GALILEO PPR AT IO: HIGH RESOLUTION SCANS TAKEN IN CONJUNCTION WITH SSI AND NIMS DATA. J. A. Rathbun, *University of Redlands, 1200 East Colton Ave., Redlands CA 92373, USA*, J. R. Spencer, *Lowell Observatory, 1400 West Mars Hill Road, Flagstaff AZ 86001*, L. K. Tamppari, T. Z. Martin, *Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena CA 91109*, L. Barnard, *Raytheon Corporation, 299 S. Euclid Ave., Pasadena, CA 91109*, L. D. Travis, *NASA-GISS, 2880 Broadway, New York, NY 10025*.

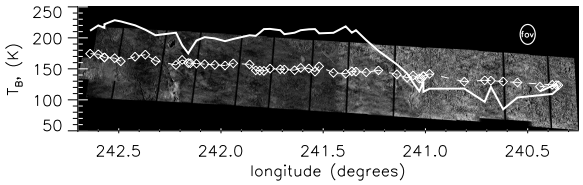

Figure 1: I24 Galileo PPR scan across the flows of Pillan, superimposed on a simultaneous SSI mosaic [2]. The diamonds show the location of the centers of the PPR fields of view (fov; size shown) relative to the image, while the solid line gives the brightness temperature of the PPR observation at the same horizontal location.

The Galileo Photopolarimeter-Radiometer (PPR), when used in the radiometry mode which is most often used at Io, is a long-wavelength infrared single-aperture photometer. It is sensitive to temperatures from about 60 to several hundred K, and is thus useful for studying the volcanoes and background temperatures on Io. PPR can take raster scan images when it is the primary instrument being used (these data were discussed last year, see Rathbun et al., 2002 [1]). It can also take data in "ride-along" mode in conjunction with another remote sensing instrument (either SSI or NIMS) producing one-dimensional temperature scans. The best data of this type were taken during the close approach flybys during orbits I24, I25, I27, I31, I32, and I33 and include measurements of the volcanoes Pele, Prometheus, Pillan, Zamama, Tvashtar, Daedalus, Amarani, Gish Bar, Isum, Emakong, Tupan, and Tohil.

Table 1 describes some of the better ride-along data taken during these orbits. The first column gives the name of the observation. The first 2 digits of this name give the orbit number, the third gives the target ("i" for Io), the fourth gives the instrument, and the remainder identify the specific observation. The next columns give the resolution (in km), the local time, average image longitude, average image latitude, approximate temperature difference measured across the scan (in K), the duration of the observation (H:MM:SS.S), the primary instrument used, and the name of the target. The temperature difference can be used as an indicator of hotspot activity, a large temperature difference suggesting an active hotspot. The local time is defined as the average longitude minus the subsolar longitude so that 0 indicates noon, 180 indicates midnight, positive values are before noon, and negative values (or those over 180) are afternoon.

An I24 PPR observation of Pillan, 24ispillan01 (figure 1), measures brightness temperatures at 17 μm [3]. The 's' in the observation name indicates that the data was taken simultaneously with an SSI image, over which the temperature scan is plotted. Pillan was the site of a large, high-temperature eruption 2.3 years earlier [4]. The darkest flows, which probably date from the 1997 eruption, have a temperature of 200 $\pm$ 20 K, whereas high-albedo flows to the east were much colder, only 100 K and probably date from previous eruptions. Thus, PPR can measure lava flow temperatures AND distinguish new lavas from old ones. This image demonstrates how PPR can be used to measure the temperature of lava flows. We will carry out similar analyses of data with large temperature variations across the scan, such as Tvashtar, Amarani, and Gish Bar in i31. Preliminary analysis of the Tvashtar data taken August 2001 (31intvasht01) gives temperatures of 220 K in the areas seen by SSI to be erupting during i27 (February 2000) and 180 K in the region erupting during i25 (November 1999) [2]. We will use lava cooling models to infer ages of these lava flows from the temperature measurements and compare them to the dates the images were taken.

References

[1] J. A. Rathbun *et al.*, In /it 33rd Annual Lunar and Planetary Science Conference, March 11-15, 2002, Houston, Texas, abstract no. 1371, volume 33, 2002.

[2] A. S. McEwen *et al.*, *Science*, 288:1193-1198, 2000.

[3] J. R. Spencer *et al.*, *Science*, 288:1198-1201, 2000.

[4] A. S. McEwen *et al.*, *Science*, 281:87-+ , 1998.

Table 1: PPR ride-along observations of Io. See text for description of columns.

Observation	Resolution	Local time	longitude	latitude	ΔT	duration	instr.	target
24incolchs01	2.81	50.82	212.19	3.58	45.3	0:01:11.3	NIMS	Colchis Regio
24incolchs02	22.77	50.62	214.39	3.06	7.3	0:02:07.3	NIMS	Colchis Regio
24inpele__01	7.93	148.15	307.97	12.52	38.6	0:01:20.7	NIMS	Pele
24inpelepm01	163.95	198.89	389.99	239.08	6.4	0:06:04.0	NIMS	Pele
24inpillan01	2.39	79.96	240.90	-9.97	30.8	0:02:04.7	NIMS	Pillan
24inpplume01	82.44	258.33	224.69	-12.57	19.4	0:06:02.0	NIMS	
24inpromth02	38.38	-12.12	153.89	-1.07	17.2	0:11:38.0	NIMS	Prometheus
24inregion02	523.07	-15.26	199.00	15.61	28.5	0:17:11.3	NIMS	
24inzamama01	5.71	8.22	170.15	16.95	37.9	0:01:58.0	NIMS	Zamama
24isamskgi01	61.60	-61.46	107.14	21.09	67.0	0:04:34.0	SSI	
24iscolchs01	2.03	54.26	215.48	3.89	33.9	0:01:48.0	SSI	Colchis Regio
24ispele__01	4.12	96.23	256.63	-18.34	69.0	0:00:46.0	SSI	Pele
24ispillan01	2.24	80.74	241.53	-10.33	58.0	0:01:00.7	SSI	Pillan
24ispromth02	29.65	-9.79	155.15	-12.31	15.6	0:02:28.7	SSI	Prometheus
24istohil_01	23.44	-1.77	162.35	-28.03	51.5	0:01:41.3	SSI	Tohil
24iszamama01	4.81	10.75	172.54	17.71	32.6	0:02:50.0	SSI	Zamama
24iszamama02	47.97	28.34	195.25	24.75	64.0	0:04:34.0	SSI	Zamama
25inregion01	24.36	347.17	147.12	6.24	7.8	0:54:36.0	NIMS	
25isemakng02	36.08	-39.40	118.96	-4.27	21.1	0:07:12.7	SSI	Emakong
27inamrani01	60.03	-28.17	115.00	27.45	15.1	0:18:40.0	NIMS	Amirani
27incamaxt01	48.66	-6.00	135.67	13.86	12.7	0:02:00.0	NIMS	Camaxtli
27inhrpele01	7.67	122.71	255.96	-18.41	29.0	0:07:04.7	NIMS	Pele
27inmosaic01	17.87	19.58	156.97	12.70	11.6	0:14:02.0	NIMS	
27inpromth01	33.59	15.50	155.04	-2.02	17.0	0:10:06.7	NIMS	Prometheus
27isamrani01	52.42	-27.41	114.74	23.43	14.3	0:01:34.0	SSI	Amirani
27iscamaxt01	45.70	3.42	144.65	12.99	11.8	0:03:42.0	SSI	Camaxtli
27ispele__01	4.44	121.55	255.36	-18.01	10.0	0:00:54.0	SSI	Pele
27ispromth01	2.95	19.64	154.90	-1.00	145.6	0:02:01.3	SSI	Prometheus
27ispromth02	42.36	13.36	154.10	1.83	21.2	0:02:35.3	SSI	Prometheus
27istohil_01	40.93	19.59	160.02	-27.97	14.0	0:01:27.3	SSI	Tohil
27iszaltrm01	83.94	-73.32	72.82	35.21	55.9	0:03:55.3	SSI	Zal
31inamrani01	85.15	40.86	118.53	22.83	37.7	0:17:11.3	NIMS	Amirani
31ingishbr01	40.34	18.17	89.42	17.23	7.9	0:16:08.7	NIMS	Gish Bar
31inhsisum01	7.35	142.20	206.11	32.55	91.1	0:06:04.0	NIMS	Isum
31intherml01	14.06	193.41	256.12	-18.63	92.9	0:03:00.0	NIMS	
31intvasht01	19.42	56.24	124.18	62.05	62.1	0:11:07.3	NIMS	Tvashtar
32inemakng01	22.54	39.82	119.49	-3.67	37.6	0:11:07.3	NIMS	Emakong
32inichaac01	53.65	64.83	148.48	12.49	11.4	0:10:06.7	NIMS	Chaac
32initupan01	40.42	59.51	141.48	-18.02	54.3	0:10:06.7	NIMS	Tupan
32inpromth01	71.63	47.15	133.02	40.64	11.6	0:13:08.7	NIMS	Prometheus
32intherml01	6.49	52.06	129.27	-78.30	5.6	0:04:02.7	NIMS	
32inthloki01	21.41	238.01	311.10	11.40	84.8	0:11:07.3	NIMS	Loki
32inthpele01	61.44	187.47	255.44	-17.70	71.1	0:05:03.3	NIMS	Pele
32inthpele02	11.26	181.27	255.81	-17.46	48.0	0:07:04.7	NIMS	Pele
32isemakng01	7.63	42.48	120.08	-23.22	84.0	0:01:27.3	SSI	Emakong
32ispele__01	17.04	188.00	261.75	-12.39	153.0	0:03:02.0	SSI	Pele
32istelgns01	1.48	59.11	135.76	-63.86	127.7	0:04:02.7	SSI	
32istelgns02	9.42	40.27	118.11	-44.08	46.6	0:01:41.3	SSI	
32istermin01	80.67	77.23	164.32	-18.03	6.3	0:02:48.0	SSI	Terminator
32istermin02	83.43	64.19	151.59	33.83	13.7	0:02:08.0	SSI	Terminator
32istohil_01	13.78	80.47	158.86	-24.42	36.2	0:02:34.7	SSI	Tohil
32istupan_01	34.79	63.30	144.52	-18.20	8.2	0:02:01.3	SSI	Tupan
32istvasht01	49.24	42.98	125.73	62.24	25.6	0:02:01.3	SSI	Tvashtar