Subj: Re: plasma fingers
Date: Sat, Aug 19, 1995 5:41 PM MST
From: mbrown@LPL.Arizona.EDU
X-From: mbrown@LPL.Arizona.EDU (Mike Brown)
To: LDessler@aol.com

Alex --
Line shapes are where I excell! With the good resolution and signal to noise of my combined data, these can be really nailed down well. I would not put too much faith in Scherb's 2-temperature fit because their aperture is about 1 Rj circular, so >>>certainly<<< there are many different temperatures in there, just from radial variations. Are you familiar with the just out (or soon to be out) paper by Nick Thomas on line shapes. He shows that at 6 Rj there are very very single gaussian. I haven't looked at mine as much as I should. I obviously need a small army of grad students. But line shapes are high on the list of things to get to in the not-too-distant future.

Also on that list is another thing:
If plasma were somehow forced to flow inward from Io to make the ribbon, this would cause supercorotation in the inner regions of the torus, right? this might explain the shape of the corotation deviation curves in the inner torus. I have not made anything of them yet because I am still not capable of dealing correctly with projection effects, but I think that I know how to do a fairly good job of it. My hunch is that if I did the analysis I would find supercorotation in there.

Will you be around on Monday the 27th (I think the 27th. whatever that monday is closest to the 27th, at least)? I have an interesting demonstration that you should see before going to Rice!

Mike

Subj: Re: plasma fingers
Date: Sat, Aug 19, 1995 9:22 PM MST
From: mbrown@LPL.Arizona.EDU
X-From: mbrown@LPL.Arizona.EDU (Mike Brown)
To: LDessler@aol.com

Alex --
I would love to come to Rice when you are going, but I am already frantic as is, so I think this would overload me. I would happily accept an invitation to give a talk sometime, though. Hopefully one of these days I will become less frantic than I am right now (I keep saying that....).

You should definitely see the demonstration before you go to Rice. But right now it only exists in my head. I have to go to the store tonight and buy a few things and try some experiments at home. If everything goes as planned I will let you know how to do your very own at home model of the torus! Details soon.....

Mike

Subj: plasma fingers
Date: Sat, Aug 19, 1995 2:35 PM MST
From: mbrown@LPL.Arizona.EDU
X-From: mbrown@LPL.Arizona.EDU (Mike Brown)
To: ldessler@aol.com
CC: dessler@arizona.edu

Alex --
I thought there might be a chance of finding you at this address over the weekend. I am in Pasadena now and working on proposals and came up with a few questions as I was trying to write about plasma finger transport. Here are a few

- Why are the plasma fingers 7 degrees across and separated by 15 degrees? Do you know what physcial parameters control this? Any guess as to a reasonable range for the real torus?

- What is the root physical cause for finger formation and outward movement? For ribbon formation we are searching for mechanisms to break down the frozen-in flux constraint. What breaks it down here?

- If I understand the terrestrial case correctly, plasma transport occurs by radial diffusion when random electric field fluctuations cause radial changes. Could such a situation occur on Jupiter? We have talked before about the destructive potential of periodically osciallting electrical fields in the torus, but if fields in the region are really caused by tailward current flow and if the amount of current flow is related to the amount of mass dumped in my Io and if this fluctuates, could we not have a fluctuating electric field which causes radial diffusion in a manner analogous to the earth? This would not show up in the RCM-J, of course, since no source and certainly no time varying source, is present.

ANy thoughts?

Mike

Subj: Re: Jupiter
Date: Mon, Aug 21, 1995 11:09 AM MST
From: mbrown@LPL.Arizona.EDU
X-From: mbrown@LPL.Arizona.EDU (Mike Brown 621-4077)
To: LDessler@aol.com

Alex --
I just read the Desch et al. paper two days ago and was pretty impressed with how well it fit the picture. And I was surprised that you complain that they do not credit the plasma finger model enough. I think they did a nice job of mostly stating the observations and then saying

that they are consistent with plasma fingers. I don't think you want people jumping up and down saying "I saw plasma fingers, I saw plasma fingers." Better to have the evidence speak for itself.

I have been running a "plasma finger" torus geometry model, where I just take the Voyager model and vary the densities by +/-50% with a period of 15 degrees. It is remarkably hard to see anything even in 5 minute exposures. I am fairly convinced, however, that the real way to do this is the space telescope program we talked about a week or two ago. Staring at the Jovian CML and watching dense/rare spots go by could be quite convining! ANother point, if you think that fingers are forming mostly in the active sector, that is the WORST geometry for ground-based imaging!

Mike

Subj: finger thoughts
Date: Mon, Aug 21, 1995 11:28 AM MST
From: mbrown@LPL.Arizona.EDU
X-From: mbrown@LPL.Arizona.EDU (Mike Brown 621-4077)
To: ldessler@aol.com

Alex --
I was just thinking more about the last point I made about viewing geometry. From the ground, the only hope you would ever have of resolving fingers would be when the torus is tilted (I assume -- I haven't done the real model, but it seems likely). This means that the ansae are around 110 and 290 degrees, which I would consider pretty well missing the active sector (though I know you might consider 290 OK). In any case, it missed half of the torus, so fingers could be hiding around 20 and 200 degrees and no one would ever see them through imaging.

One question though, is why you would expect fingers predominantly in the active sector. Yang etc. showed that fingers start where the density is highest. If the total flux-tube mass is constant around the torus (with System III, at least) I don't see why there would be a prefered spot. I would guess that if Sys4 is really a density wave moving around fingers would be >there< if they could form fast enough before the density variation moved on.

Mike