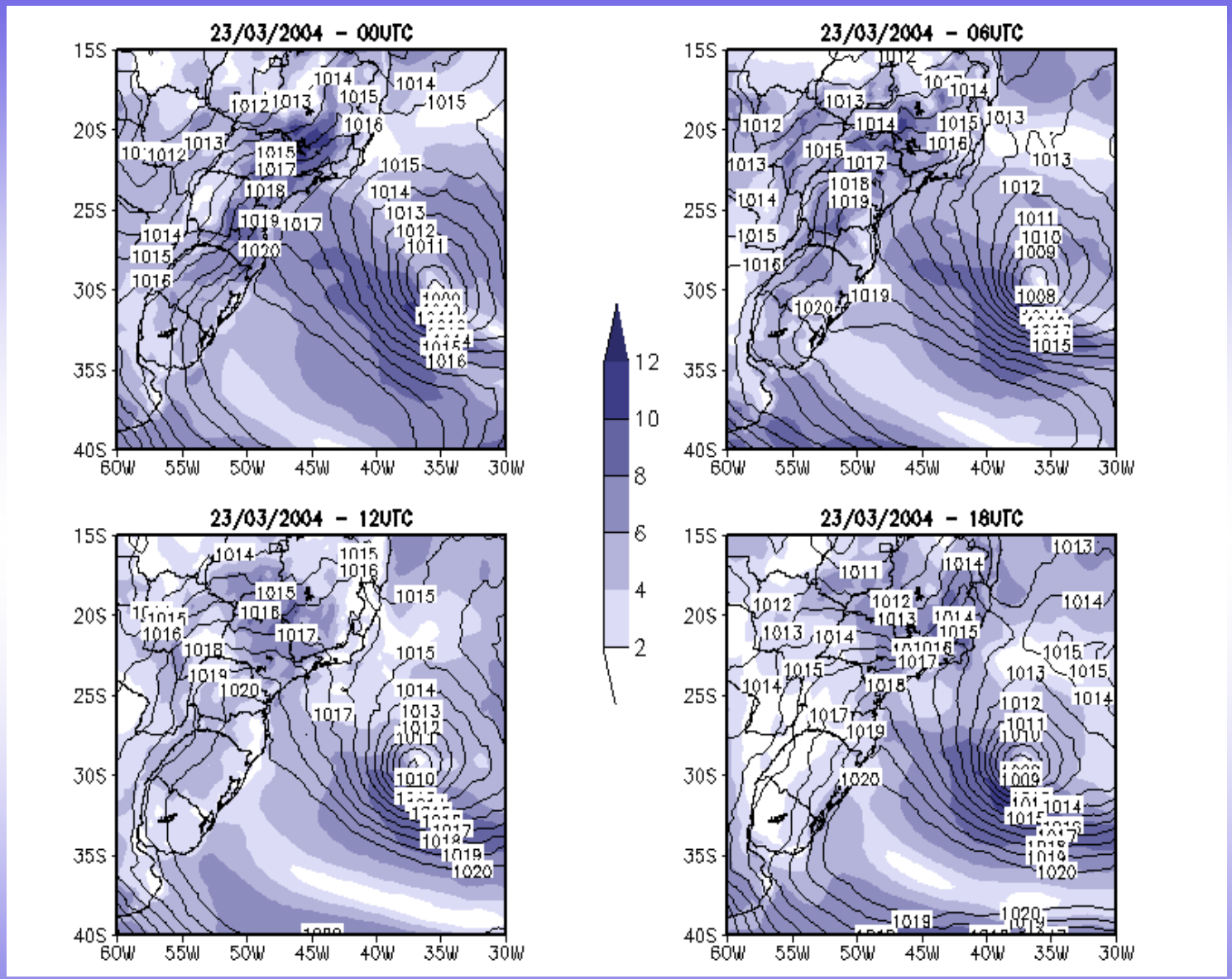
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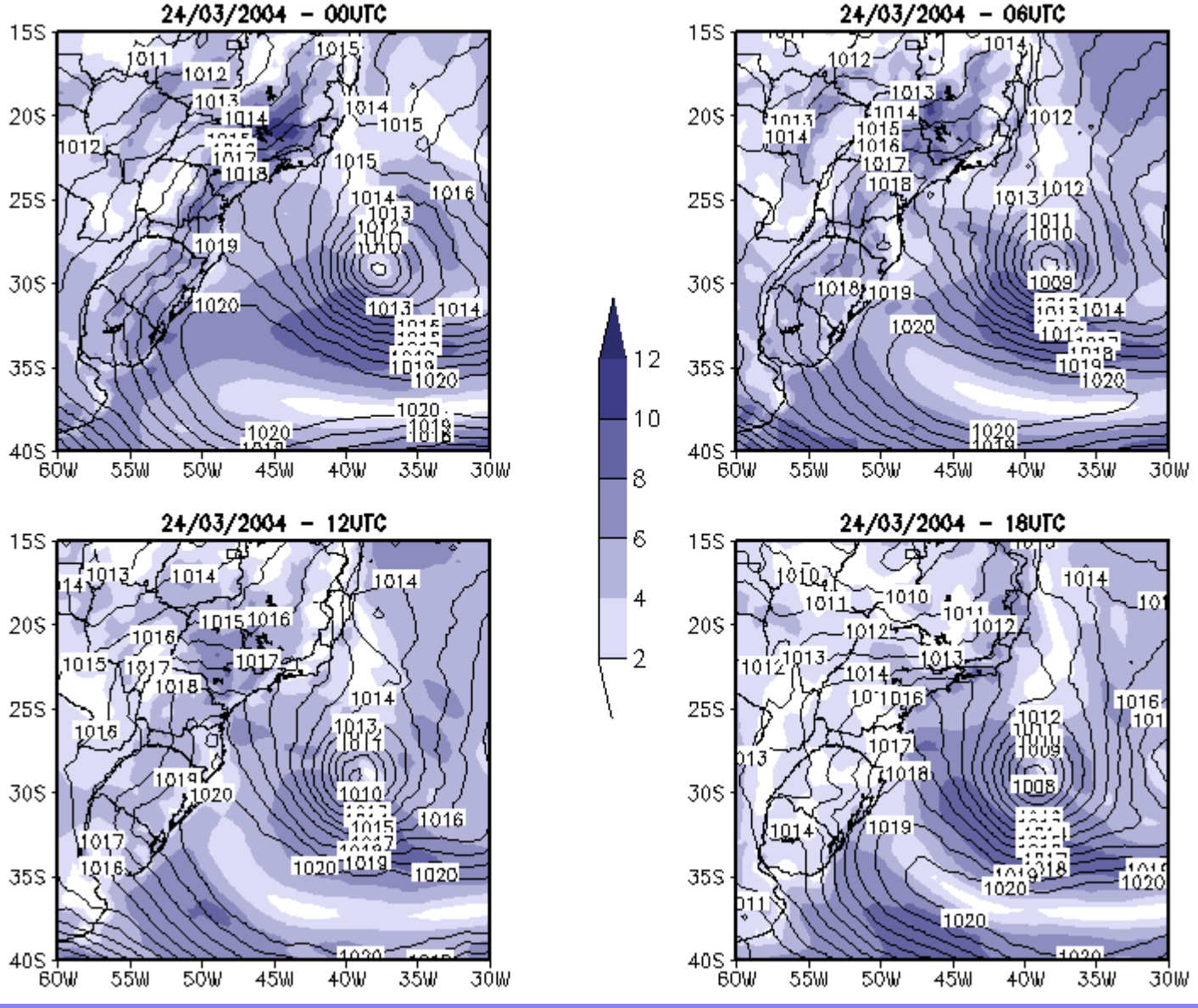
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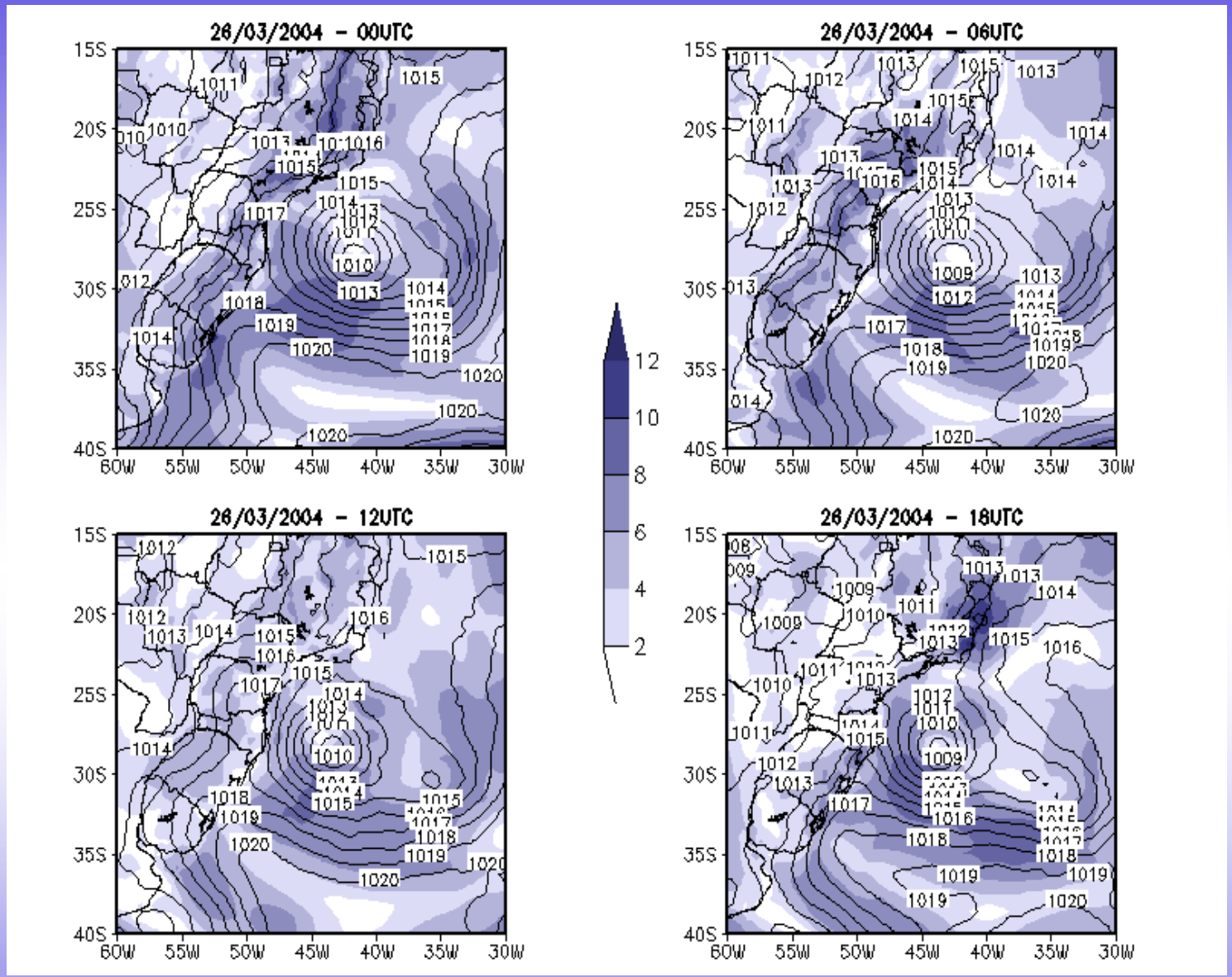
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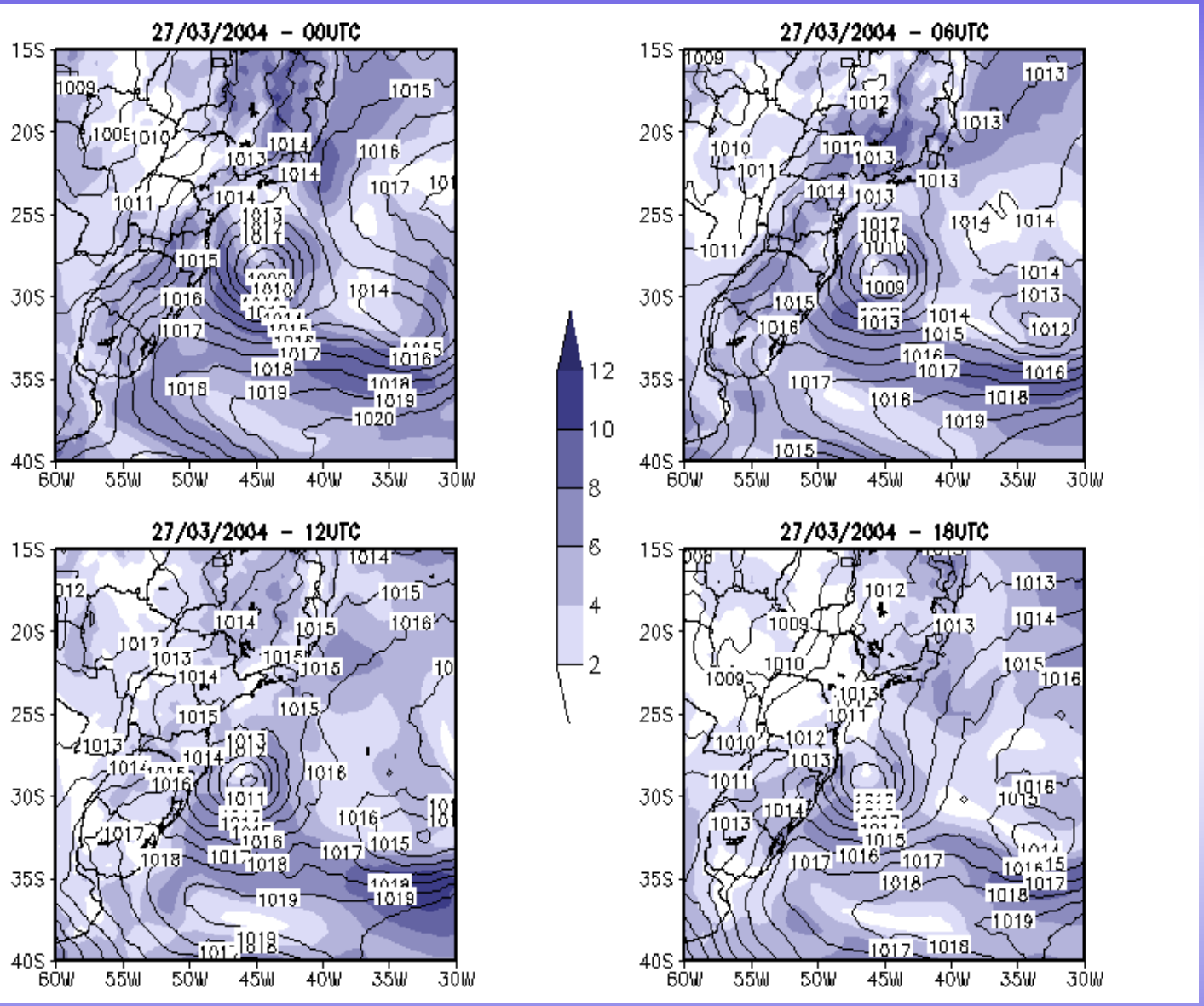
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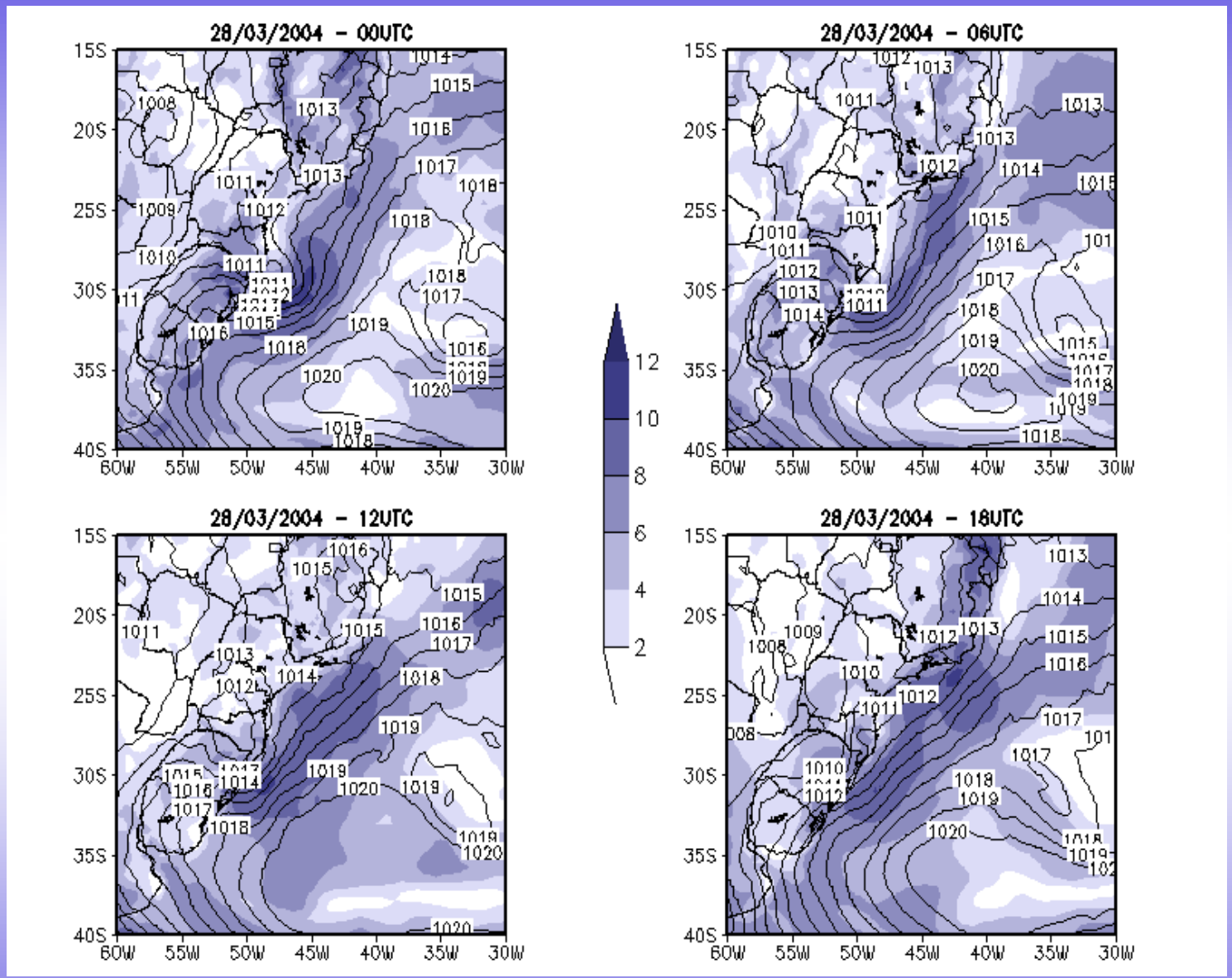
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