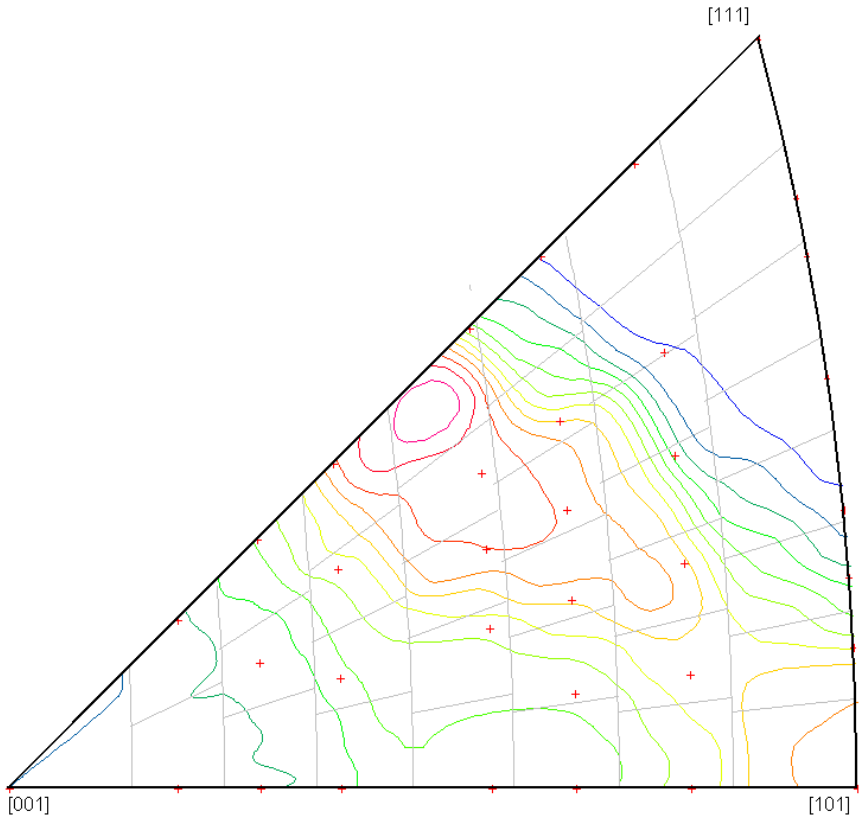
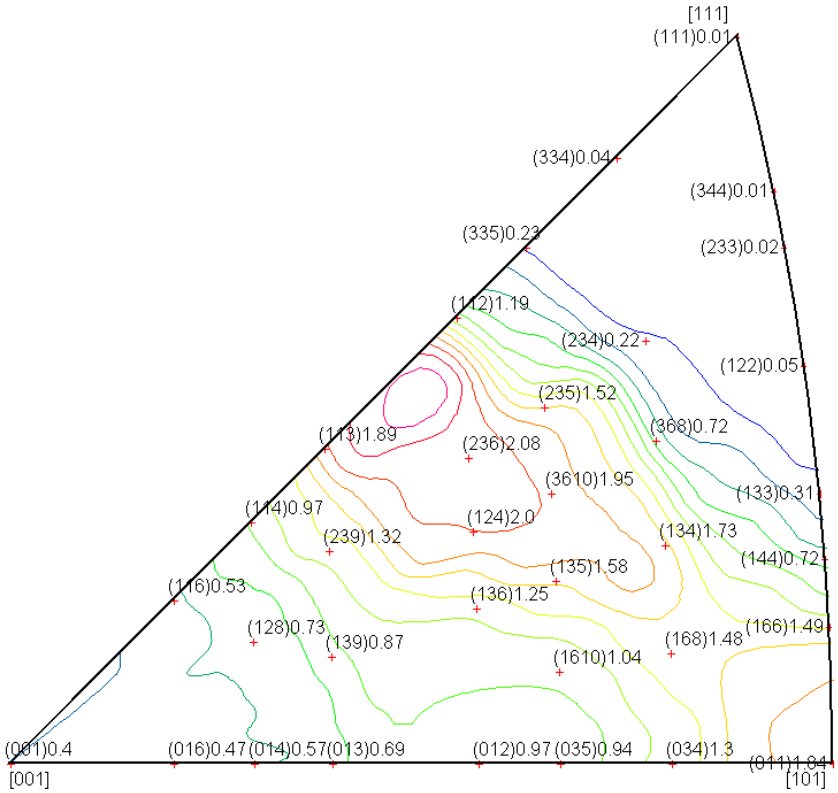
# アルミニウム材料ＯＤＦ解析結果の数値化




２０２６年０１月１４日

*ＨｅｌｐｅｒＴｅｘ　Ｏｆｆｉｃｅ*

概要

複数の極点図からＯＤＦ解析が行われ、ＯＤＦ図、再計算点図、逆極点図までは機械的作業である。
入力データと再計算極点図からＲｐ％を計算し、入力データの評価を行った後、VolumeFraction 計算が行われる。VolumeFraction の評価は、VlumeFraction から計算し再々計算極点図と再計算極点図を用いて再計算Ｒｐ％を計算し、評価が行われていが、再々計算Ｒｐ％の評価は難しい。
経験的に、Ｒｐ％のプロファイルは±１．５％に収まるが、再々計算Ｒｐ％の閾値は決められない。
VolumeFraction を扱わない、ＯＤＦ図、逆極点図の数値化を説明します。
ODF ソフトウエアは、Ｌａｂｏｔｅｘで説明します。
ＯＤＦソフトウエアとし他に、

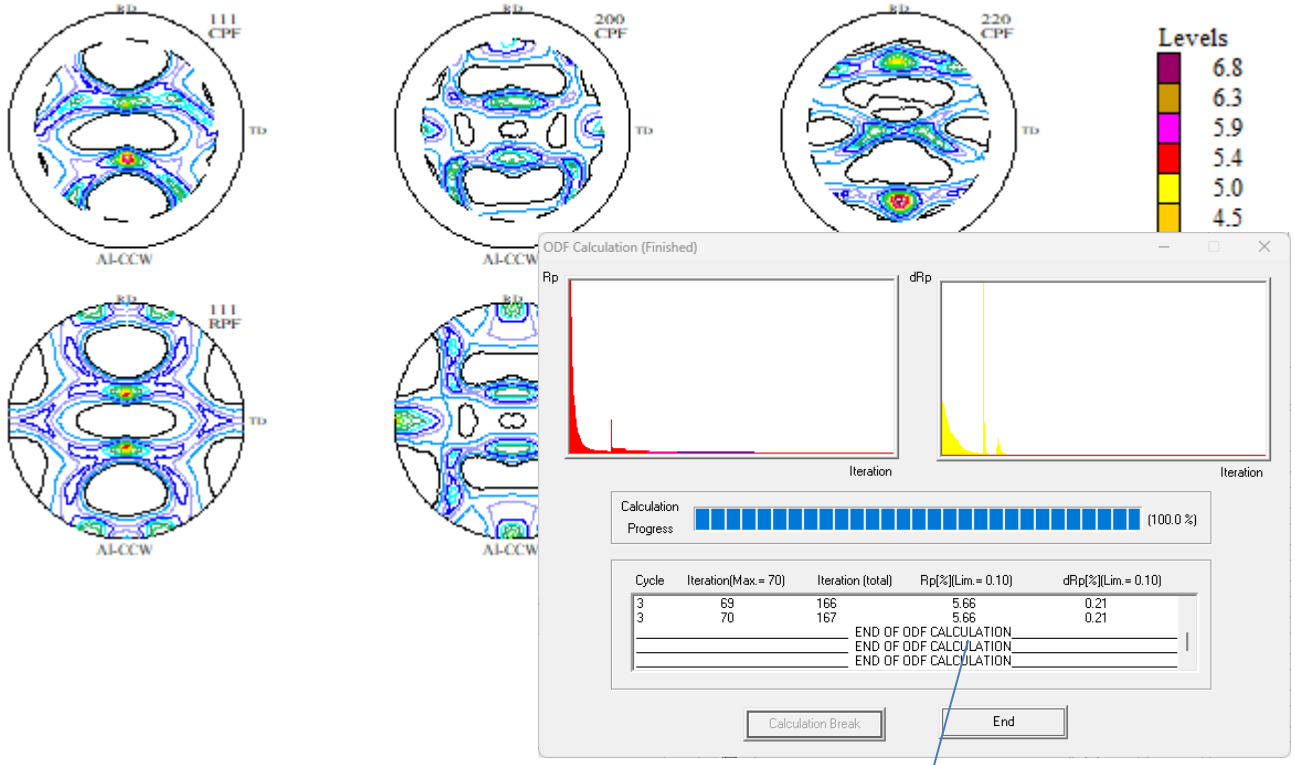
ＳｔａｎｄａｒｄＯＤＦ
ＭＴＥＸ
ＴｅｘＴｏｏｌｓ
ｐｏｐＬＡ

Ｅｘｐｏｒｔ後の処理は

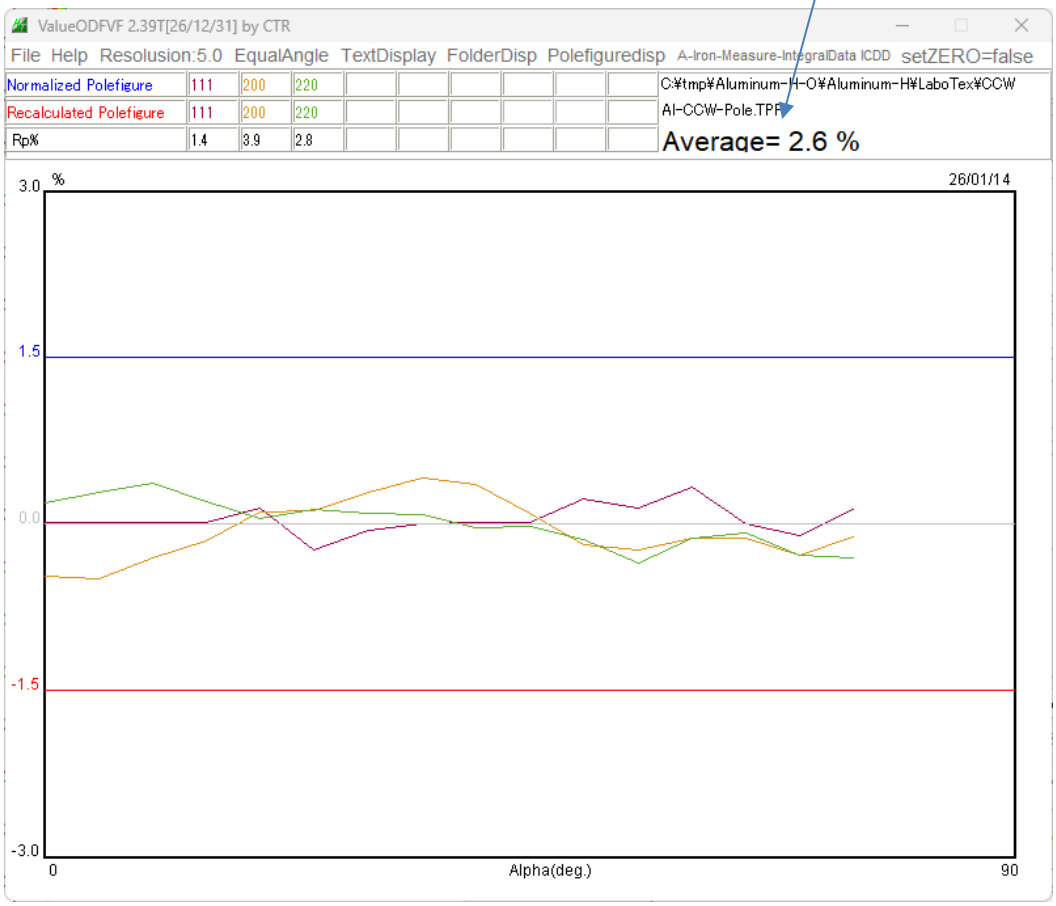
ＧＰＯＤＦＤｉｓｐｌａｙ
ｈｋｌｕｖｗｌｉｓｔＤｉｓｐｌａｙ
ＧＰＩｎｖｅｒｓｅＤｉｓｐｌａｙ＋
ＩｎｖｅｒｓｅＣｕｂｉｃＣｏｎｔｏｕｒＤｉｓｐｌａｙ
ｈｋｌｌｉｓｔＤｉｓｐｌａｙ
で行います。

https://helpertex.sakura.ne.jp/Soft/DOC4/A-Fe-ODFAfter.pdf
も参考にしてください。

Ａｌｕｍｉｎｕｍ－H材をＬａｂｏＴｅｘで解析



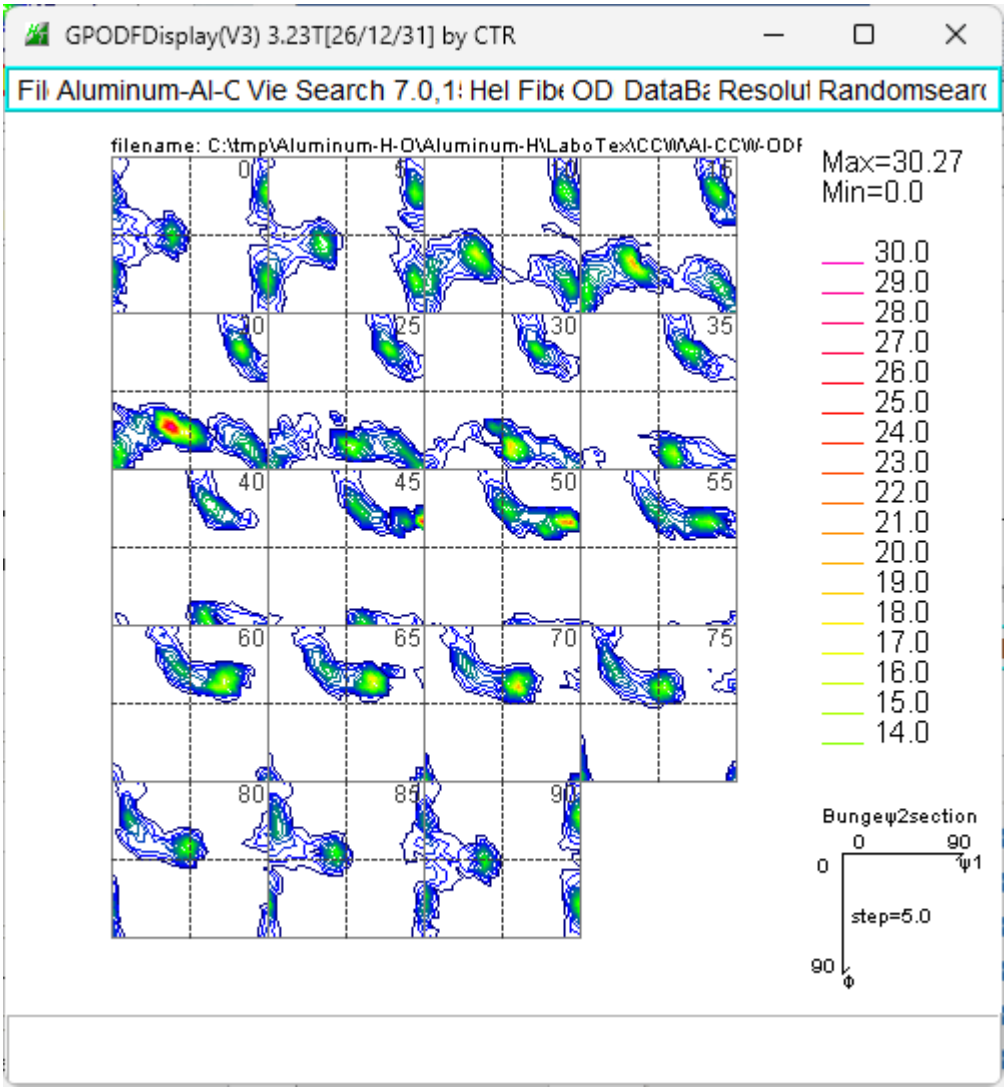

Export 極点図から Rp%評価



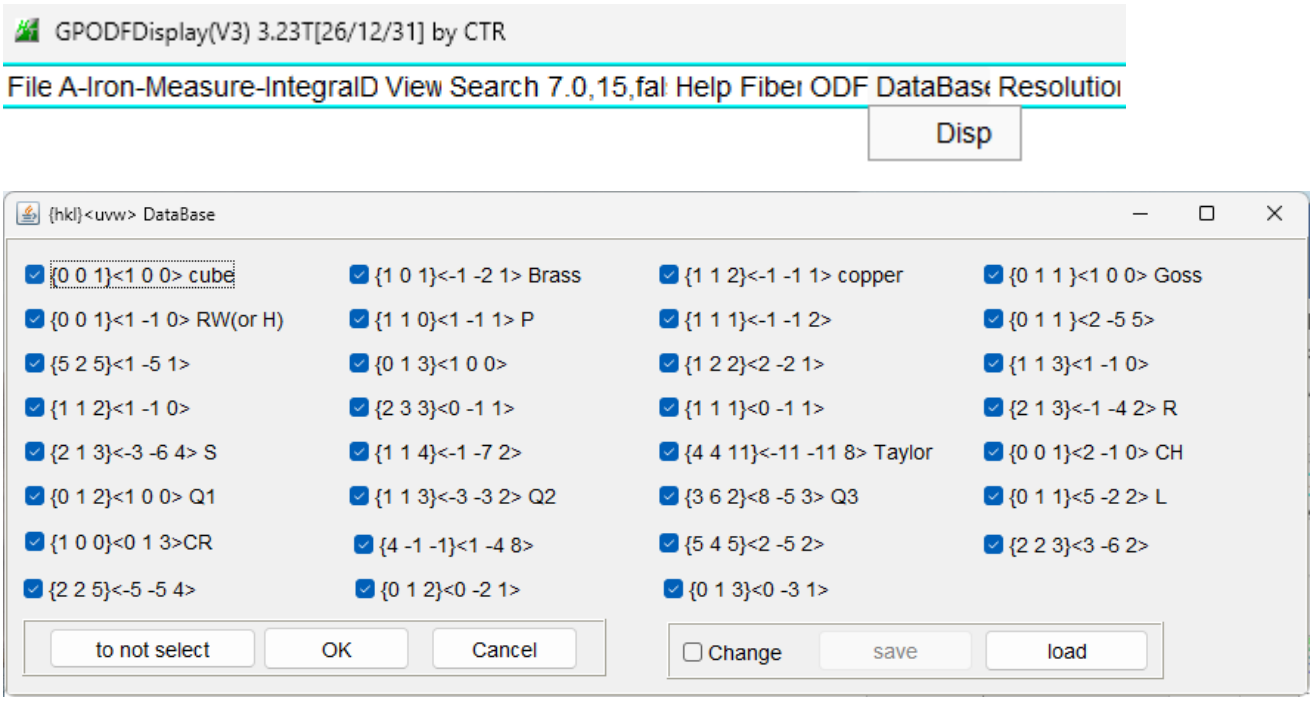

±１．５%以内を確認

もし、右側が下がるようであれば、ｄｅｆｏｃｕｓ確認（最適化Ｒｐ%を試す）

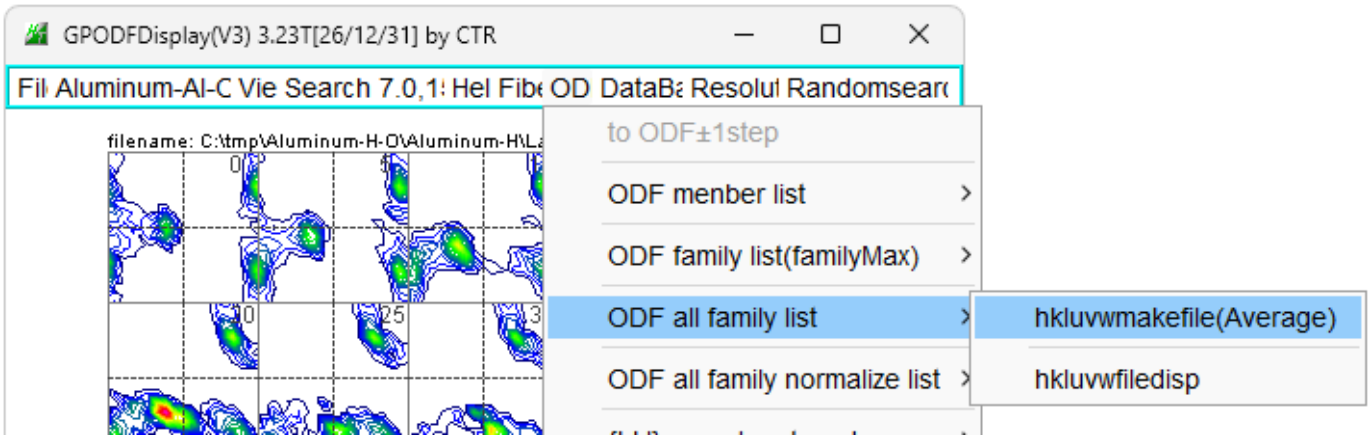
ＯＤＦ図の評価




データベースの確認、確認する方位の選択



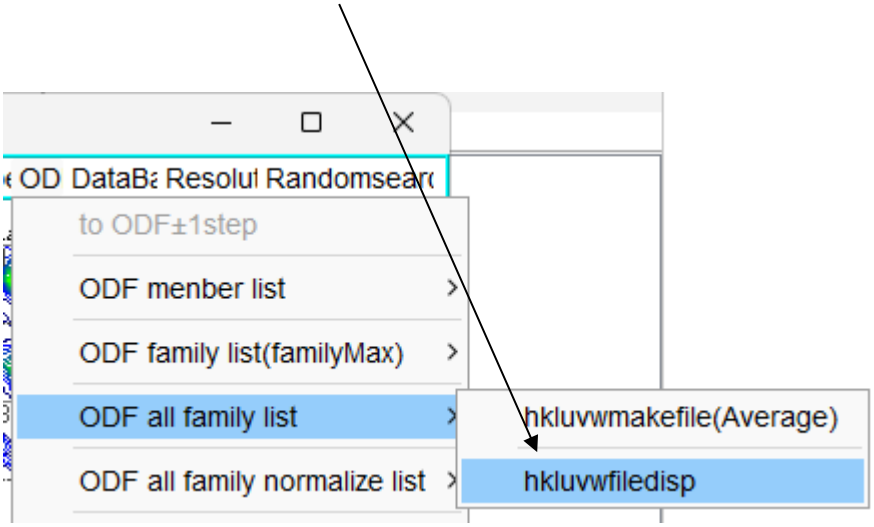
検索方法を指定

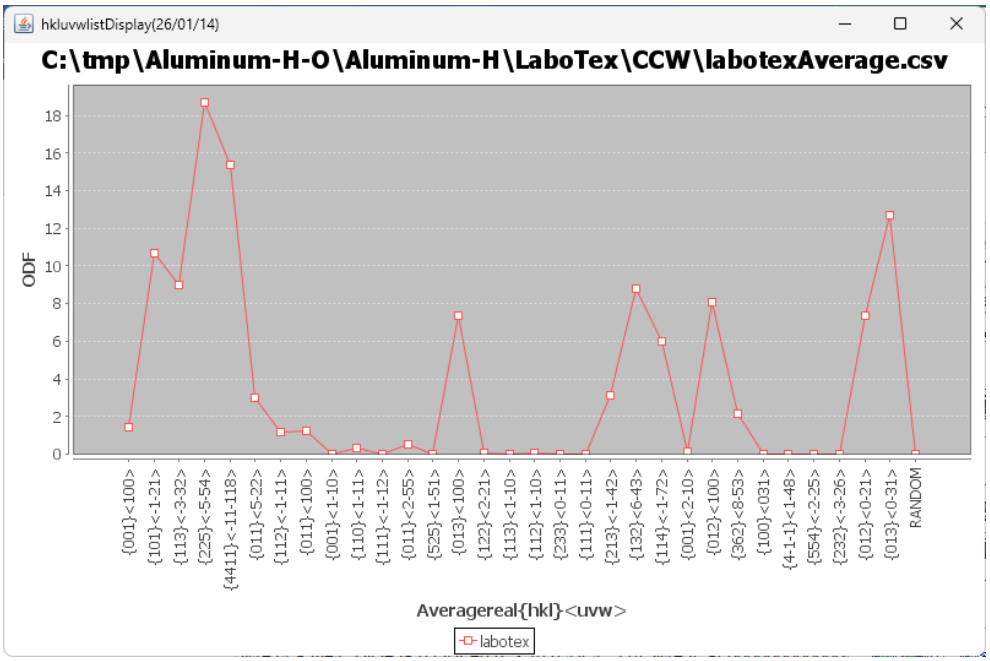



方位密度が計算される。

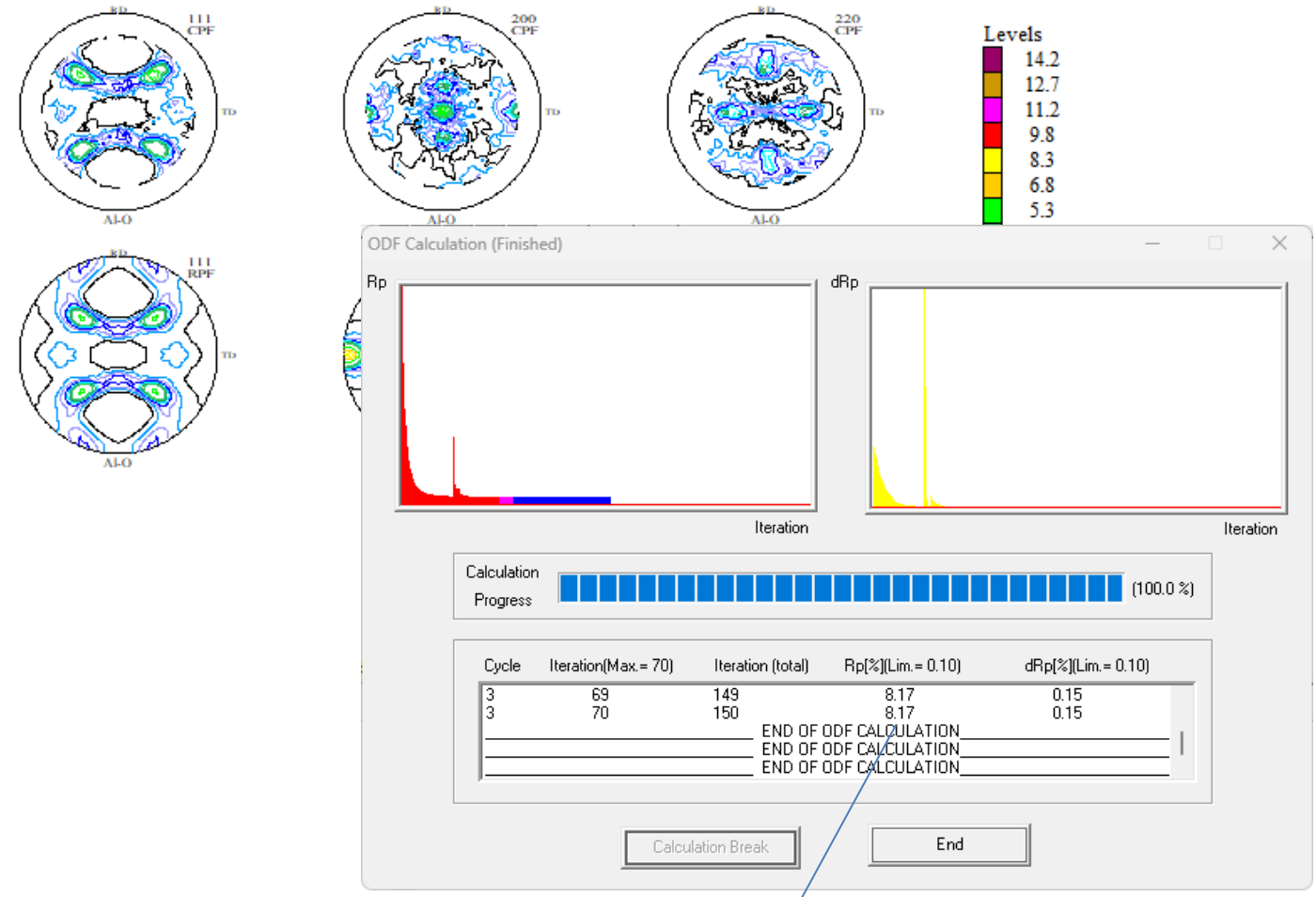
Averagereal{hkl}<uvw>,labotex
{001}<100>,1.41
{101}<-1-21>,10.67
{113}<-3-32>,9.01
{225}<-5-54>,18.69
{4411}<-11-118>,15.35
{011}<5-22>,2.98
{112}<-1-11>,1.2
{011}<100>,1.25
{001}<1-10>,0.03
{110}<1-11>,0.31
{111}<-1-12>,0.02
{011}<2-55>,0.56
{525}<1-51>,0.02
{013}<100>,7.39
{122}<2-21>,0.05
{113}<1-10>,0.0
{112}<1-10>,0.06
{233}<0-11>,0.01
{111}<0-11>,0.0
{213}<-1-42>,3.13
{132}<6-43>,8.77
{114}<-1-72>,5.98
{001}<2-10>,0.11
{012}<100>,8.1
{362}<8-53>,2.13
{100}<031>,0.04
{4-1-1}<1-48>,0.0
{554}<-2-25>,0.01
{232}<-3-26>,0.01
{012}<0-21>,7.35
{013}<0-31>,12.72
RANDOM,0.0

グラフ表示

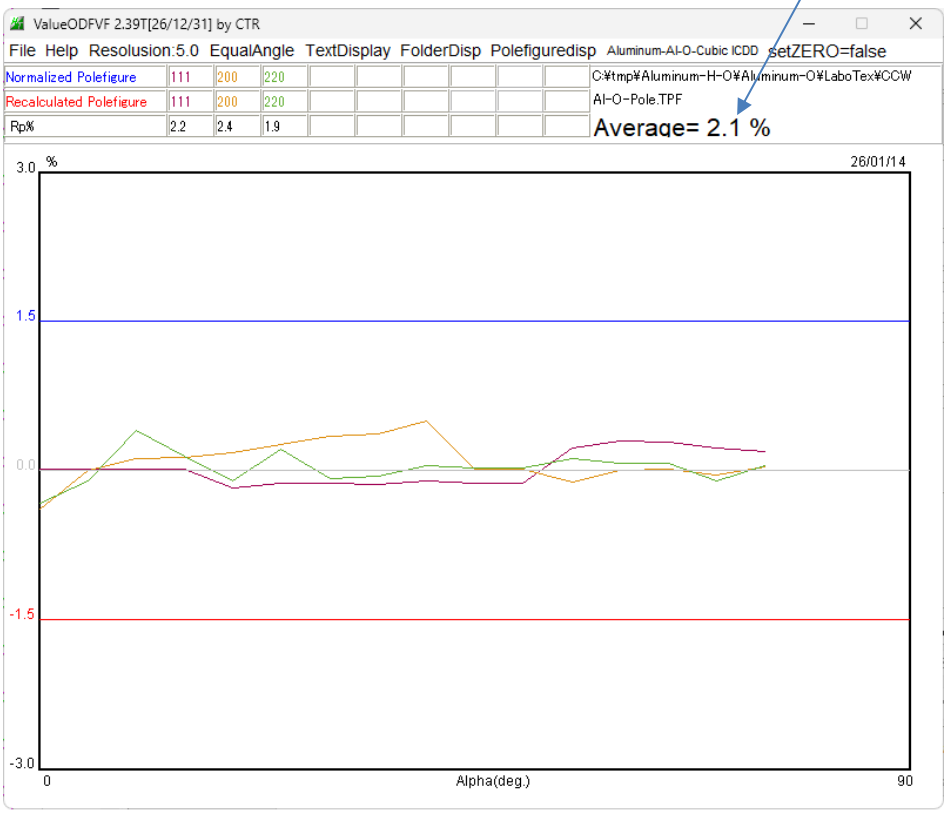


同様にＡｌｕｍｉｎｕｍ―Ｏ材の解析

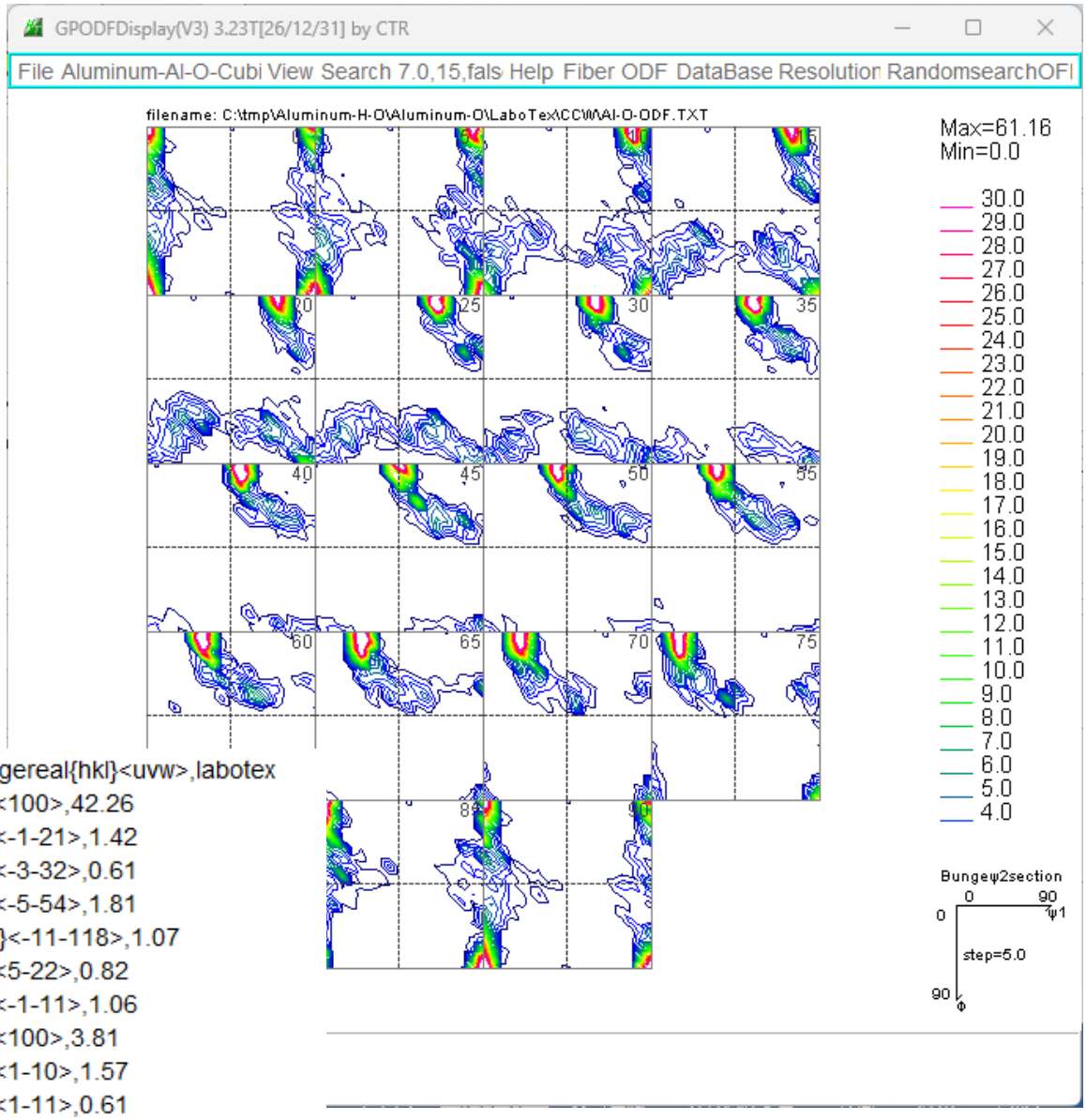



Ｅｘｐｏｒｔ極点図からＲｐ％

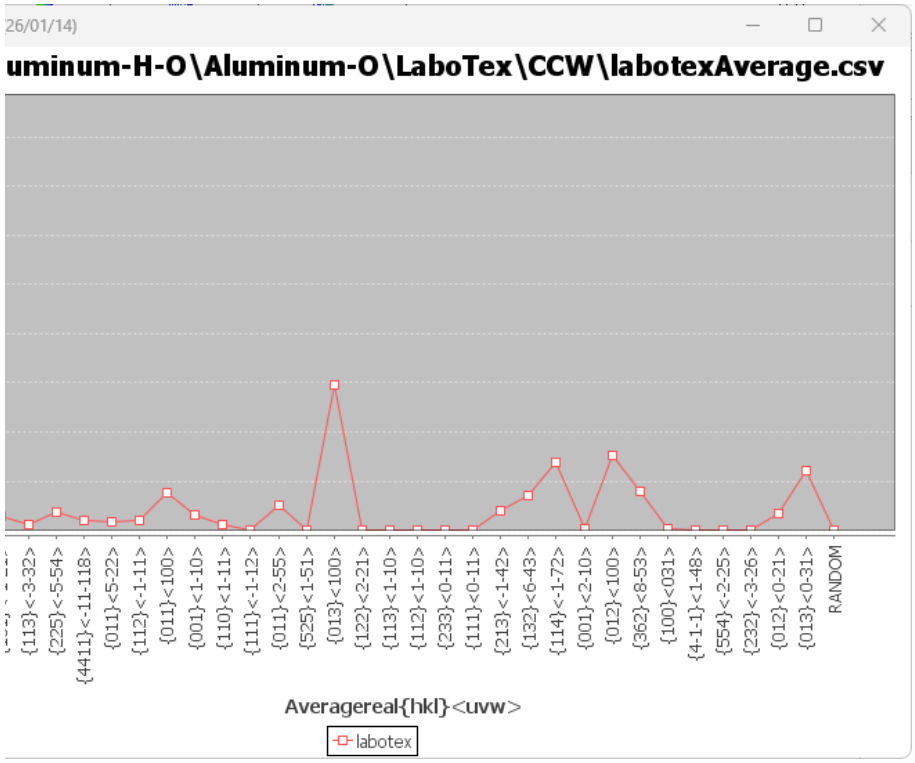



±１．５％以内で正常

O材のＯＤＦ解析結果（ＧＰＯＤＦＤｉｓｐｌａｙ）

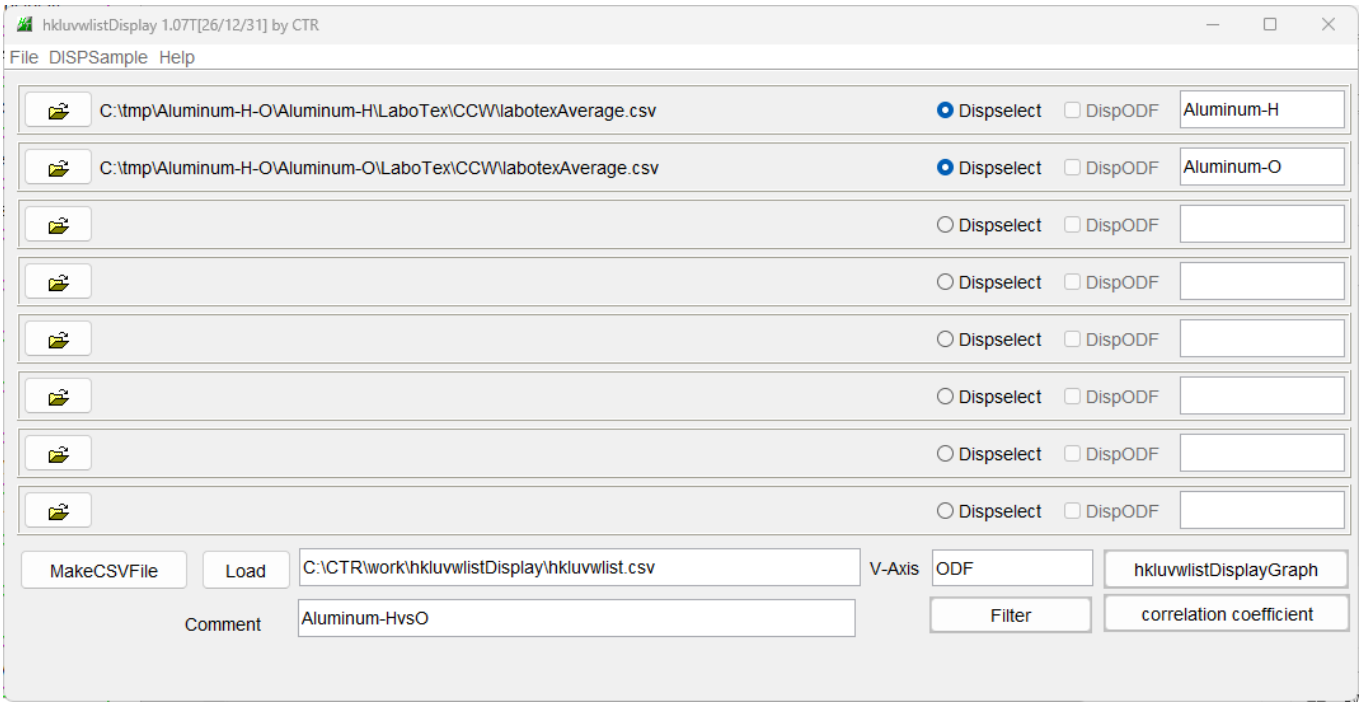


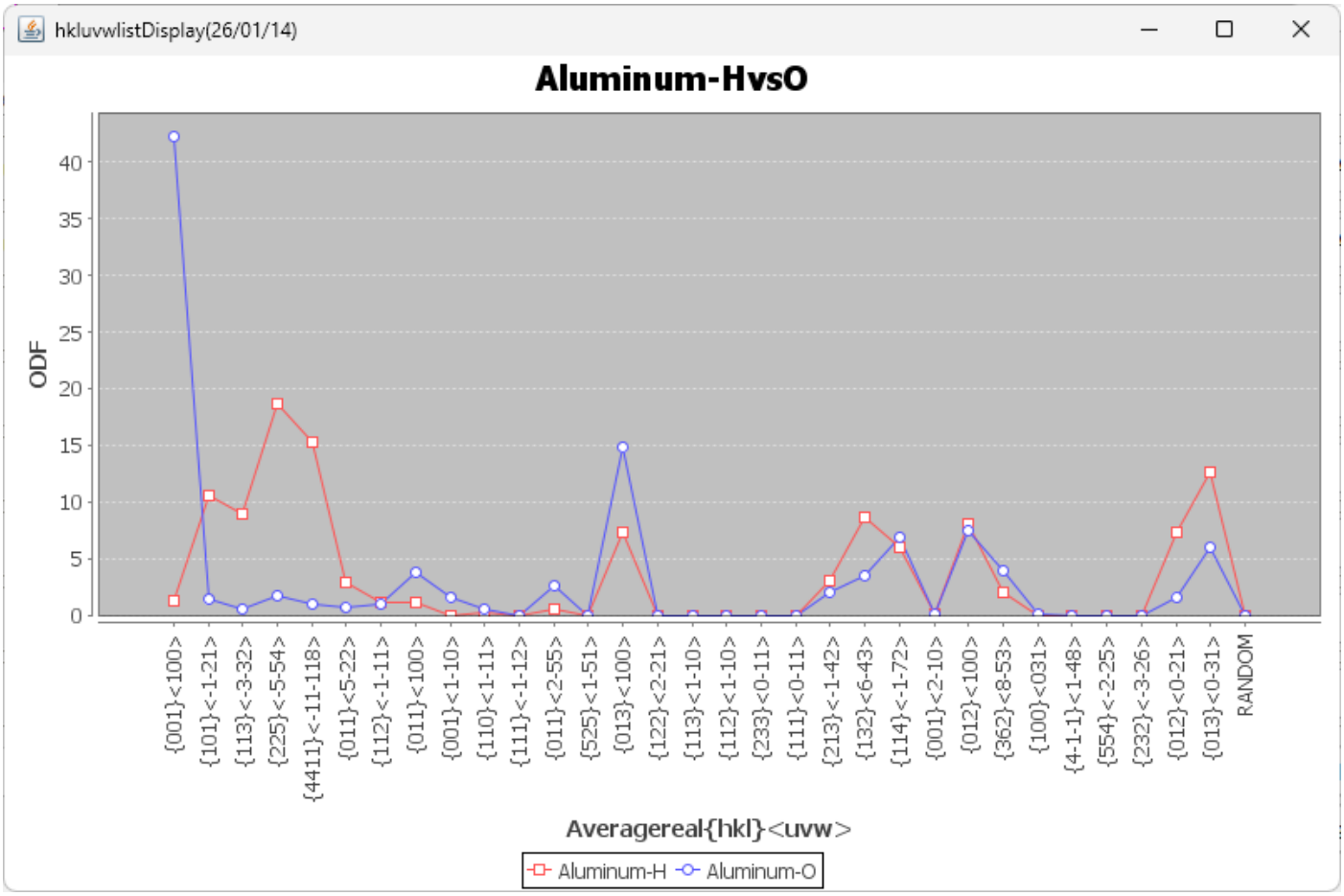

Averagereal{hkl}<uvw>,labotex
{001}<100>,42.26
{101}<-1-21>,1.42
{113}<-3-32>,0.61
{225}<-5-54>,1.81
{4411}<-11-118>,1.07
{011}<5-22>,0.82
{112}<-1-11>,1.06
{011}<100>,3.81
{001}<1-10>,1.57
{110}<1-11>,0.61
{111}<-1-12>,0.02
{011}<2-55>,2.61
{525}<1-51>,0.03
{013}<100>,14.81
{122}<2-21>,0.06
{113}<1-10>,0.01
{112}<1-10>,0.04
{233}<0-11>,0.03
{111}<0-11>,0.01
{213}<-1-42>,2.04
{132}<6-43>,3.53
{114}<-1-72>,6.92
{001}<2-10>,0.16
{012}<100>,7.55
{362}<8-53>,4.0
{100}<031>,0.2
{4-1-1}<1-48>,0.01
{554}<-2-25>,0.0
{232}<-3-26>,0.01
{012}<0-21>,1.68
{013}<0-31>,6.05
RANDOM,0.0

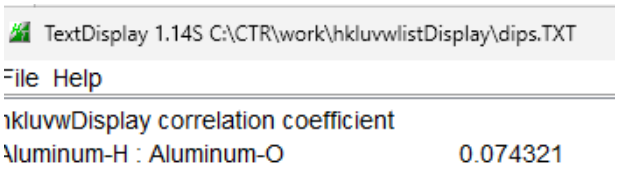


Ａｌｉｍｉｎｕｍ　Ｈ材、Ｏ材の比較（ｈｋｕｖｗｌｉｓｔＤｉｓｐｌａｙ）

最大８試料の比較が可能



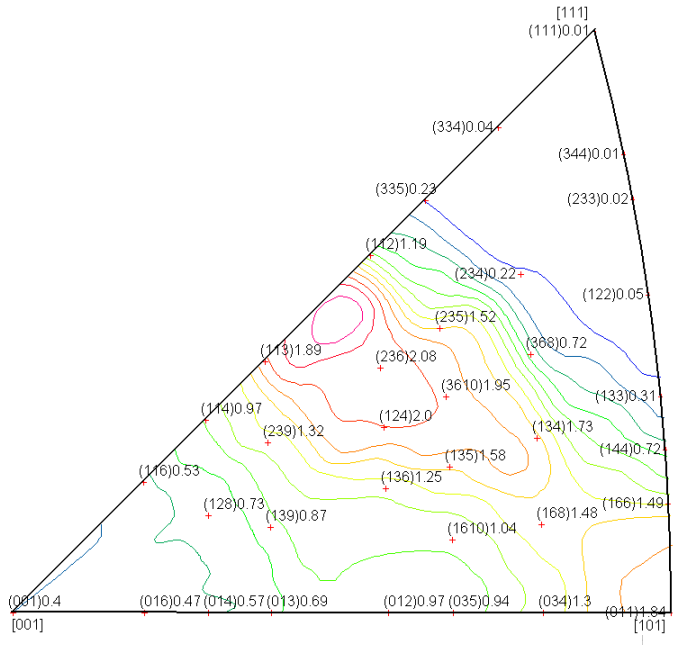



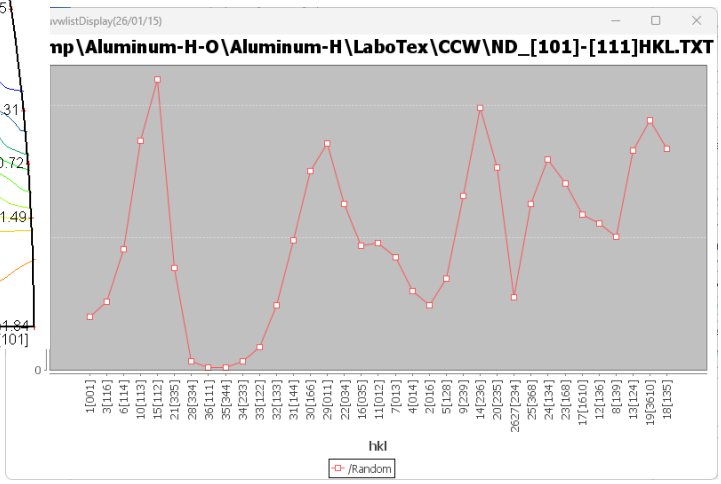




相関係数は低い

ＮＤ逆極点図比較（ＲＤ，ＴＤも同様可能）（GPINverseDisplay＋InverseCubicContourDisplay）

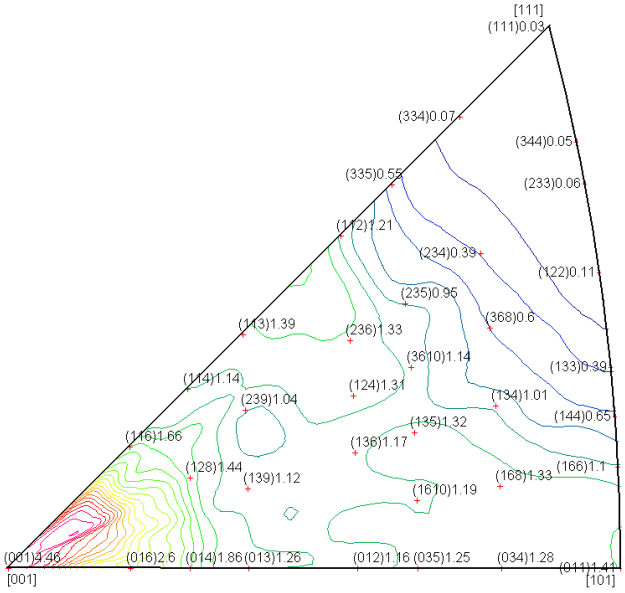
Ａｌｕｍｉｎｕｍ―H材

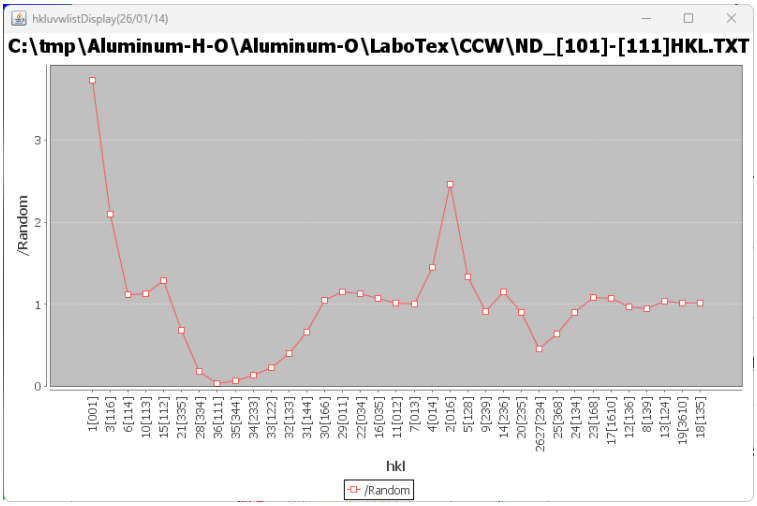



| fai | beta | (hkl)Intens | VNumber | BoxNumber | /Random |
|---|---|---|---|---|---|
| 0.0 | 0.0 | (001)0.4 | 1 | 1 | 0.4 |
| 9.462 | 0.0 | (016)0.47 | 2 | 21 | 0.49 |
| 13.263 | 45.0 | (116)0.53 | 3 | 2 | 0.519 |
| 14.036 | 0.0 | (014)0.57 | 4 | 20 | 0.6 |
| 15.616 | 26.565 | (128)0.73 | 5 | 22 | 0.692 |
| 19.471 | 45.0 | (114)0.97 | 6 | 3 | 0.913 |
| 18.435 | 0.0 | (013)0.69 | 7 | 19 | 0.853 |
| 19.36 | 18.435 | (139)0.87 | 8 | 33 | 1.003 |
| 21.832 | 33.69 | (239)1.32 | 9 | 23 | 1.313 |
| 25.239 | 45.0 | (113)1.89 | 10 | 4 | 1.731 |
| 26.565 | 0.0 | (012)0.97 | 11 | 18 | 0.956 |
| 27.791 | 18.435 | (136)1.25 | 12 | 32 | 1.106 |
| 29.206 | 26.565 | (124)2.0 | 13 | 34 | 1.653 |
| 31.003 | 33.69 | (236)2.08 | 14 | 24 | 1.975 |
| 35.264 | 45.0 | (112)1.19 | 15 | 5 | 2.192 |
| 30.964 | 0.0 | (035)0.94 | 16 | 17 | 0.936 |
| 31.311 | 9.462 | (1610)1.04 | 17 | 31 | 1.175 |
| 32.312 | 18.435 | (135)1.58 | 18 | 36 | 1.668 |
| 33.855 | 26.565 | (3610)1.95 | 19 | 35 | 1.884 |
| 35.796 | 33.69 | (235)1.52 | 20 | 25 | 1.529 |
| 40.316 | 45.0 | (335)0.23 | 21 | 6 | 0.773 |
| 36.87 | 0.0 | (034)1.3 | 22 | 16 | 1.251 |
| 37.247 | 9.462 | (168)1.48 | 23 | 30 | 1.409 |
| 38.329 | 18.435 | (134)1.73 | 24 | 29 | 1.587 |
| 39.981 | 26.565 | (368)0.72 | 25 | 28 | 1.256 |
| 42.031 | 33.69 | (234)0.22 | 26 | 27 | 0.811 |
| 42.031 | 33.69 | (234)0.22 | 27 | 26 | 0.29 |
| 46.686 | 45.0 | (334)0.04 | 28 | 7 | 0.071 |
| 45.0 | 0.0 | (011)1.84 | 29 | 15 | 1.711 |
| 45.392 | 9.462 | (166)1.49 | 30 | 14 | 1.504 |
| 45.868 | 14.036 | (144)0.72 | 31 | 13 | 0.981 |
| 46.508 | 18.435 | (133)0.31 | 32 | 12 | 0.487 |
| 48.19 | 26.565 | (122)0.05 | 33 | 11 | 0.173 |
| 50.238 | 33.69 | (233)0.02 | 34 | 10 | 0.068 |
| 51.34 | 36.87 | (344)0.01 | 35 | 9 | 0.023 |
| 54.736 | 45.0 | (111)0.01 | 36 | 8 | 0.019 |

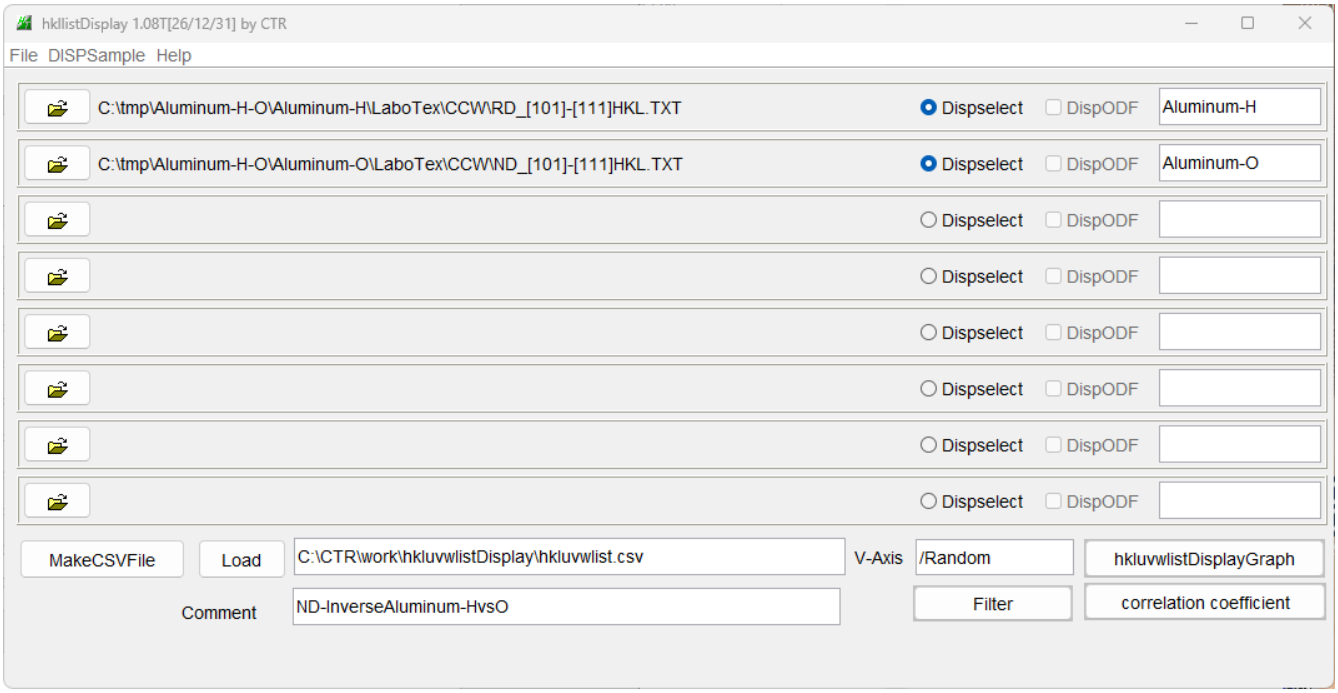
Ａｌｕｍｉｎｕｍ—Ｏ材

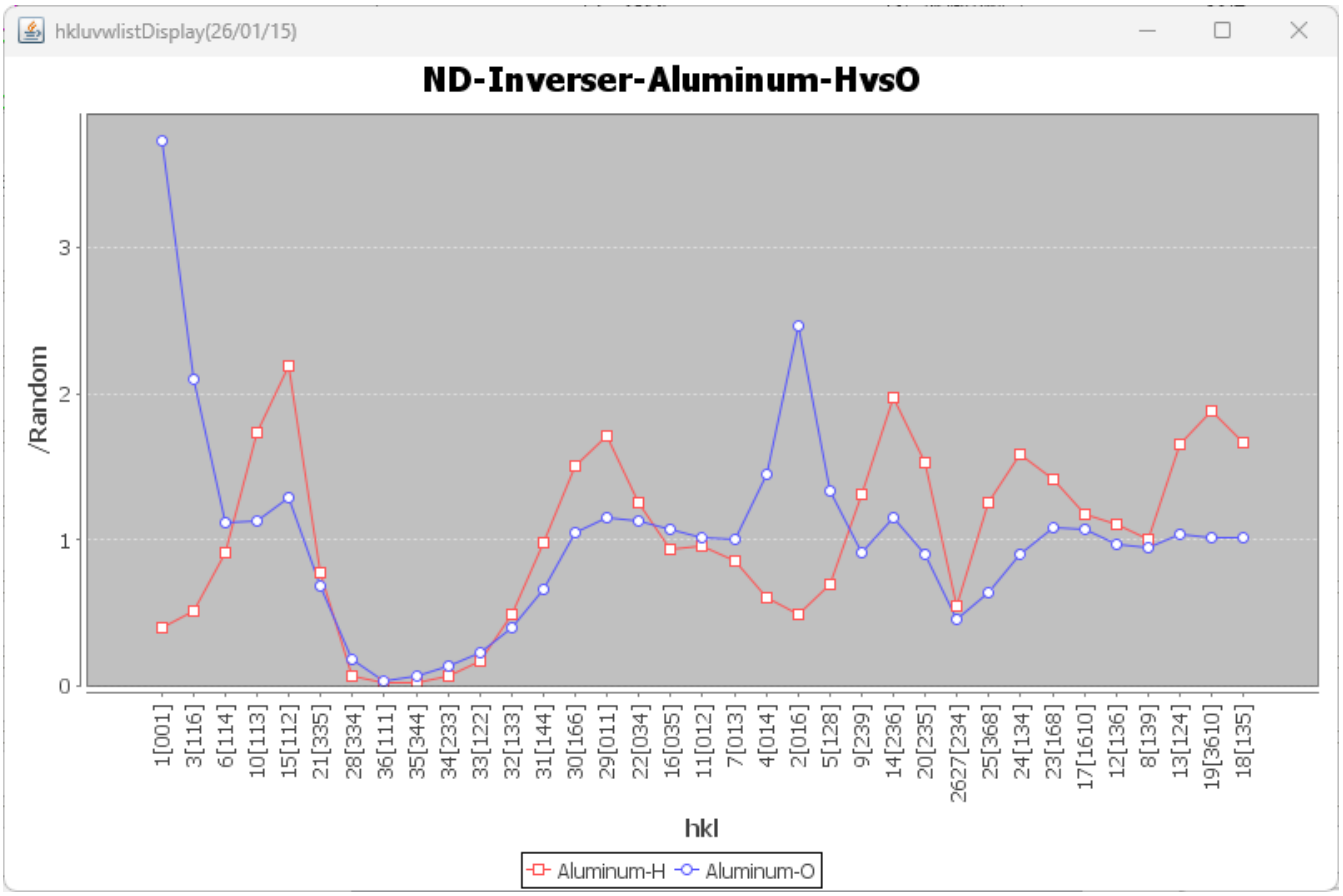



| fai | beta | (hkl)Intens | VNumber | BoxNumber | /Random |
|---|---|---|---|---|---|
| 0.0 | 0.0 | (001)4.46 | 1 | 1 | 3.726 |
| 9.462 | 0.0 | (016)2.6 | 2 | 21 | 2.465 |
| 13.263 | 45.0 | (116)1.66 | 3 | 2 | 2.092 |
| 14.036 | 0.0 | (014)1.86 | 4 | 20 | 1.449 |
| 15.616 | 26.565 | (128)1.44 | 5 | 22 | 1.335 |
| 19.471 | 45.0 | (114)1.14 | 6 | 3 | 1.118 |
| 18.435 | 0.0 | (013)1.26 | 7 | 19 | 1.004 |
| 19.36 | 18.435 | (139)1.12 | 8 | 33 | 0.95 |
| 21.832 | 33.69 | (239)1.04 | 9 | 23 | 0.914 |
| 25.239 | 45.0 | (113)1.39 | 10 | 4 | 1.132 |
| 26.565 | 0.0 | (012)1.16 | 11 | 18 | 1.02 |
| 27.791 | 18.435 | (136)1.17 | 12 | 32 | 0.971 |
| 29.206 | 26.565 | (124)1.31 | 13 | 34 | 1.034 |
| 31.003 | 33.69 | (236)1.33 | 14 | 24 | 1.15 |
| 35.264 | 45.0 | (112)1.21 | 15 | 5 | 1.287 |
| 30.964 | 0.0 | (035)1.25 | 16 | 17 | 1.072 |
| 31.311 | 9.462 | (1610)1.19 | 17 | 31 | 1.068 |
| 32.312 | 18.435 | (135)1.32 | 18 | 36 | 1.018 |
| 33.855 | 26.565 | (3610)1.14 | 19 | 35 | 1.013 |
| 35.796 | 33.69 | (235)0.95 | 20 | 25 | 0.897 |
| 40.316 | 45.0 | (335)0.55 | 21 | 6 | 0.688 |
| 36.87 | 0.0 | (034)1.28 | 22 | 16 | 1.126 |
| 37.247 | 9.462 | (168)1.33 | 23 | 30 | 1.089 |
| 38.329 | 18.435 | (134)1.01 | 24 | 29 | 0.897 |
| 39.981 | 26.565 | (368)0.6 | 25 | 28 | 0.643 |
| 42.031 | 33.69 | (234)0.39 | 26 | 27 | 0.556 |
| 42.031 | 33.69 | (234)0.39 | 27 | 26 | 0.352 |
| 46.686 | 45.0 | (334)0.07 | 28 | 7 | 0.189 |
| 45.0 | 0.0 | (011)1.41 | 29 | 15 | 1.153 |
| 45.392 | 9.462 | (166)1.1 | 30 | 14 | 1.048 |
| 45.868 | 14.036 | (144)0.65 | 31 | 13 | 0.663 |
| 46.508 | 18.435 | (133)0.39 | 32 | 12 | 0.399 |
| 48.19 | 26.565 | (122)0.11 | 33 | 11 | 0.231 |
| 50.238 | 33.69 | (233)0.06 | 34 | 10 | 0.137 |
| 51.34 | 36.87 | (344)0.05 | 35 | 9 | 0.073 |
| 54.736 | 45.0 | (111)0.03 | 36 | 8 | 0.041 |

Ａｌｕｍｉｎｕｍ-H材、O材比較（ｈｋｌｌｉｓｔＤｉｓｐｌａｙ）

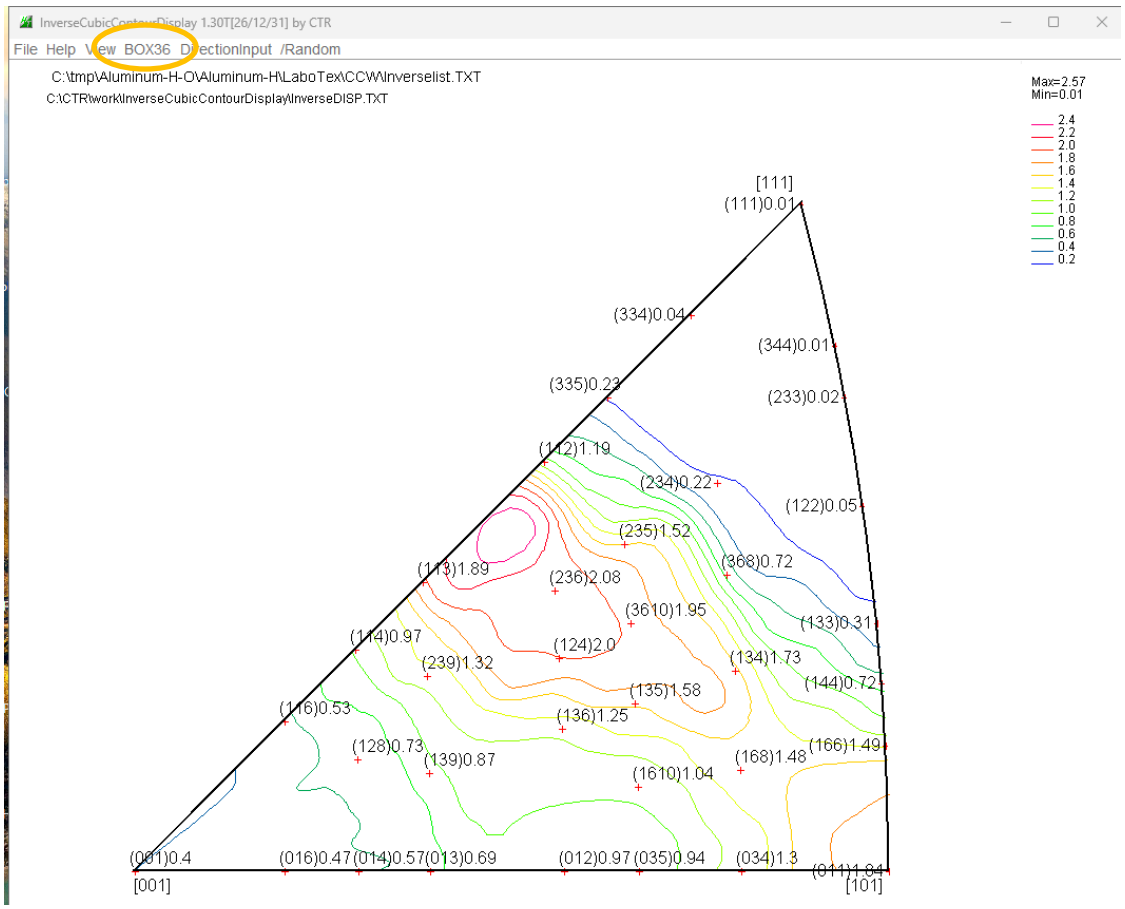



| hkluvwDisplay correlation coefficient | |
|---|---|
| Aluminum-H : Aluminum-O | 0.150663 |

相関係数は低い

逆極点図表示




Ｂｏｘ内の代表方位の方位密度表示（平均値ではありません）


３６Ｂｏｘと代表方位位置

Ｂｏｘ内平均密度（%＜－＞Random 比率）

TextDisplay 1.14S C:\CTR\work\InverseCubicContourDisplay\IntensList.TXT

File Help

| fai | beta | (hkl)Intens | VNumber | BoxNumber | /Random | BoxInteng(%) |
|---|---|---|---|---|---|---|
| 0.0 | 0.0 | (001)0.4 | 1 | 1 | 0.4 | 1.11 |
| 9.462 | 0.0 | (016)0.47 | 2 | 21 | 0.49 | 1.362 |
| 13.263 | 45.0 | (116)0.53 | 3 | 2 | 0.519 | 1.441 |
| 14.036 | 0.0 | (014)0.57 | 4 | 20 | 0.6 | 1.667 |
| 15.616 | 26.565 | (128)0.73 | 5 | 22 | 0.692 | 1.922 |
| 19.471 | 45.0 | (114)0.97 | 6 | 3 | 0.913 | 2.535 |
| 18.435 | 0.0 | (013)0.69 | 7 | 19 | 0.853 | 2.369 |
| 19.36 | 18.435 | (139)0.87 | 8 | 33 | 1.003 | 2.785 |
| 21.832 | 33.69 | (239)1.32 | 9 | 23 | 1.313 | 3.646 |
| 25.239 | 45.0 | (113)1.89 | 10 | 4 | 1.731 | 4.807 |
| 26.565 | 0.0 | (012)0.97 | 11 | 18 | 0.956 | 2.655 |
| 27.791 | 18.435 | (136)1.25 | 12 | 32 | 1.106 | 3.073 |
| 29.206 | 26.565 | (124)2.0 | 13 | 34 | 1.653 | 4.592 |
| 31.003 | 33.69 | (236)2.08 | 14 | 24 | 1.975 | 5.485 |
| 35.264 | 45.0 | (112)1.19 | 15 | 5 | 2.192 | 6.09 |
| 30.964 | 0.0 | (035)0.94 | 16 | 17 | 0.936 | 2.6 |
| 31.311 | 9.462 | (1610)1.04 | 17 | 31 | 1.175 | 3.265 |
| 32.312 | 18.435 | (135)1.58 | 18 | 36 | 1.668 | 4.634 |
| 33.855 | 26.565 | (3610)1.95 | 19 | 35 | 1.884 | 5.233 |
| 35.796 | 33.69 | (235)1.52 | 20 | 25 | 1.529 | 4.247 |
| 40.316 | 45.0 | (335)0.23 | 21 | 6 | 0.773 | 2.146 |
| 36.87 | 0.0 | (034)1.3 | 22 | 16 | 1.251 | 3.474 |
| 37.247 | 9.462 | (168)1.48 | 23 | 30 | 1.409 | 3.913 |
| 38.329 | 18.435 | (134)1.73 | 24 | 29 | 1.587 | 4.407 |
| 39.981 | 26.565 | (368)0.72 | 25 | 28 | 1.256 | 3.49 |
| 42.031 | 33.69 | (234)0.22 | 26 | 27 | 0.811 | 2.252 |
| 42.031 | 33.69 | (234)0.22 | 27 | 26 | 0.29 | 0.806 |
| 46.686 | 45.0 | (334)0.04 | 28 | 7 | 0.071 | 0.196 |
| 45.0 | 0.0 | (011)1.84 | 29 | 15 | 1.711 | 4.753 |
| 45.392 | 9.462 | (166)1.49 | 30 | 14 | 1.504 | 4.178 |
| 45.868 | 14.036 | (144)0.72 | 31 | 13 | 0.981 | 2.726 |
| 46.508 | 18.435 | (133)0.31 | 32 | 12 | 0.487 | 1.354 |
| 48.19 | 26.565 | (122)0.05 | 33 | 11 | 0.173 | 0.48 |
| 50.238 | 33.69 | (233)0.02 | 34 | 10 | 0.068 | 0.188 |
| 51.34 | 36.87 | (344)0.01 | 35 | 9 | 0.023 | 0.063 |
| 54.736 | 45.0 | (111)0.01 | 36 | 8 | 0.019 | 0.053 |

代表方位密度　VectorNo　CWNo　平均 random 比　平均%