A comparison between the motions of the GRS and a LRS of Jupiter near their interaction during the year 2008

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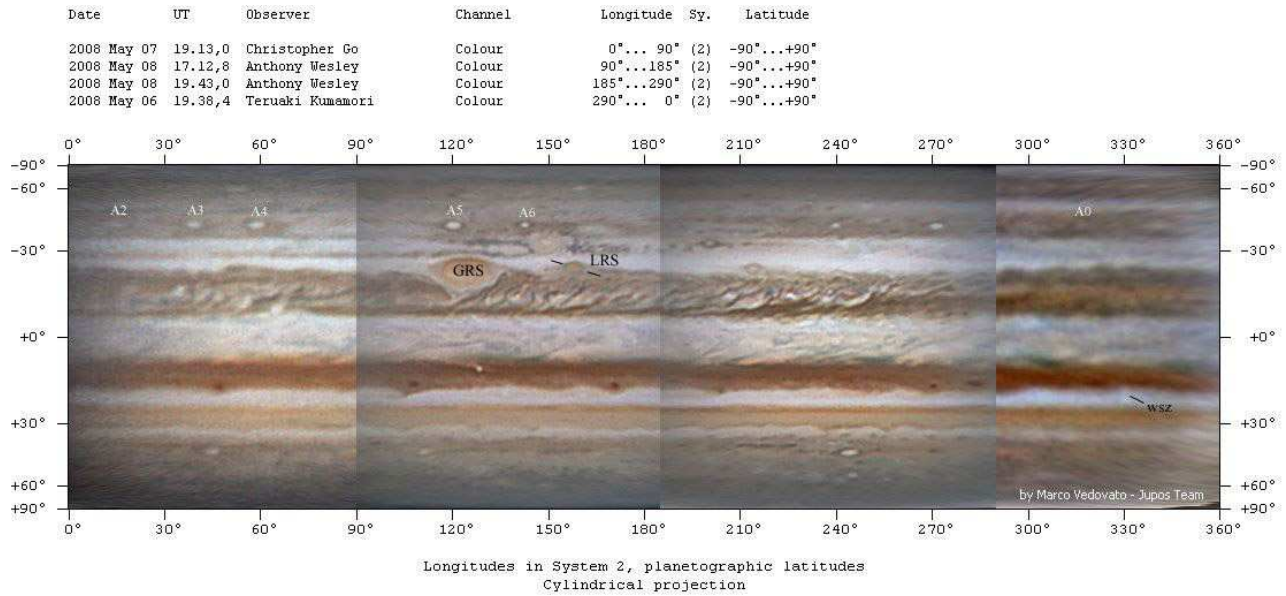
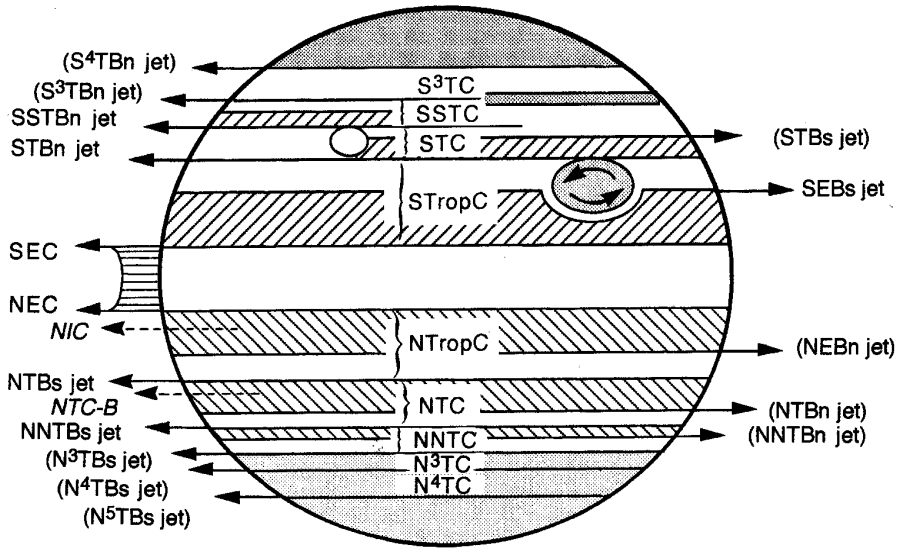
Last year (2008) I amused myself to analyze one aspect about the encounter between two Jupiter spots. For this aim, I used WinJupos, a software for measuring the Jupiter images [1].

In the following picture (South on top), a map composed by using some very good images, the reader will be able to meet the protagonists of this tale:



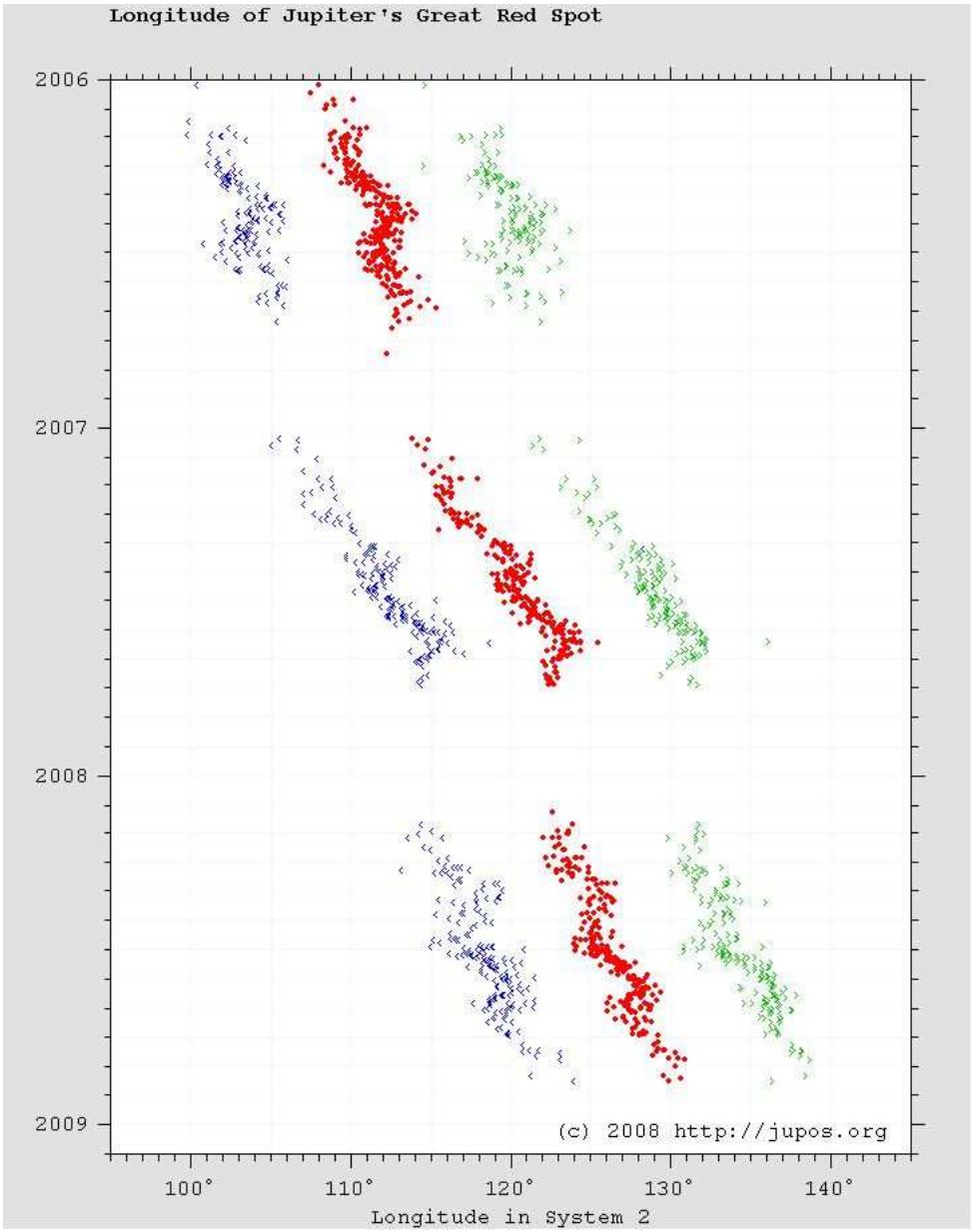
The first one is the famous Great Red Spot (GRS), a long-lived anticyclonic circulation, centered around -22,5° South latitude. The second one is a smaller reddish spot (LRS, Little Red Spot), an anticyclonic circulation too, probably born around the end of 2007 and the beginning of 2008, a residue of a previous "Tropical Disturbance", observed during the 2007. Red Spot and Little Red Spot share the same latitude and belong to the same current, the South Tropical Current (STropC).



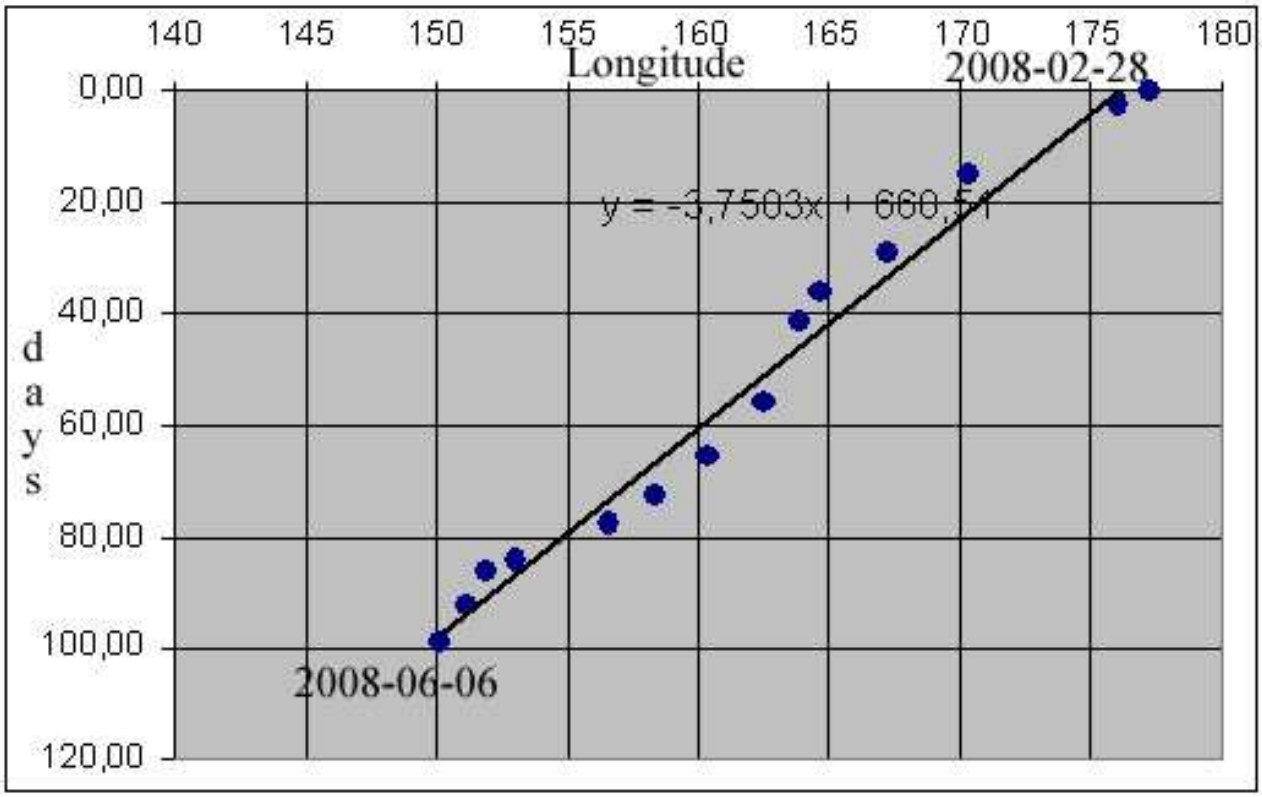
Jupiter: domains, jetstreams and currents; South on top
(from: "The Giant Planet Jupiter", John H. Rogers, page 42)

This two features are also influenced by the same jetstreams (very fast currents): the SEBs jet, the retrograding jetstream marking the South of the SEB (South Equatorial Belt), and the STBn jet, the one marking the North of the STB (South Temperate Belt) [2]. Moreover the same color might suggest a further similarity between this two spots, although their sizes were very different.

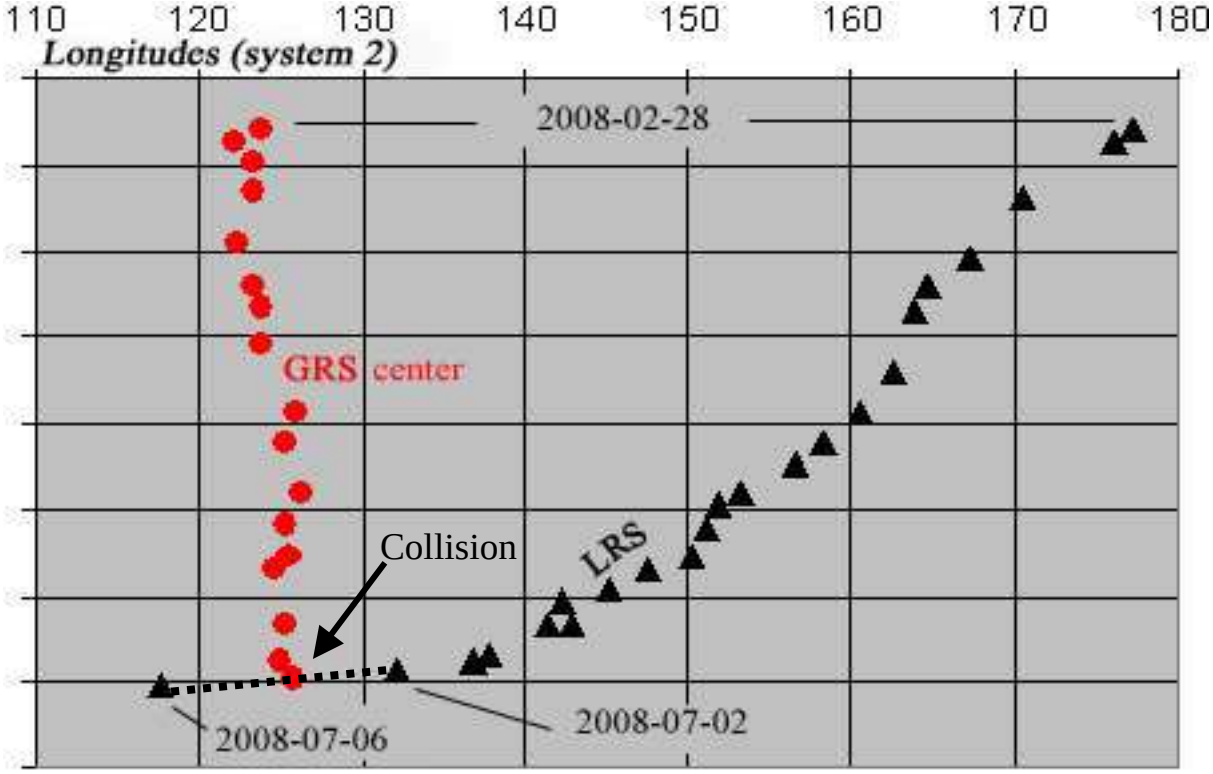
It is well-known that GRS has a 90-days oscillation around its mean motion in the Jupiter outer atmosphere; having a look to the map above, GRS is moving very slowly in longitude (maintaining its latitude fixed) from left to right, toward increasing longitudes (retrograde motion). This lazy motion is not constant but presents an oscillation around the main drift. In the following graph the red points are the GRS center, the ones on the left (blue) and right (green) side are the ends of GRS; it is easy to note a period close to 90 days.



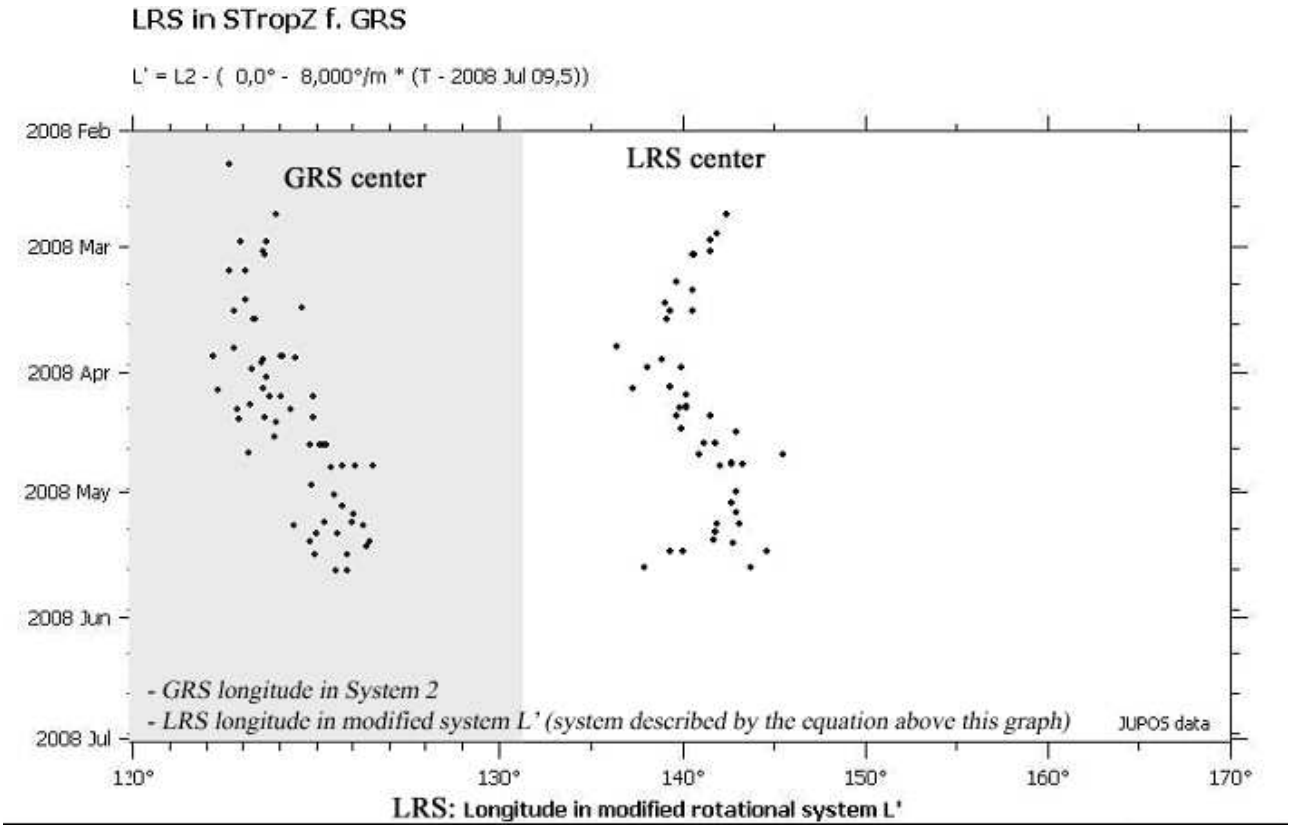
Instead the LRS moved in the opposite direction (prograde motion), with a main drift close to 0,27°/day, so an encounter was inevitable. In the the picture below, a graph I obtained before the encounter, using few points but from very good images (i.e. those of C. Go, F. Carvalho, A. Wesley, G. Grassman and others). I noted, also in the LRS case, an oscillation around the interpolating line (graph in system 2).



After the encounter the LRS was quickly destroyed. The following graph documents the collision.



I was interested to see if this LRS oscillation were similar to the GRS one, with the same period and whether in phase or not. So I matched "in parallel" the relative motions (by using a modified reference system for the LRS, stretching the longitude to have the same slope for both the drifts); a light correlation between the two oscillations seems noticeable. I do not know whether the effect is causal or it is real. In this last case, are the two oscillations determined by a same cause, hidden in atmospheric currents embedded in deeper layers? John Rogers in his book notes how 90 days (the period of RS oscillation) is the time that needs to SEBs jetstream to encircle the planet [3]. Maybe a resonance between the RS (and LRS?) oscillation and the speed of SEBs jetstream.



GRS longitude in System 2; LRS longitude in modified system L', described by the equation above this graph

John Rogers, Jupiter director of the British Astronomical Association, wrote me, by email, this comment: "*Very interesting. Perhaps the oscillation of the GRS has an effect on the nearby LRS? Or perhaps the synchrony is a coincidence -- it is difficult to say!*" [4].

I will have to prepare further analysis when there will be similar opportunities.

[1] Jupos - Database for Object Positions on Jupiter; http://jupos.org
[2] John H. Rogers: *The Giant Planet Jupiter*, (chapt. 3), Cambridge University Press, 1995
[3] John H. Rogers: *The Giant Planet Jupiter*, (chapt. 10.5)
[4] John H. Rogers, private communication