

Spiral galaxies and powerful extratropical cyclone in the Falklands Islands

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Short communication

A cyclone is a large air mass that rotates around a strong center of low atmospheric pressure, counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere as viewed from above (opposite to an anticyclone).¹⁻³ A subtropical cyclone is a weather system that has some characteristics of a tropical cyclone and some characteristics of an extratropical cyclone. They can form between the equator and the 50th parallel.^{1,4-8} In mathematics, a spiral is a curve which emanates from a point, moving farther away as it revolves around the point. The characteristic shape of hurricanes, cyclones, typhoons is a spiral. There are several types of turns, and determining the characteristic equation of which spiral the Extratropical Cyclone (EC) fits into is the goal of the work. The study demonstrates a double spiral for the EC similarly Lindblad (1964) demonstrates a double spiral, to demonstrate the structure of spiral galaxies. Despite the data obtained in the EC that passed through the southern tip of South America west and east of the Falklands Islands, everything indicates that the short occurrence ECs indicate the double spiral structure, but with the structure of a Cote's double spiral.

The occurrence of cyclones is relatively common for the region at this time of year, but the recent phenomenon has been exacerbated by other meteorological and atmospheric factors. This phenomenon, with this feature to lower the pressure inside quickly generates very strong winds and so that name of explosive cyclones.⁶⁻¹⁰ For large-scale occurs, the subtropical cyclones influence and are influenced by the weather and other atmospheric phenomena point of view, the call synoptic condition. The winds are driven by this low-pressure core and by the rotation of the Earth, which deflects the path of the wind through a phenomenon known as the Coriolis force.¹⁰⁻¹⁵ In mathematics, a spiral is a curve which emanates from a point, moving farther away as it revolves around the point.^{10,16-19} The characteristic shape of hurricanes, cyclones, typhoons is a spiral.²⁰⁻²⁶ There are several types of turns, and determining the characteristic equation of which spiral the "cyclone bomb".²⁷

As stated in the introduction the characteristic shape of hurricanes, cyclones, typhoons is a spiral. In mathematics, a spiral is a curve which emanates from a point, moving farther away as it revolves around the point.^{27,33-39} After an analysis of the different types of spirals, it was found that the shape that came closest to the EC spiral, (Figure 1), is a "Cotes's Spiral."^{27,33-38} The ellipsoid shape of the subtropical cyclone is verified at 10:40 (UTC) on March 09, 2022 at 13:40 (UTC), when it passes between the south of Argentina, on the east coast, and the west of the Islands of Falklands. At 14:40 (UTC) it becomes spherical, already north of the Falklands Islands until 18:40, where from 19:40 on March 9th until 05:40 on the 10th it remains ellipsoid. Its ellipsoid shape whose eccentricity increases as it is pushed - pressed - by the high pressure area coming from the Amazon region, which crosses Paraguay, Mato Grosso, Mato Grosso do Sul and southern Brazil, entering the Atlantic Ocean towards the southeast. The cyclone nucleus presents the form of a double spiral. The Figure 1 same way Figure 2 of the show a double spiral of galaxies of Lindblad (1964). This spiral is denoted from Cote's Spiral Gobato et al.

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The EC core forms in the extreme south of Chile/Argentina, Punta Arenas region, Ushuaia, respectively. With an initial atmospheric pressure of 990 mb, on March 08, 2022, 12:00 (UTC), moving northwest of the Atlantic Ocean. Passing between this "strait" of the extreme south of South America and the Falklands Islands, without any storm in the continental region. The cyclone in the coordinates 50°17'11"S 60°47'41"W on March 9 12:00, at 49°59'13"S 60°37'58"W, and one on March 10, 00:00 (UTC), travels 35.31 km (21.9406 miles) in 12 hours, with an average speed of 2.9425 km/h (1.8284 miles/h, 1.5888 knots), that is, 0.82 m/s. Surprisingly after that its speed increases exponentially in 12h, after the cyclone leaves the "strait" between the mainland and the Falklands Islands. The cyclone travels 592.12 km (367.9263 miles) in 12 hours, with an average speed of 49.3433 km/h (30.6605 miles/h, 26.6433 knots), that is, 13.71 m/s, moving from 49°59'24"S 60°37'48"W at north of the Falklands Islands, March 10, 2022 00:00 (UTC).

The data's of the points coordinates collected from Figure 1, in Longitude and Latitude, they were obtained, with the location of the low pressure center (986 mbar) of the EC at 20°S -20°W, at March 9 00:00 UTC, and the low pressure center of 972 mbar, March 9 12:00 UTC. In Figure (2-(01)) the shape of the EC is represented, using as a parameter the isobaric ones observed in Figure 1. An "explosive EC" is an atmospheric phenomenon that occurs when there is a very rapid drop in central atmospheric pressure.⁶⁻¹⁰ This phenomenon, with its characteristic of rapidly lowering the pressure in its interior, generates very intense winds and for this reason it is called explosive cyclone. It was determined the mathematical equation of the shape of the extratropical cyclone, being in the shape of a spiral called "Cotes's Spiral." In the case of EC, which formed in the south of the Atlantic Ocean, and passed through the south coast of Argentina and Falkland Island.

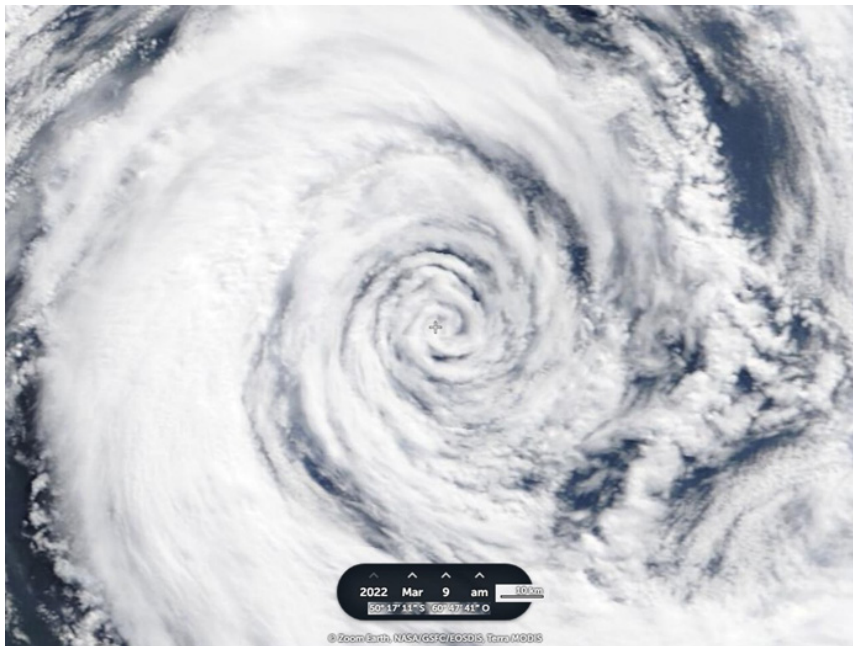


Figure 1 The extratropical cyclone at the height of the Falklands Islands has a minimum central pressure of 970 hPa (mbar) on Wednesday morning, so it is an intense and deep system. It is not an unusual event, since around Antarctica there is a so-called belt of low pressure and more intense cyclones are common in places further south of the Atlantic.

Source: ^{28,29} Authors.

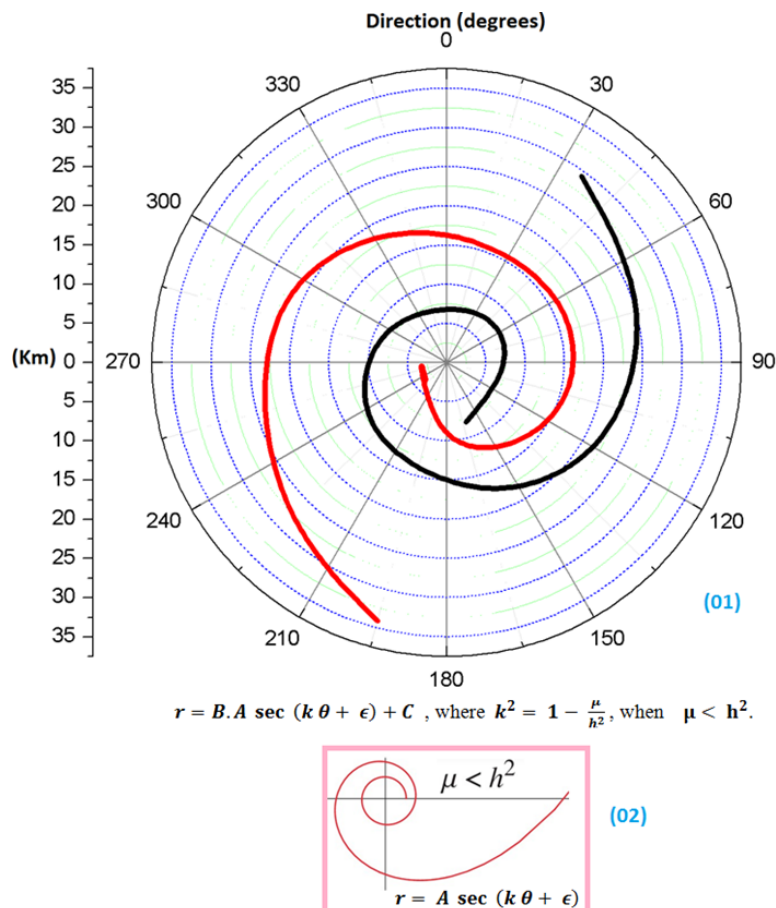


Figure 2 Graph (01) built with the data collected from Figure (1).The graphic depicts two spirals, constructed with the coordinates of the atmospheric pressure gradients by the wind speed tangent in the vortex of the EC cyclone that passed north of the Falklands Islands. Graph (02) represents the shapes of the “Cote’s Spiral” for $\mu < h^2$. Source:Authors.

The temperatures of the clouds and the surface near the low pressure center of the EC. The cloud temperature data between: March 09, 2022 10:40 UTC, to March 10, 2022 05:40 UTC. The core maintains a cloud temperature of approximately 20°C to -20°C, with its near edge having a gradient of -50°C, -60°C, 50°C, as it moves away on the distance from the core. Only from day 11, that is extreme edge ranging from -50°C to -70°C. The temperature in the center of the EC is approximately 20°C at 00:00 UTC, March 9, 2022, of at 12:20 UTC, in the low pressure center of the EC, the temperature varies from 20°C to -30°C, indicating that the EC increases in size and further tapers its core, sucking a great amount of steam to high altitudes of water where it condenses quickly. The Figure 2 show the graphic depicts two spirals, constructed with the coordinates of the atmospheric pressure gradients by the wind speed tangent in the vortex of the extratropical cyclone that passed north of the Falklands Islands.

The subtropical cyclone originates on March 08 at 12:00 UTC and disappears on March 11 at 12:00 UTC, that is, in approximately 72 hours its climatic influence takes place in the extreme south of South America, and under the Falklands, heading west. The location in latitude and longitude coordinates, 50°36'36"S and 61°09'00"W, respectively, of the cyclone core, at 09:00 March 2022, and core is approximately 165 km (102.652 miles) in diameter, but its catchment area is approximately 1,900,000 km² (733,594.1012 square miles). The study demonstrates a double spiral for the extratropical cyclone similarly Lindblad (1964) demonstrates a double spiral, Figure 2 to demonstrate the structure of spiral galaxies.

Acknowledgments

None.

Conflicts of Interest

None.

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