An improved map of the Galactic Faraday sky

Oppermann et al. 2011

第134回雑誌会 (Jun 27, 2012)

中村翔(服部研 1st year Ph.D)

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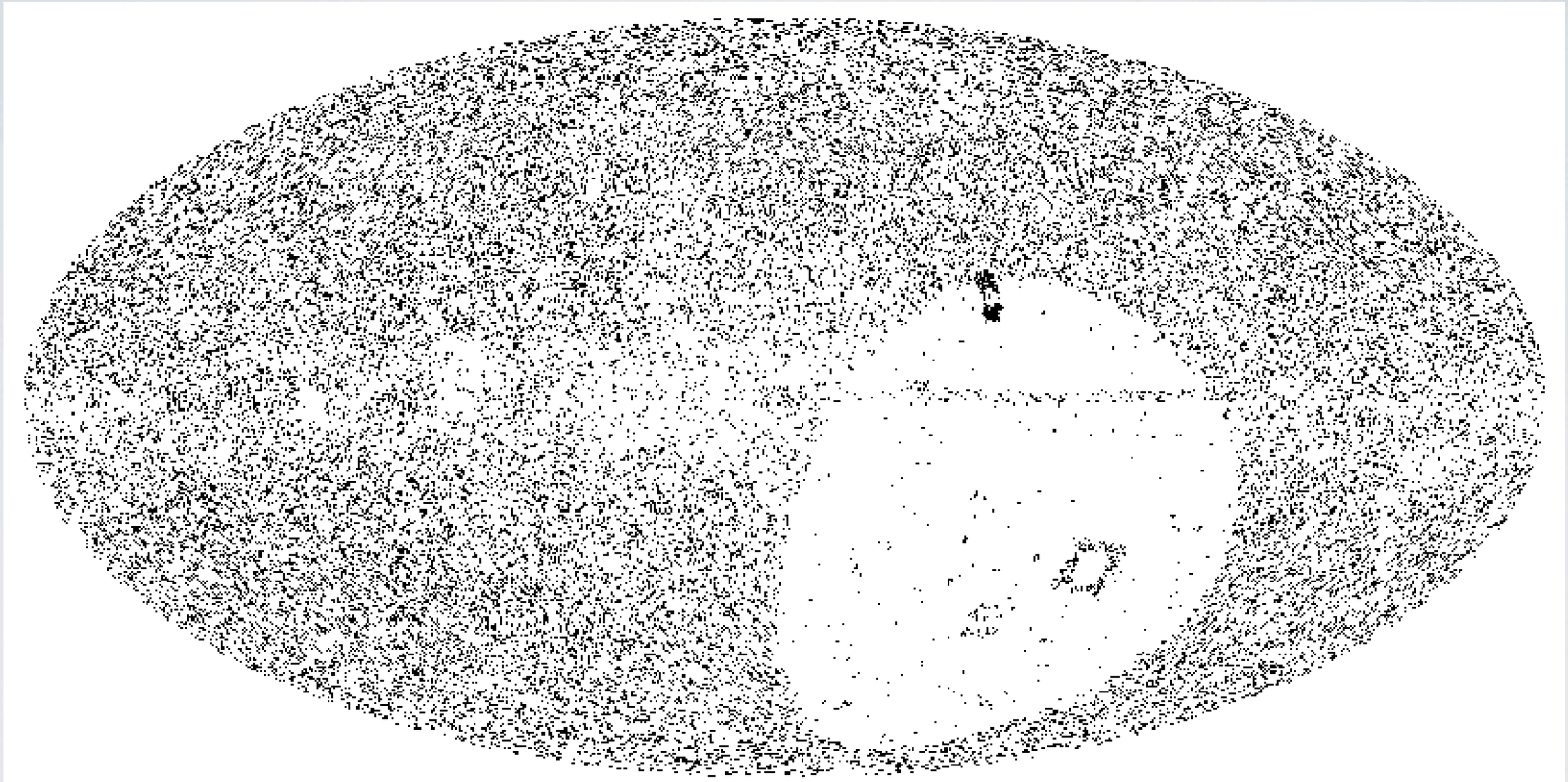
data sets(extragalactic radio source)

Table 1. Details of the data sets used for the map reconstruction.

identifyer	telescope	survey	# observed wavelengths	frequency range / MHz	method	# data points	catalog reference	survey reference
Bonafede	VLA		3-5	various[(a)]	λ^2-fit	7	(1)	
Broten	various[(b)]		various[(b)]	various[(b)]	λ^2-fit	121+3/2[(c)]	(2)	
Brown CGPS	DRAO ST	CGPS	4	1 403-1 438	λ^2-fit	380	(3)	(4)
Brown SGPS	ATCA	SGPS	12	1 332-1 436	λ^2-fit	148	(5)	(6),(7)
Clarke	VLA		4,6	1 365-4 885	λ^2-fit	125	(8),(9)	
Clegg	VLA		6	1 379-1 671	λ^2-fit	56	(10)	
Feain	ATCA	Cent. A	24	1 280-1 496	RM synthesis	281	(11)	(12)
Gaensler	ATCA	SGPS test	9	1 334-1 430	λ^2-fit	18	(13)	
Hammond	ATCA		23	1 332-1 524	RM synthesis	88	(14)	
Heald	WSRT	WSRT-SINGS	1024	1 300-1 763	RM synthesis	57	(15)	(16)
Hennessy	VLA		4	1 362-1 708	λ^2-fit	17	(17)	
Johnston-Hollitt A	ATCA		23	1 292-1 484	RM synthesis	68	(18)	
Johnston-Hollitt B	ATCA		4	1 384-6 176	λ^2-fit	12	(19),(20)	
Kato	Nobeyama		4[(d)]	8 800-10 800[(d)]	λ^2-fit	1	(21)	
Kim	various[(e)]		various[(e)]	various[(e)]	λ^2-fit	20+1/2[(c)]	(22)	
Klein	VLA & Effelsberg	B3/VLA	4	1 400-10 600	λ^2-fit	143	(23)	(24),(25)
Lawler	various[(f)]		various[(f)]	various[(f)]	λ^2-fit	3	(26)	(27)
Mao SouthCap	ATCA		32	1 320-2 432	RM synthesis	329	(28)	
Mao NorthCap	WSRT		16	1 301-1 793	RM synthesis	400	(28)	
Mao LMC	ATCA		14	1 324-1 436	RM synthesis	188	(29),(30)	
Mao SMC	ATCA		14	1 324-1 436	λ^2-fit	62	(31)	
Minter	VLA		4	1 348-1 651	λ^2-fit	98	(32)	
Oren	VLA		4,6	various[(g)]	λ^2-fit	51+4/2[(c)]	(33)	
O'Sullivan	ATCA		100	1 100-2 000	RM synthesis	46	(34)	
Roy	ATCA & VLA		4 and more	various[(h)]	λ^2-fit	67	(35)	
Rudnick	VLA		2	1 440-1 690	λ^2-fit	17+2/2[(c)]	(36)	
Schnitzeler	ATCA		12	1 320-1 1 448[(i)]	RM synthesis	178	(37)	
Simard-Normandin	various[(j)]		various[(j)]	various[(j)]	λ^2-fit	535+6/2[(c)]	(38)	
Tabara	various[(k)]		various[(k)]	various[(k)]	λ^2-fit	62+3/2[(c)]	(39)	
Taylor	VLA	NVSS	2	1 344-1 456	λ^2-fit	37 543	(40)	(41)
Van Eck	VLA		14	1 353-1 498	RM synthesis[(l)]	194	(42)	
Wrobel	VLA		6	1 373-1 677	λ^2-fit	5+1/2[(c)]	(43)	

系外の電波銀河で、偏光が受かっているもの、RMがわかっているものを使用。

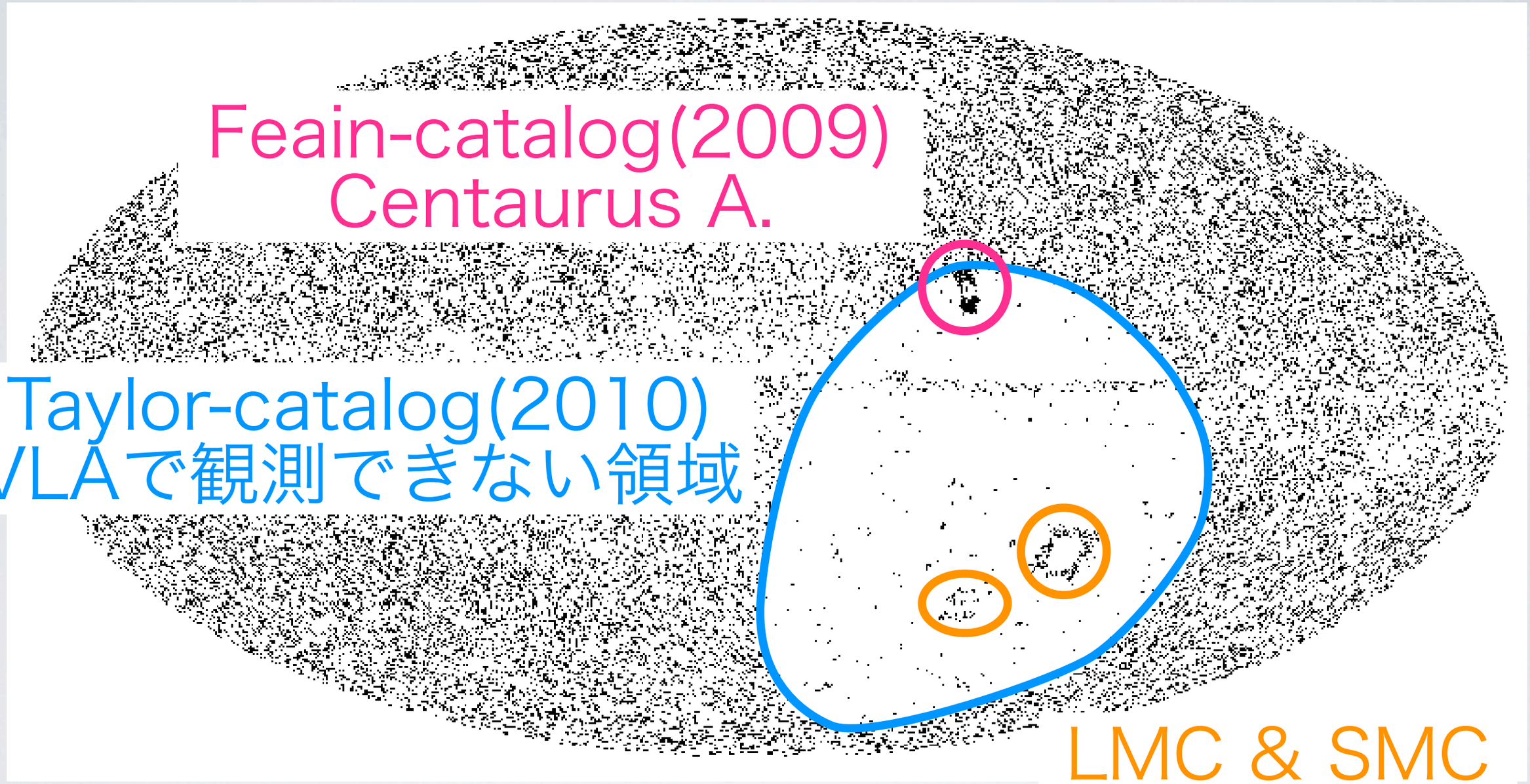
data sets(extragalactic radio source)



データ点の分布図。

point source ===> 場の量に変換(extended critical filter)

data sets(extragalactic radio source)



データ点の分布図。

point source ===> 場の量に変換(extended critical filter)

統計の詳しい内容はこちら

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A.R. Taylor[4], and G.

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[7] ASTRON, Postbu
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[16] Astronomisches Institu
[17] School of Physics, Uni

Information field theory for cosmological perturbation reconstruction and non-linear signal analysis

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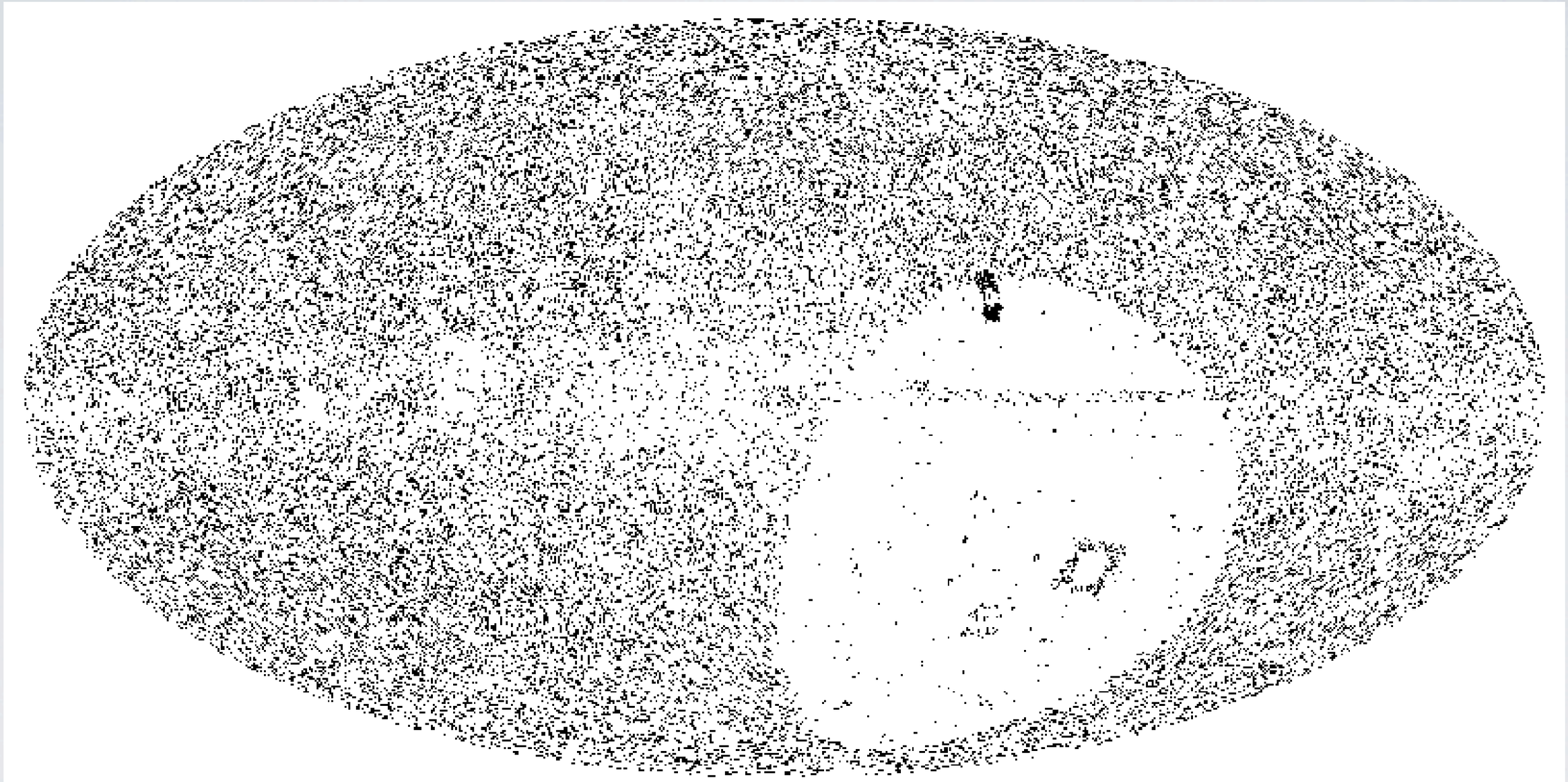
Max-Planck-Institut für Astrophysik, Karl-Schwarzschild-Str. 1, 85741 Garch

(Dated: September 29, 2009)

We develop *information field theory* (IFT) as a means of Bayesian inference
tributed signals, the information fields. A didactical approach is attempted. Sta
considerations on the nature of measurements, signals, noise, and their relatio
ality, we derive the information Hamiltonian, the source field, propagator, an
Free IFT reproduces the well known Wiener-filter theory. Interacting IFT can
expanded, for which we provide the Feynman rules in position-, Fourier-, an
ics space, and the Boltzmann-Shannon information measure. The theory sh
many fields. However, here, two cosmological signal recovery problems are d
formulation. 1) Reconstruction of the cosmic large-scale structure matter dist
unts in incomplete galaxy surveys within a simple model of galaxy fo
ich should resemble the initial density perturbations of
lete and Poissonian-noise affected respo
provide, can be reconstruc
filter to dete

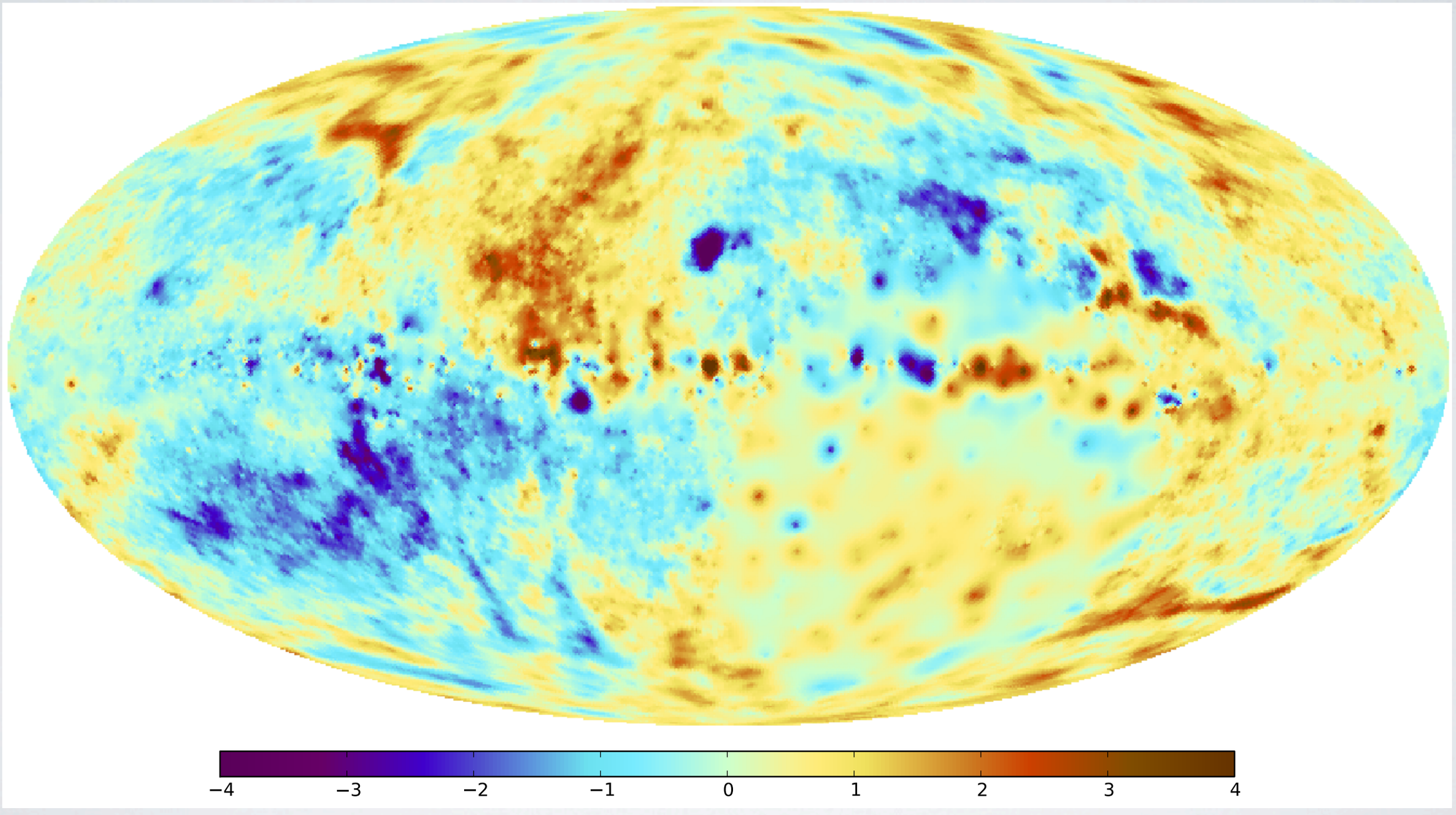
data sets(extragalactic radio source)



データ点の分布図。

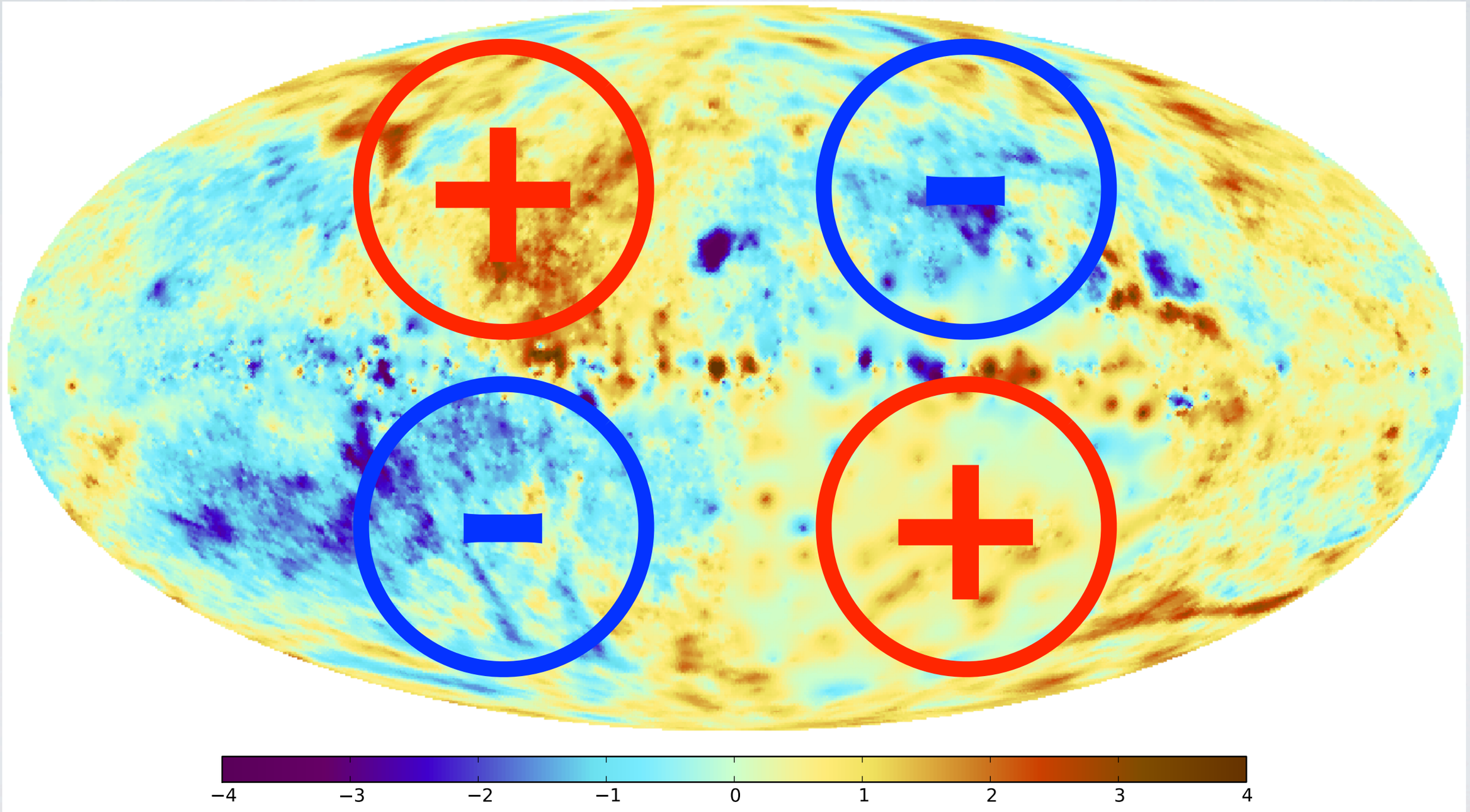
point source ===> 場の量に変換(extended critical filter)

結果図

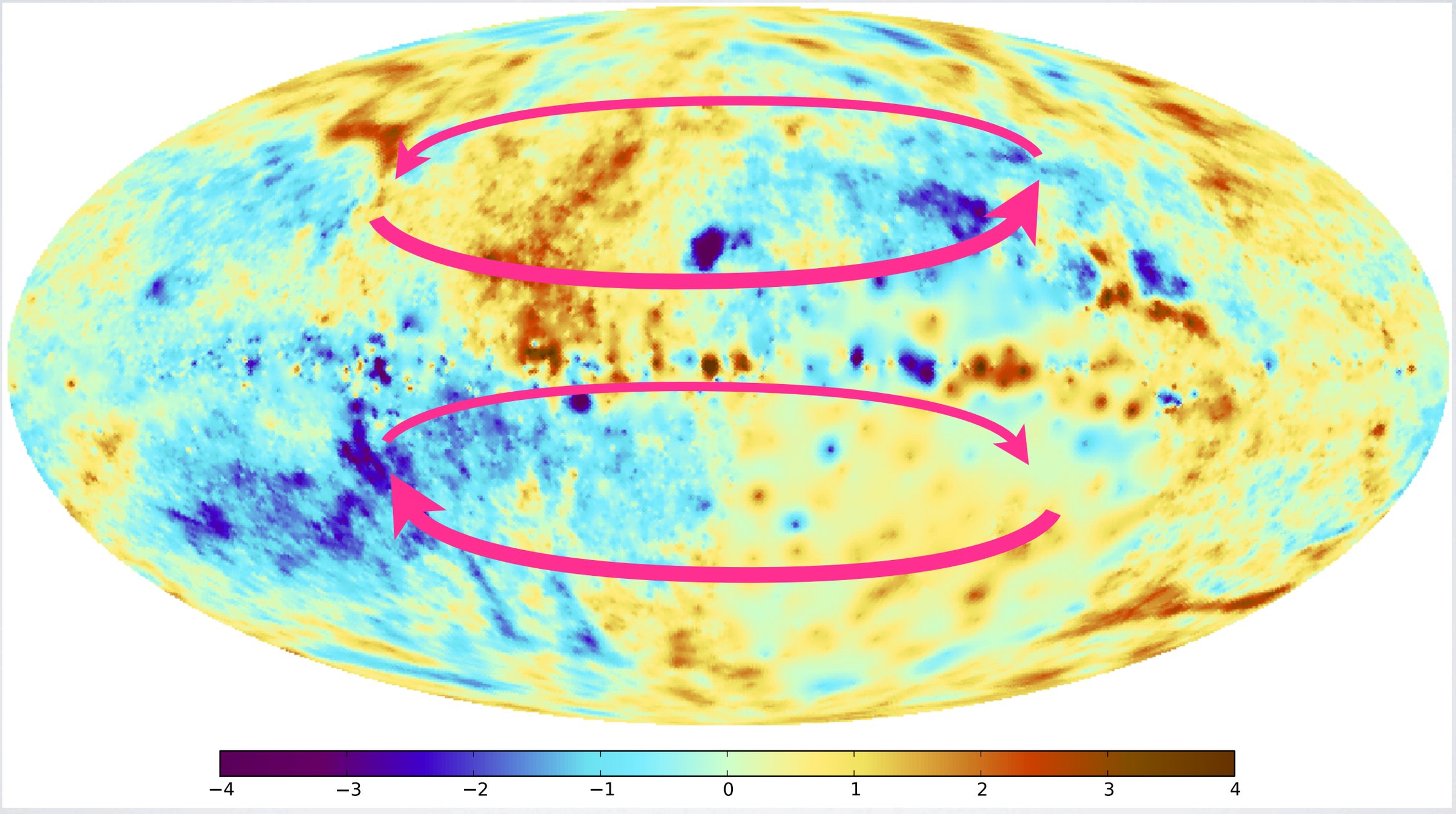


dimensionless RM signal field map

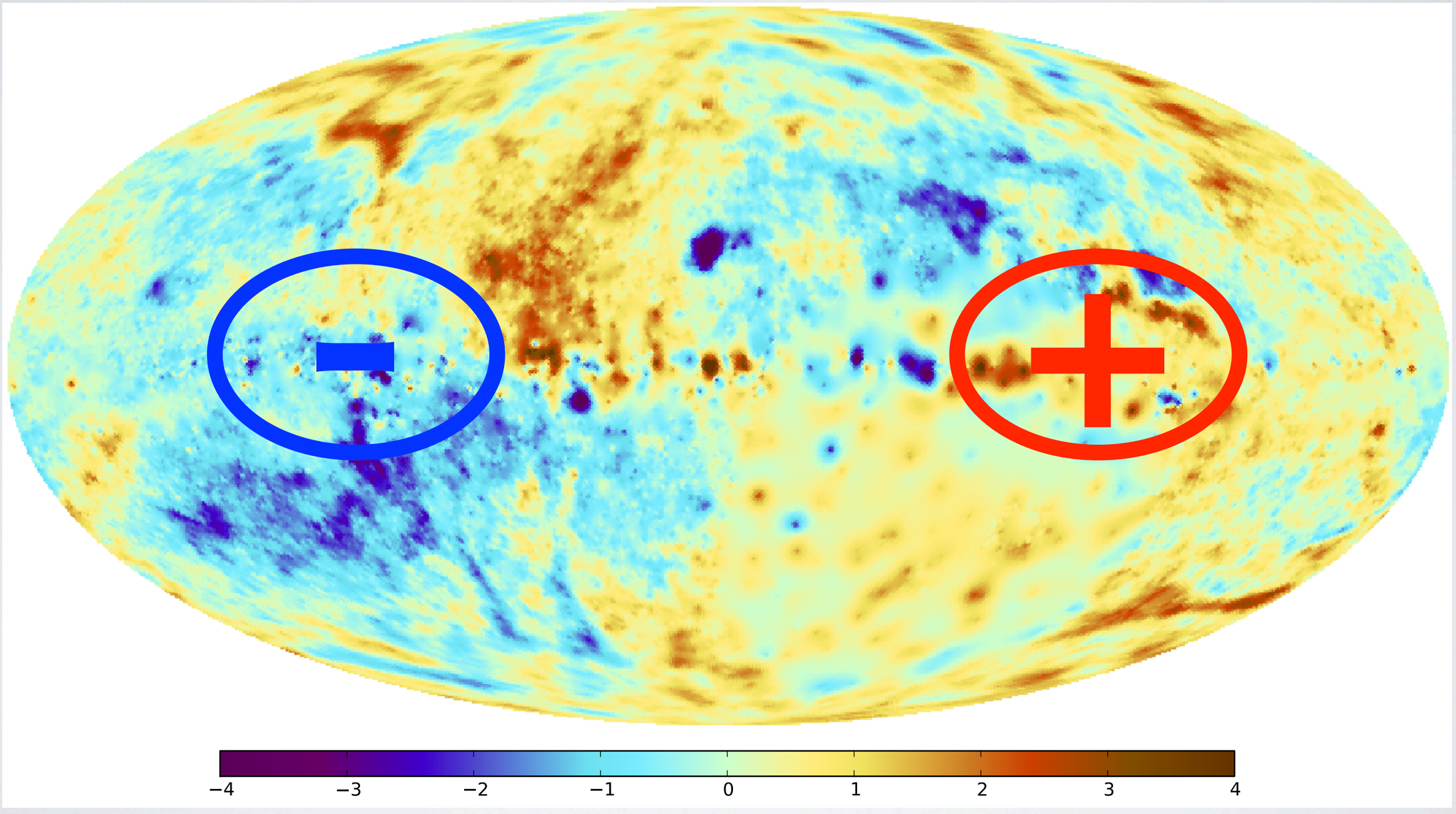
quadrupole-like structure



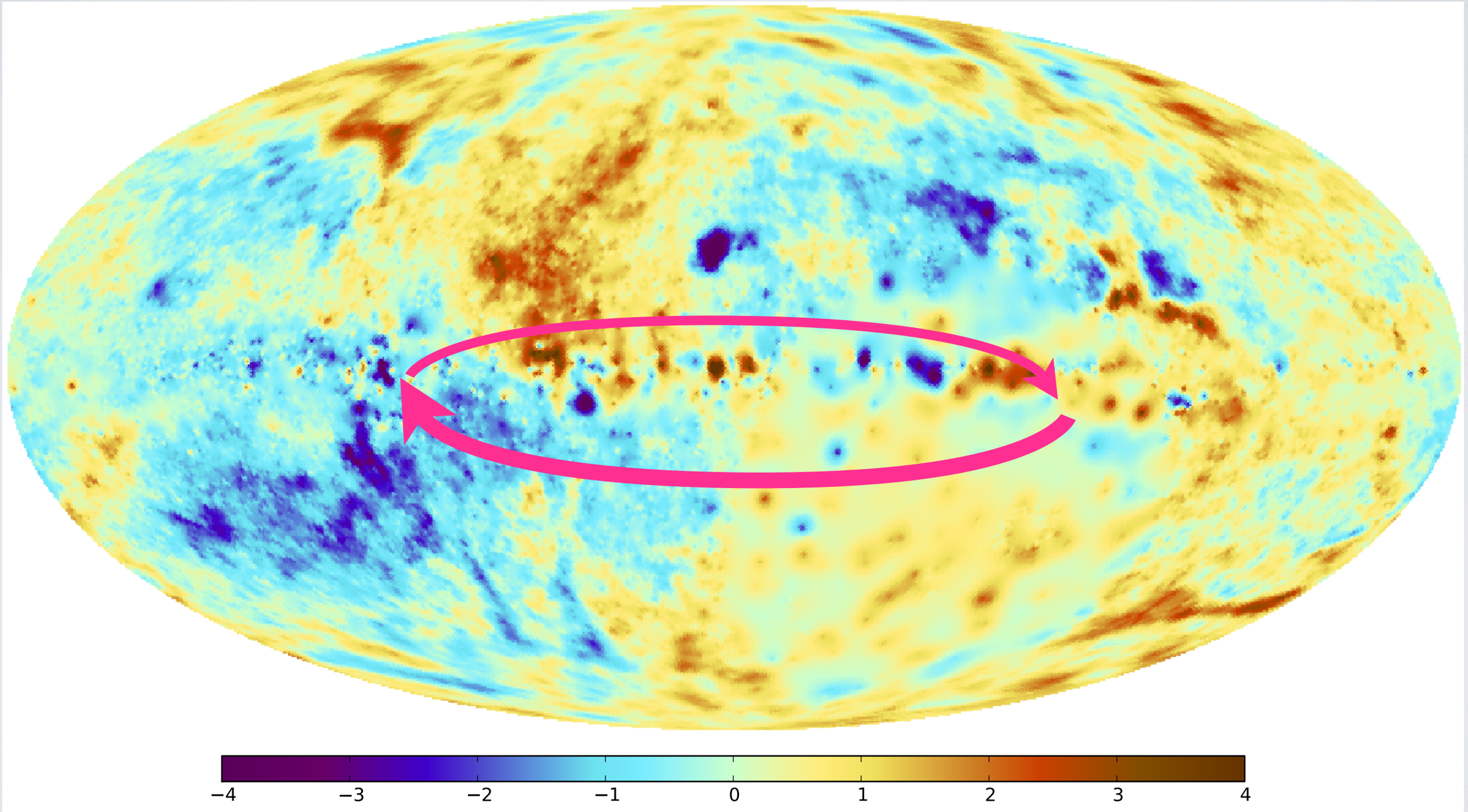
quadrupole-like structure



dipolar structure

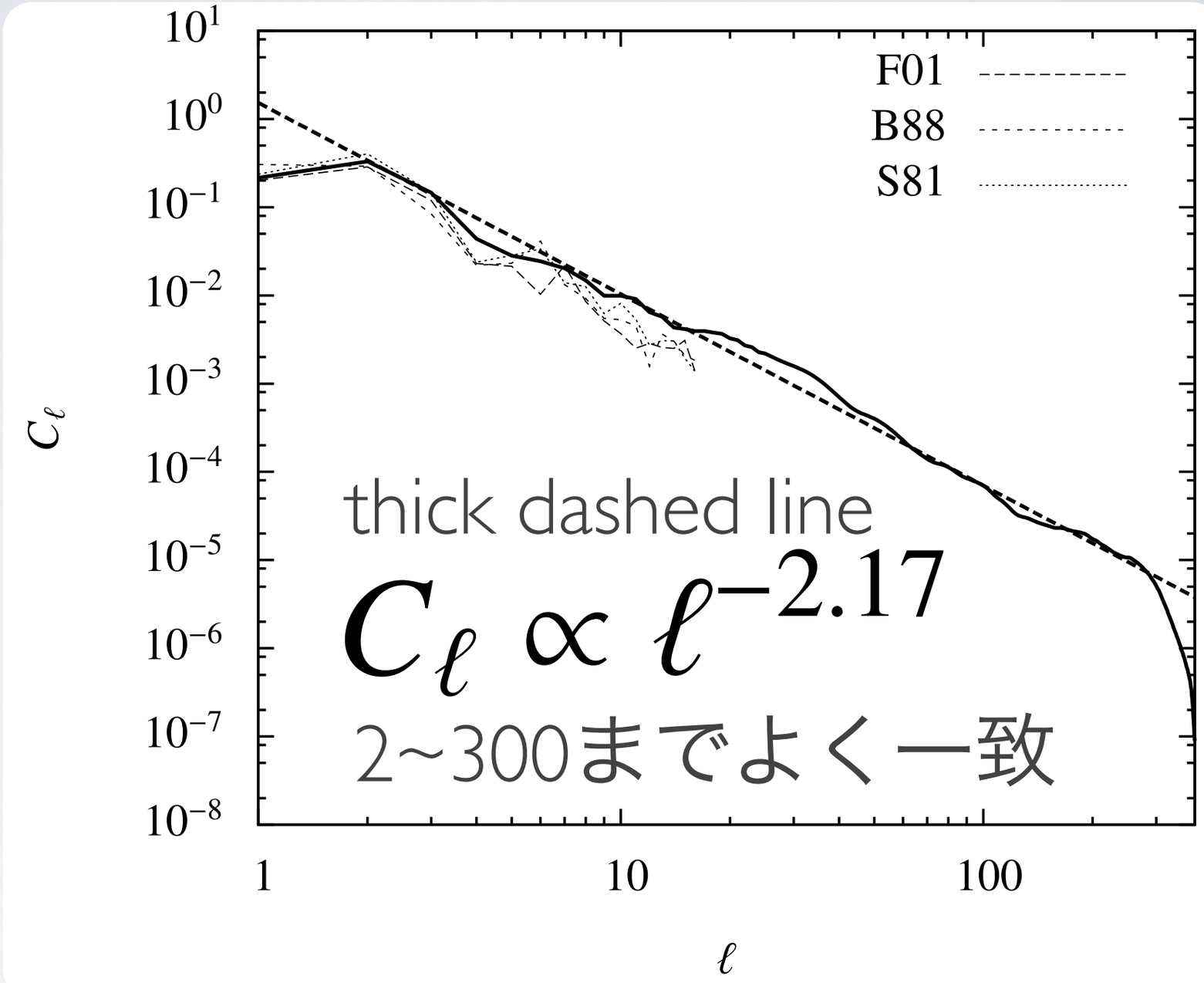


dipolar structure



angular power spectrum

thick solid lineが
今回の結果



point source ===> 場の量に変換、HEALPix data

===> パワースペクトルを計算

WHY $C_\ell \propto \ell^{-2.17}$?

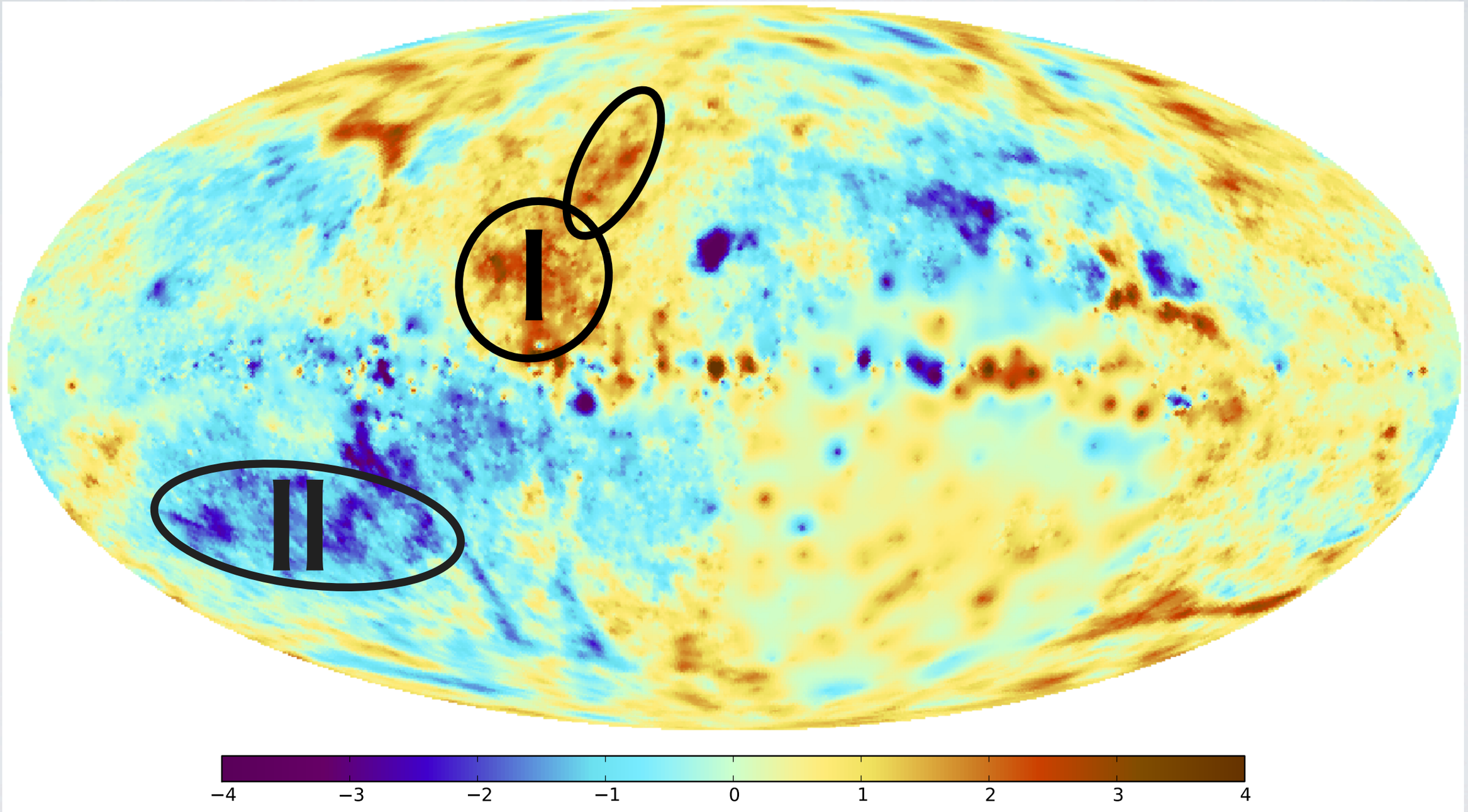
- 先行研究と一致しているが、物理的根拠は不明（おそらく銀河の大局的磁場構造を反映しているのであろう）。
- ただしMW Galaxyのglobal MHD simulationをしたとき、そのsimulationがどれくらい現実味のあるものかを示す指標として使えるのではないか？ ===> future workに期待

まとめ

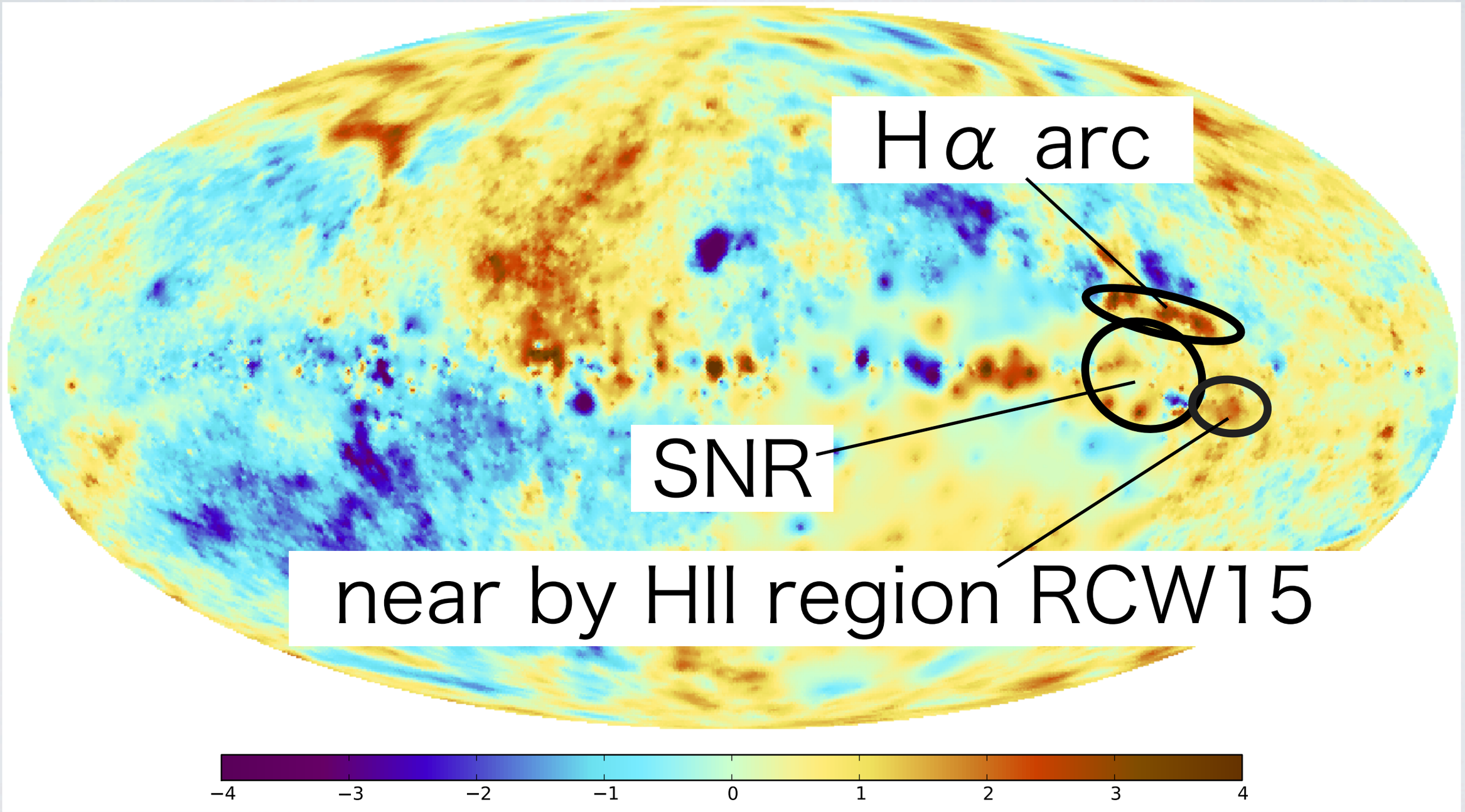
- これまで系外電波銀河の偏光観測により求められてきたRM dataを一つにまとめあげた。
- extended critical filterを用いることで、今までより精度よくRMのsignal field mapを作成することに成功。
- パワースペクトルも先行研究とよく一致。

予備スライド

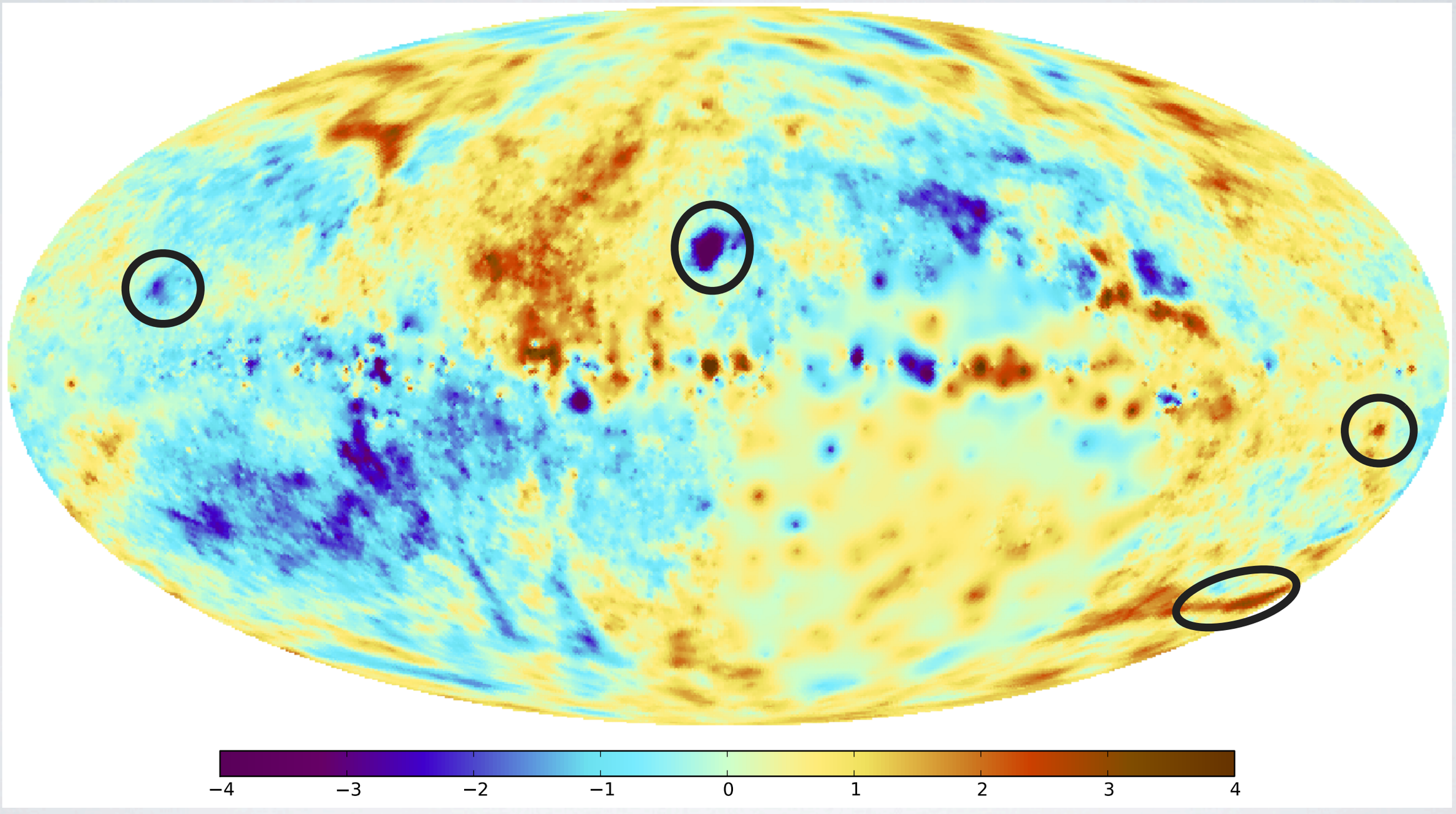
Radio Loop I(North Polar Spur), II



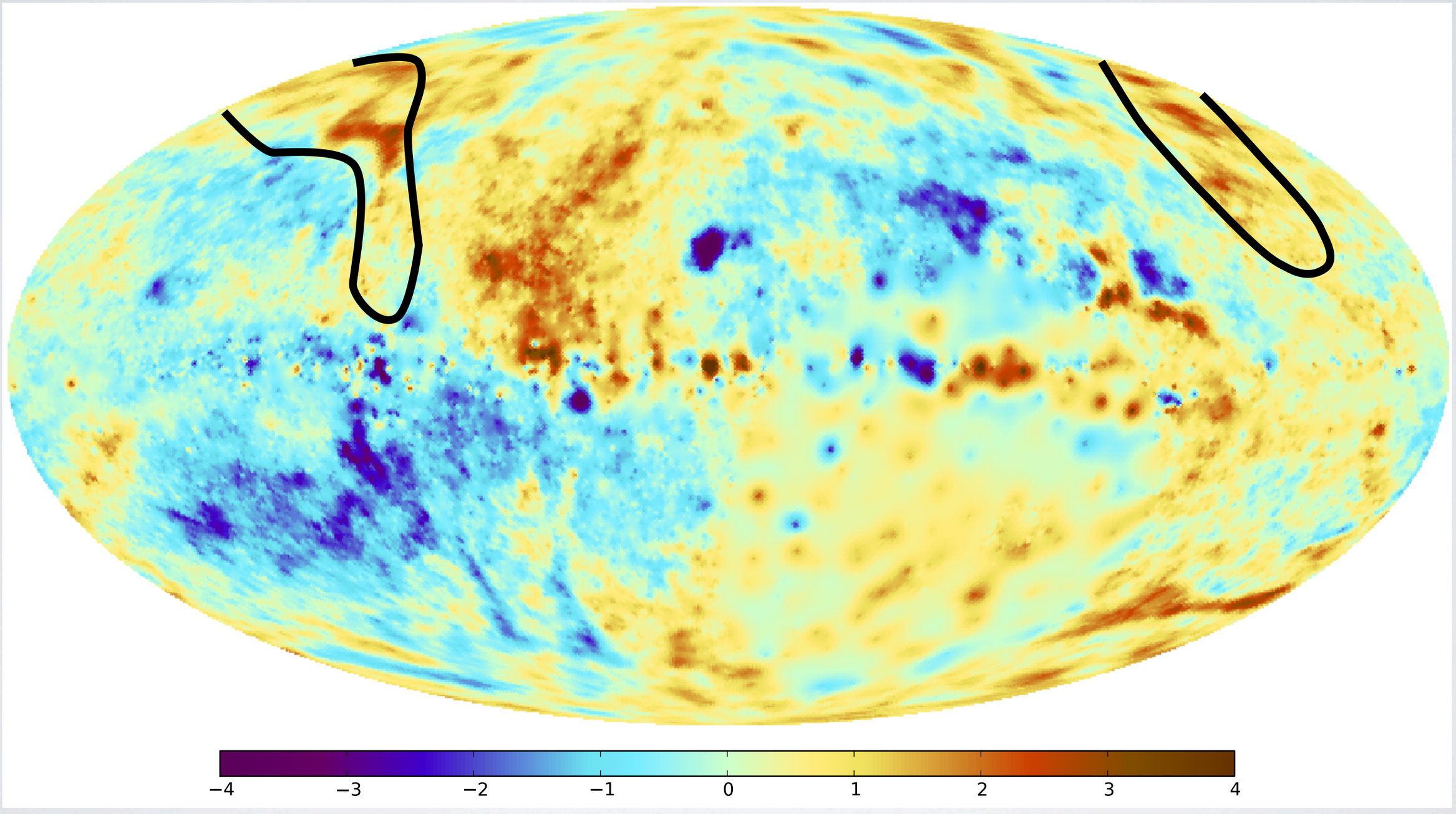
Gum nebula



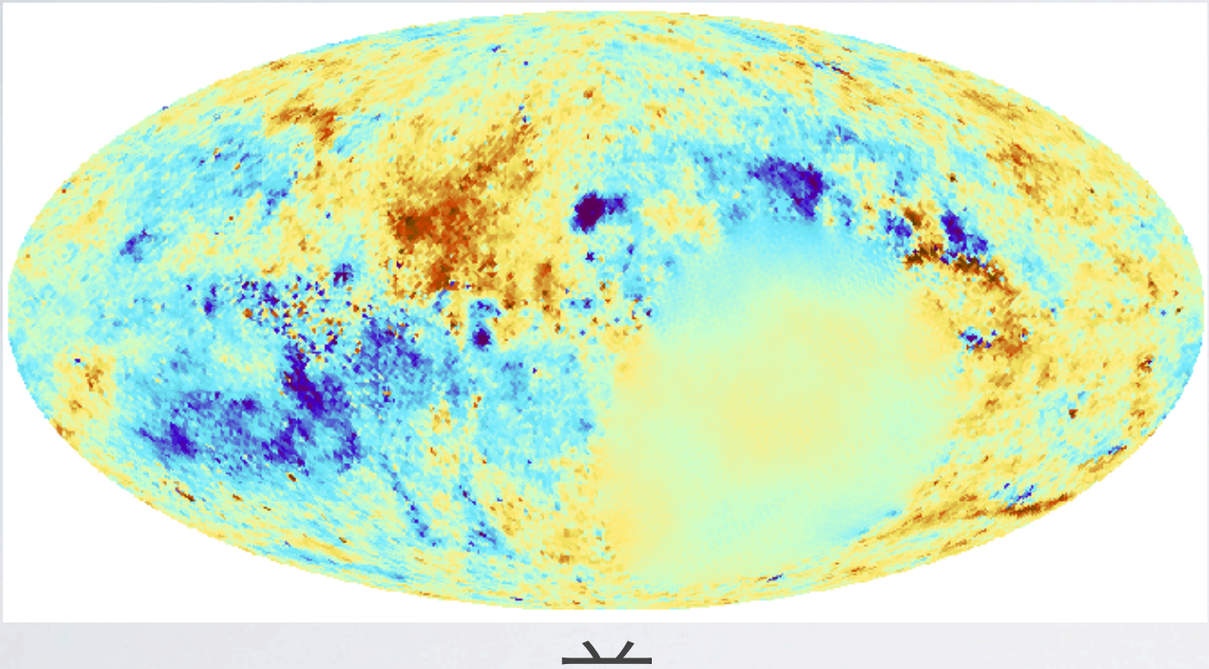
OB association



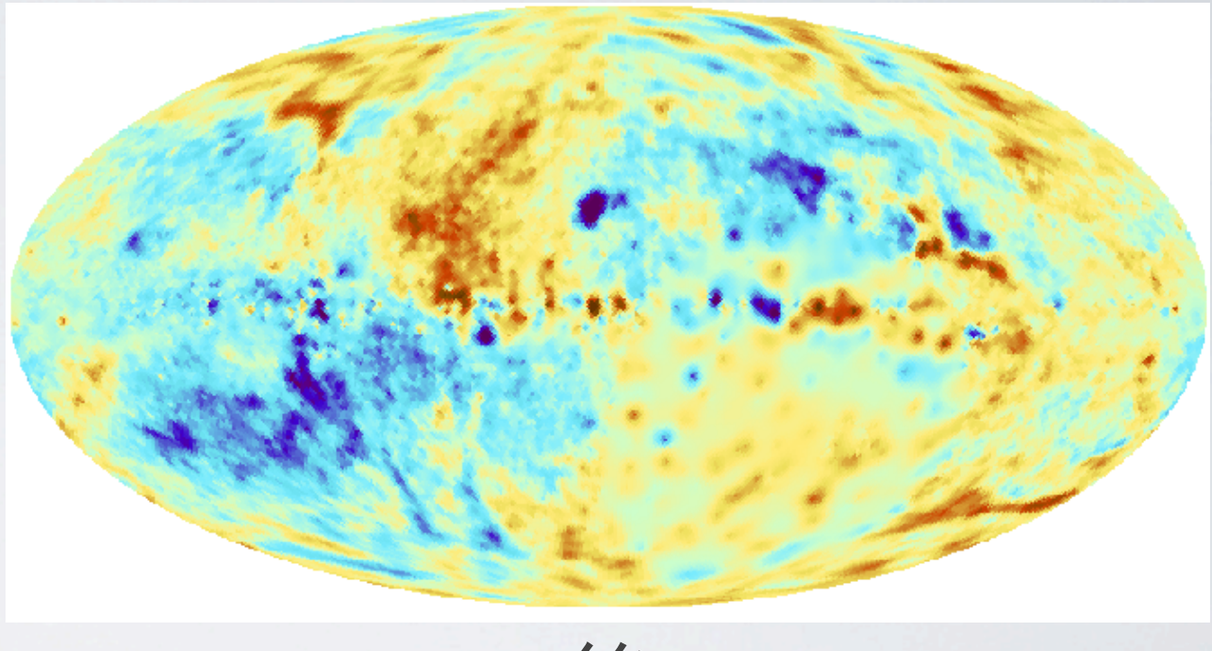
arc of atomic hydrogen gas



extended critical filter



前



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