

SUMMARY OF DATABASE:

6° halo

Finland: 0
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 1
Other: 0
All observations: 1

9° halo

Finland: 366
Germany: 13
Czech republic: 78
Netherlands: 9
Hungary: 4
USA: 17
Antarctica: 15
Other: 26
All observations: 528

9° column arcs

Finland: 70
Germany: 0
Czech republic: 3
Netherlands: 2
Hungary: 0
USA: 3
Antarctica: 8
Other: 9
All observations: 95

9° upper plate arcs

Finland: 24
Germany: 2
Czech republic: 0
Netherlands: 1
Hungary: 0
USA: 20
Antarctica: 0
Other: 3
All observations: 50

9° lower plate arcs

Finland: 102
Germany: 1
Czech republic: 3

Netherlands: 3
Hungary: 0
USA: 6
Antarctica: 3
Other: 5
All observations: 123

12° halo

Finland: 0
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 1
Other: 0
All observations: 1

18° halo

Finland: 225
Germany: 29
Czech republic: 28
Netherlands: 7
Hungary: 1
USA: 26
Antarctica: 1
Other: 35
All observations: 352

18° column arcs

Finland: 2
Germany: 0
Czech republic: 1
Netherlands: 1
Hungary: 0
USA: 0
Antarctica: 0
Other: 2
All observations: 6

18° plate arcs

Finland: 179
Germany: 2
Czech republic: 7
Netherlands: 5
Hungary: 0
USA: 16
Antarctica: 2
Other: 16
All observations: 227

20° halo

Finland: 93
Germany: 2
Czech republic: 8
Netherlands: 3
Hungary: 0
USA: 4
Antarctica: 4
Other: 11
All observations: 125

20° column arcs

Finland: 10
Germany: 0
Czech republic: 1
Netherlands: 1
Hungary: 0
USA: 0
Antarctica: 1
Other: 4
All observations: 17

20° upper plate arcs

Finland: 7
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 1
Antarctica: 0
Other: 1
All observations: 9

20° lower plate arcs

Finland: 1
Germany: 1
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 1
Antarctica: 0
Other: 0
All observations: 3

23° halo

Finland: 156
Germany: 7
Czech republic: 12
Netherlands: 2
Hungary: 0
USA: 9

Antarctica: 0
Other: 14
All observations: 200

23° upper plate arcs

Finland: 462
Germany: 1
Czech republic: 20
Netherlands: 8
Hungary: 0
USA: 9
Antarctica: 3
Other: 25
All observations: 528

23° lower plate arcs

Finland: 0
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 1
Antarctica: 0
Other: 1
All observations: 2

24° halo

Finland: 71
Germany: 13
Czech republic: 4
Netherlands: 1
Hungary: 0
USA: 5
Antarctica: 0
Other: 7
All observations: 102

24° column arcs

Finland: 14
Germany: 0
Czech republic: 0
Netherlands: 1
Hungary: 0
USA: 2
Antarctica: 2
Other: 5
All observations: 24

24° upper plate arcs

Finland: 17
Germany: 0

Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 3
Antarctica: 1
Other: 1
All observations: 22

24° lower plate arcs

Finland: 69
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 1
USA: 6
Antarctica: 8
Other: 6
All observations: 90

28° halo

Finland: 0
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 2
All observations: 2

35° halo

Finland: 58
Germany: 4
Czech republic: 7
Netherlands: 0
Hungary: 0
USA: 5
Antarctica: 0
Other: 7
All observations: 81

35° column arcs

Finland: 1
Germany: 0
Czech republic: 1
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 1
All observations: 3

35° upper plate arcs

Finland: 1
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 1
Antarctica: 0
Other: 1

All observations: 3

35° lower plate arcs

Finland: 0
Germany: 1
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 2
Antarctica: 1
Other: 0

All observations: 4

44° parhelia

Finland: 8
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 1
Antarctica: 0
Other: 8

All observations: 17

46° contact arcs

Finland: 3
Germany: 1
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 0

All observations: 4

120° parhelia

Finland: 466
Germany: 21
Czech republic: 56
Netherlands: 11
Hungary: 3
USA: 20

Antarctica: 8
Other: 27
All observations: 612

120° subparhelia:

Finland: 1
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 0
All observations: 1

Anthelion

Finland: 100
Germany: 3
Czech republic: 10
Netherlands: 3
Hungary: 0
USA: 0
Antarctica: 2
Other: 3
All observations: 121

Blue circles:

Finland: 1
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 0
All observations: 1

Blue spot

Finland: 16
Germany: 2
Czech republic: 2
Netherlands: 0
Hungary: 1
USA: 2
Antarctica: 1
Other: 2
All observations: 26

Bottlinger rings

Finland: 1
Germany: 0

Czech republic: 1
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 7
All observations: 9

Circular Subanthelic Halo:

Finland: 1
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 0
All observations: 1

Elliptical glow

Finland: 3
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 1
All observations: 4

Elliptical halo 1x

Finland: 101
Germany: 6
Czech republic: 3
Netherlands: 4
Hungary: 1
USA: 2
Antarctica: 0
Other: 1
All observations: 118

Elliptical halo 2x

Finland: 30
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 1
Antarctica: 0
Other: 0
All observations: 31

Elliptical halo 3x

Finland: 9
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 1
Antarctica: 0
Other: 1
All observations: 11

Elliptical halo 4x

Finland: 4
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 0
All observations: 4

Elliptical halo 5x

Finland: 1
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 0
All observations: 1

Greenler arcs

Finland: 72
Germany: 3
Czech republic: 5
Netherlands: 1
Hungary: 0
USA: 3
Antarctica: 8
Other: 5
All observations: 97

Hastings arcs

Finland: 1
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0

Antarctica: 6
Other: 1
All observations: 8

Heliac arcs

Finland: 42
Germany: 6
Czech republic: 7
Netherlands: 0
Hungary: 0
USA: 1
Antarctica: 17
Other: 14
All observations: 87

Kern arcs

Finland: 3
Germany: 0
Czech republic: 0
Netherlands: 1
Hungary: 0
USA: 7
Antarctica: 0
Other: 1
All observations: 5 (7 possible)

Liljequist parhelia

Finland: 10
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 2
Other: 1
All observations: 13

Liljequist subparhelia

Finland: 1
Germany: 1
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 2
All observations: 4

Lowitz arcs

Finland: 250
Germany: 63

Czech republic: 23
Netherlands: 2
Hungary: 1
USA: 4
Antarctica: 1
Other: 22
All observations: 366

Lowitz reflected arcs

Finland: 16
Germany: 0
Czech republic: 1
Netherlands: 0
Hungary: 0
USA: 5
Antarctica: 4
Other: 14
All observations: 40

Moilanen arcs

Finland: 64
Germany: 5
Czech republic: 15
Netherlands: 0
Hungary: 1
USA: 4
Antarctica: 4
Other: 40
All observations: 134

Parry upper suncave arcs

Finland: 377
Germany: 28
Czech republic: 120
Netherlands: 12
Hungary: 7
USA: 17
Antarctica: 30
Other: 46
All observations: 637

Parry lower suncave arcs

Finland: 6
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 1
All observations: 7

Parry upper sunvex arcs

Finland: 50
Germany: 12
Czech republic: 14
Netherlands: 3
Hungary: 4
USA: 5
Antarctica: 3
Other: 29
All observations: 120

Parry lower sunvex arcs

Finland: 10
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 1
Antarctica: 2
Other: 0
All observations: 13

Parry Raypath 4-8-1 arcs:

Finland: 3
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 0
All observations: 3

Parry reflected lower sunvex arcs:

Finland: 1
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 0
All observations: 1

Pyramidal heliac arcs

Finland: 6
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0

Antarctica: 0
Other: 1
All observations: 7

Subanthetic arcs

Finland: 11
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 4
Other: 1
All observations: 16

Subanthe lion

Finland: 0
Germany: 1
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 5
Antarctica: 0
Other: 3
All observations: 9

Subhelic arcs

Finland: 21
Germany: 2
Czech republic: 1
Netherlands: 0
Hungary: 0
USA: 2
Antarctica: 6
Other: 5
All observations: 37

SubKern arcs:

Finland: 4
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 0
All observations: 4

Superparhelia

Finland: 15
Germany: 1

Czech republic: 4
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 0
Other: 1
All observations: 21

Tricker arcs

Finland: 45
Germany: 4
Czech republic: 3
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 7
Other: 0
All observations: 59

Tape upper arcs

Finland: 24
Germany: 1
Czech republic: 4
Netherlands: 0
Hungary: 2
USA: 0
Antarctica: 14
Other: 7
All observations: 52

Tape lower arcs

Finland: 2
Germany: 0
Czech republic: 1
Netherlands: 0
Hungary: 0
USA: 0
Antarctica: 13
Other: 0
All observations: 16

Wegener arcs

Finland: 145
Germany: 19
Czech republic: 14
Netherlands: 4
Hungary: 3
USA: 6
Antarctica: 9
Other: 32
All observations: 232

Unknown halos/arcs

Finland: 5
Germany: 0
Czech republic: 0
Netherlands: 0
Hungary: 0
USA: 1
Antarctica: 1
Other: 1

All observations: 8

Summary of rare halos observations by country:

1. Finland: 3840
2. Czech: 425
3. Germany: 255
4. USA: 219
5. Antarctica: 134
6. Netherlands: 85
7. Hungary: 26
And Other countries: 458

Summary of all rare halos observations:

Total: 5440 observations in Database to date: 1.3.2009

Top 10 rare halo forms:

1. Parry upper suncave arcs: 637
2. 120° parhelia: 612
3. 23° upper plate arcs: 528
4. 9°halo: 528
5. Lowitz arcs: 366
6. 18° halo: 352
7. Wegener arcs: 232
8. 18° plate arcs: 227
9. 23° halo: 200
10. Moilanen arc: 134

Top 10 halo observers:

1. Marko Riikonen: 572
2. Jukka Ruoskanen: 350
3. Jarmo Moilanen: 319
4. Veikko Makela: 210
5. Martti Penttinen: 162
6. Patrik Trncak: 141
7. Ismo Luukkonen: 137
8. Timo Kinnunen: 114
9. Marko Pekkola: 111
10. Walter Tape: 103

By light source:

1. Sun: 4947
2. Moon: 355
3. Artificial: 138

By cloud type:

1. High clouds CS: 4412
2. Diamond dust DD: 860
3. Other (snow, Ac...): 168

Record of observations by one day:

1. display 5.6.2008: 159 reports from 21 observers
2. display 11.5.2002: 78 reports from 12 observers
3. display 12.4.1987: 72 reports from 14 observers
4. display 12.5.2002: 64 reports from 11 observers
5. display 10.4.2001: 49 reports from 8 observers
6. display 11.4.1987: 37 reports from 10 observers
7. display 22.4.1987: 34 reports from 10 observers

The best visibility of...

Odd radius halos:

1. **9° halo** (528 observations)
2. **18° halo** (352 observations)
3. **23° halo** (200 observations)
4. **20° halo** (125 observations)
5. **24° halo** (102 observations)
6. **35° halo** (81 observations)

Odd radius column arcs:

1. **9° column arcs** (95 observations)
2. **24° column arcs** (24 observations)
3. **20° column arcs** (17 observations)
4. **18° column arcs** (6 observations)
5. **35° column arcs** (3 observations)

Odd radius plate arcs:

1. **23° upper plate arcs** (528 observations)
2. **18° plate arcs** (227 observations)
3. **9° lower plate arcs** (123 observations)
4. **24° lower plate arcs** (90 observations)
5. **9° upper plate arcs** (50 observations)
6. **24° upper plate arcs** (22 observations)
7. **20° upper plate arcs** (9 observations)
8. **Pyramidal heliac arcs** (7 observations)
9. **35° lower plate arcs** (4 observations)
10. **35° upper plate arcs** (3 observations)
11. **20 lower plate arcs** (3 observations)
12. **23 lower plate arcs** (2 observations)

Elliptical halos:

1. **Elliptical halo 1x:** 118 observations
2. **Elliptical halo 2x:** 31 observations
3. **Elliptical halo 3x:** 11 observations
4. **Bottlinger rings:** 9 observations
5. **Elliptical halo 4x:** 4 observations
6. **Elliptical glow:** 4 observations
7. **Elliptical halo 5x:** 1 observation

Halos from singly oriented columns:

1. **Wegener arcs:** 232 observations
 2. **Greenler arcs:** 97 observations
 3. **Tricker arcs:** 59 observations
 4. **(Subhelic arcs: 37 observations)***
- *origin from Parry oriented columns too

Halos from Parry oriented columns:

1. **Parry upper suncave arcs:** 637 observations
 2. **Parry upper sunvex arcs:** 120 observations
 3. **Heliac arcs:** 87 observations
 4. **Tape upper arcs:** 52 observations
 5. **(Subhelic arcs: 37 observations)***
 6. **Tape lower arcs:** 16 observations
 7. **Parry lower sunvex arcs:** 13 observations
 8. **Hastings arcs:** 8 observations
 9. **Parry lower suncave arcs:** 7 observations
 10. **Parry raypath 4-8-1 arcs:** 3 observations
 11. **Parry reflected lower sunvex arcs:** 1 observation
- * origin from singly oriented columns too

Halos from singly oriented plates:

1. **120° parhelia:** 612 observations
 2. **Blue spot:** 26 observations
 3. **Superparhelia:** 21 observations
 4. **(44° parhelia: 17 observations)***
 5. **Liljequist parhelia:** 13 observations
 6. **Kern arcs:** 5 observations
 7. **Sub Kern arcs:** 4 observations
 8. **Liljequist subparhelia:** 4 observations
 9. **120° subparhelia:** 1 observation
- *origin from multiple scattering

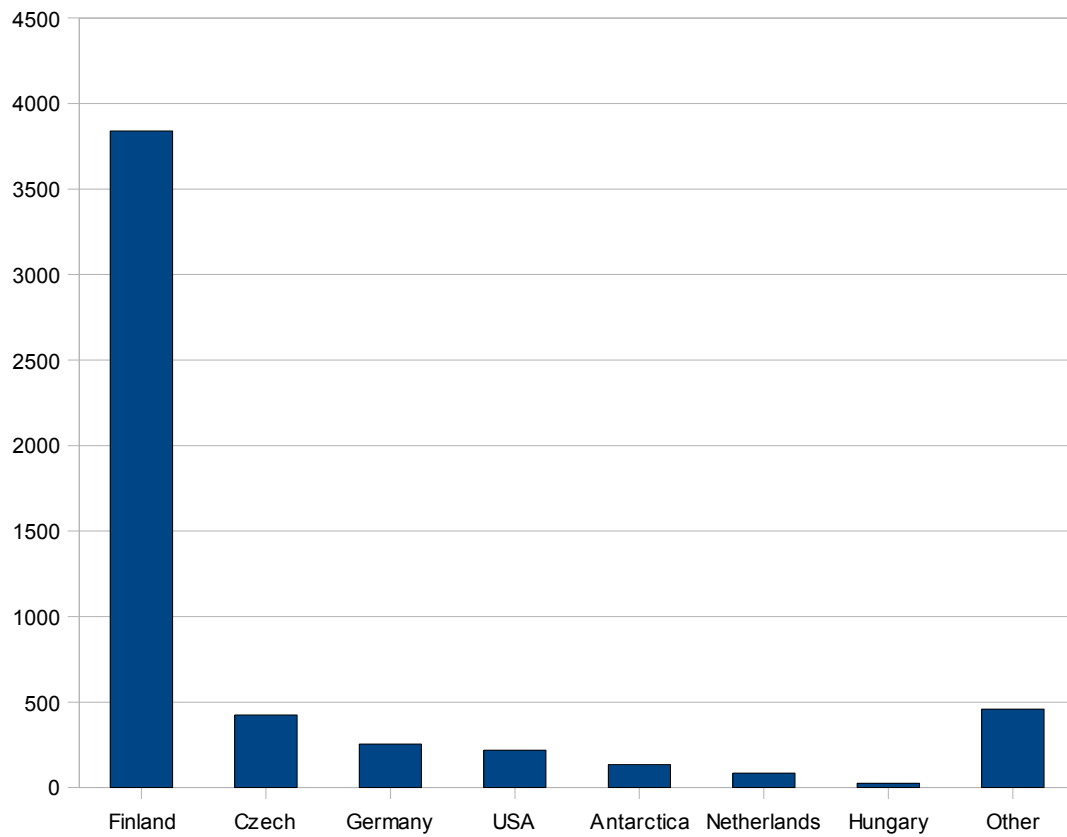
Halos from Lowitz oriented plates:

1. **Lowitz arcs:** 366 observations
2. **Lowitz reflected arcs:** 40 observations
3. **46° contact arcs:** 4 observations

GRAPHS:

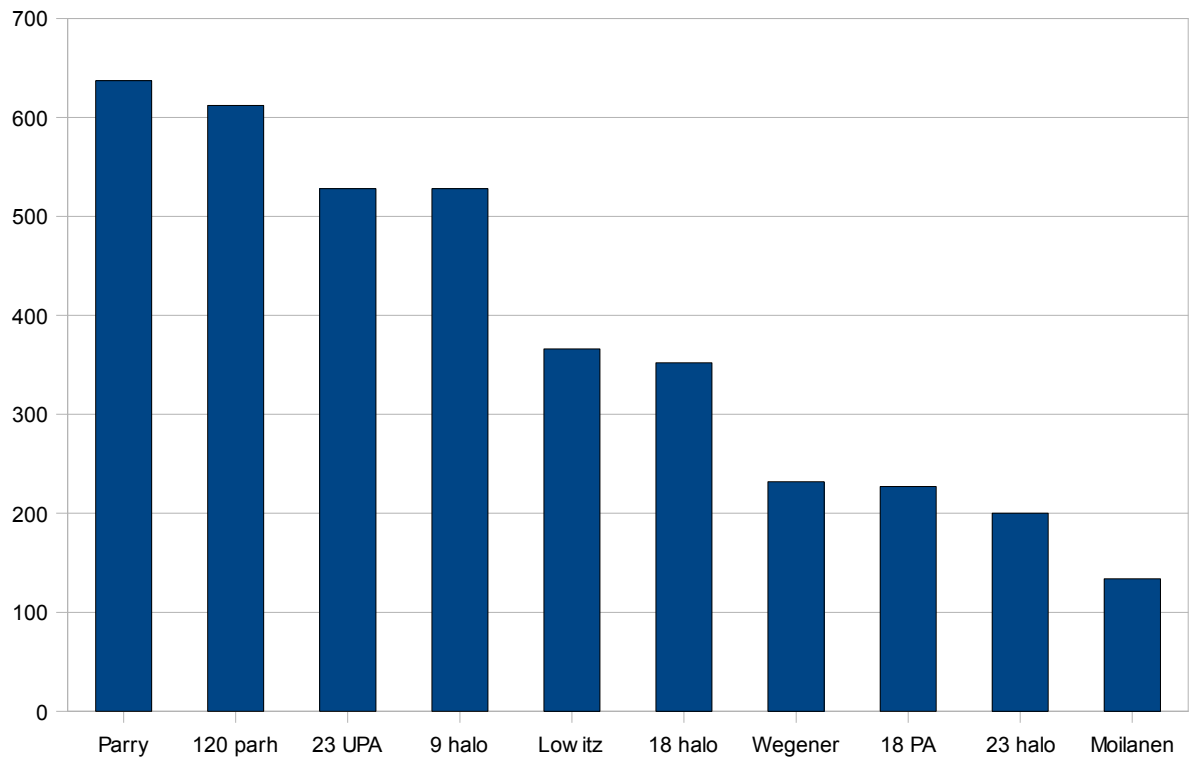
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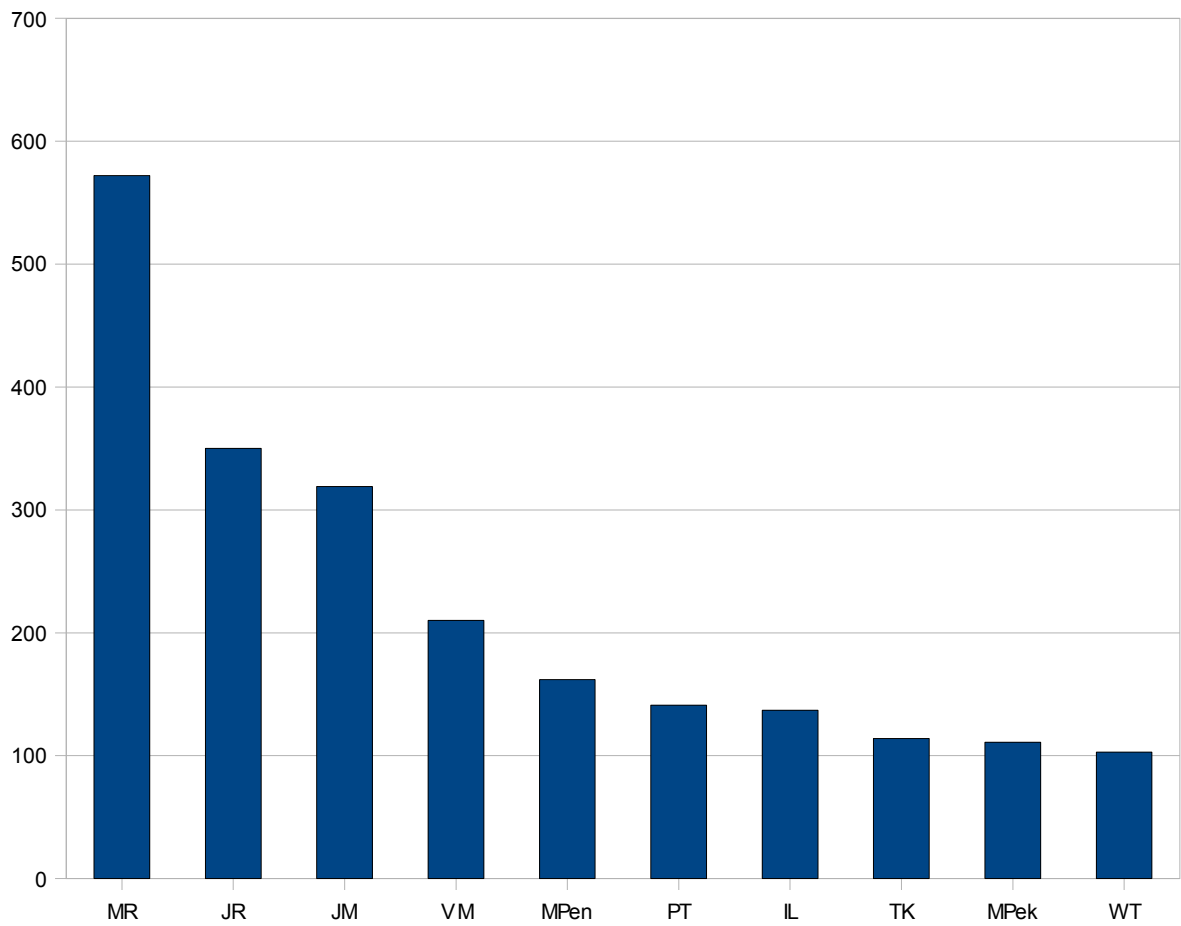
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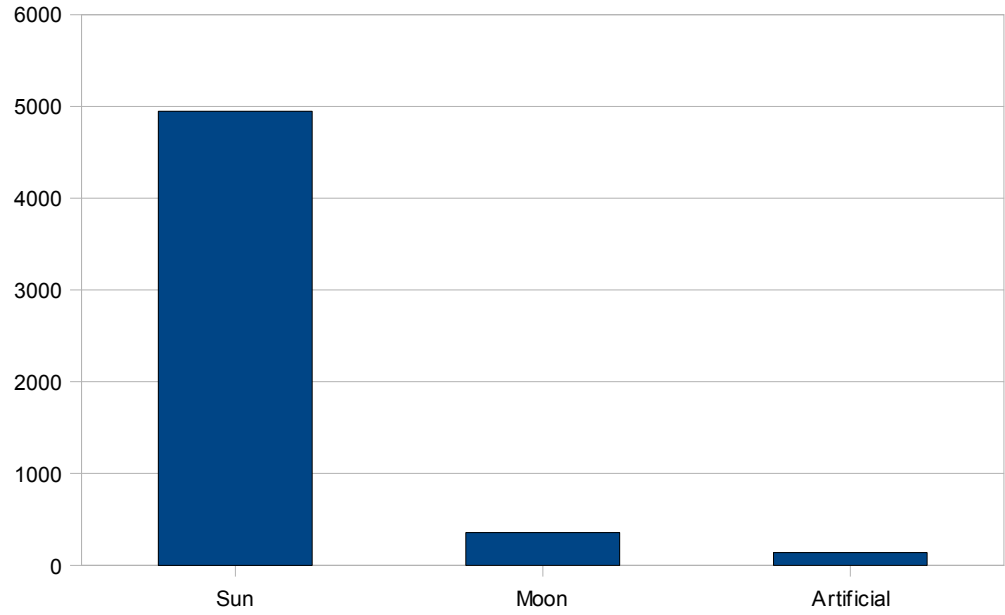
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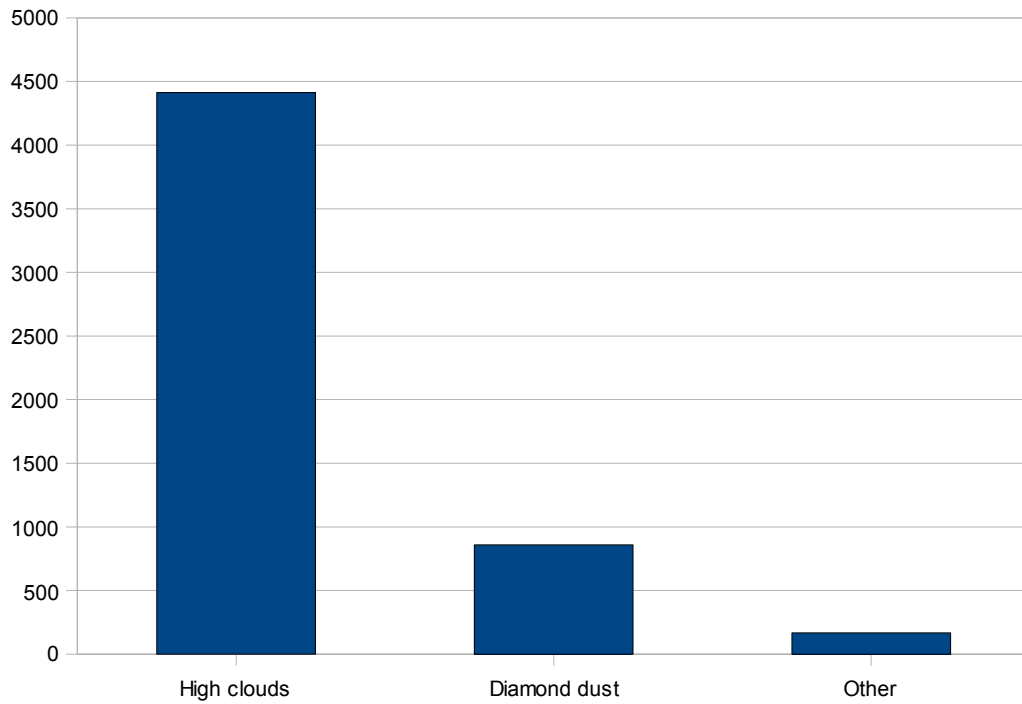
By light source:

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2. Moon: 355
3. Artificial: 138



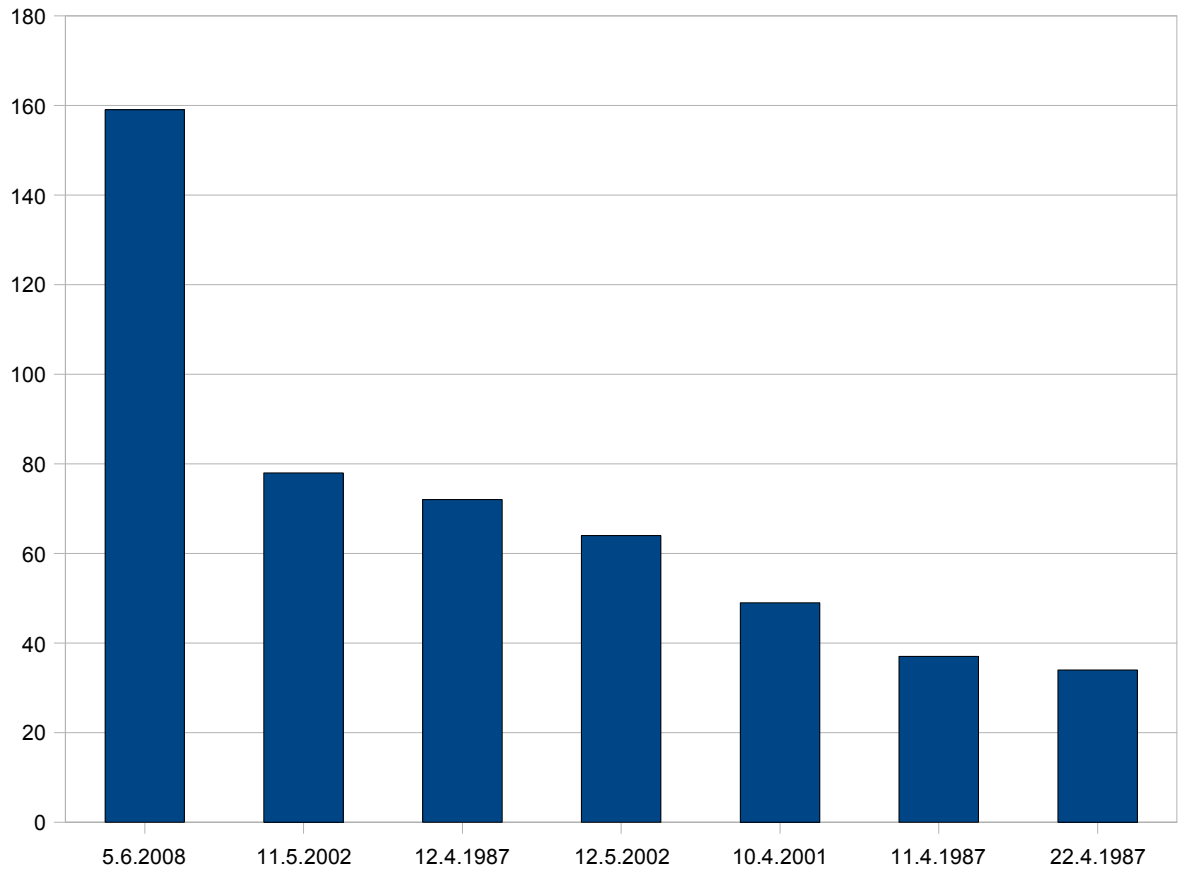
By cloud type:

1. High clouds CS: 4412
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3. Other (snow, Ac...): 168



Record of observations by one day:

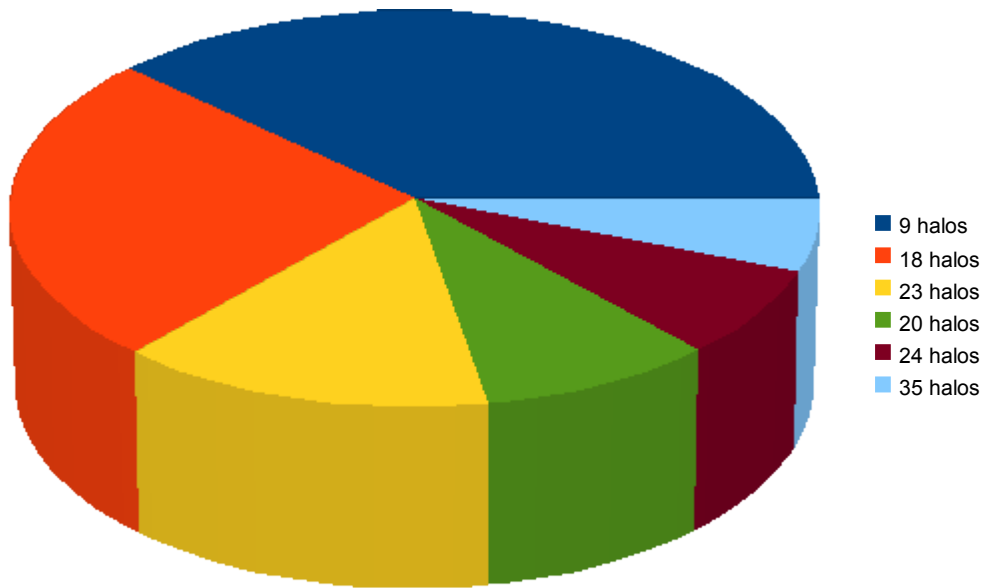
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The best visibility of...

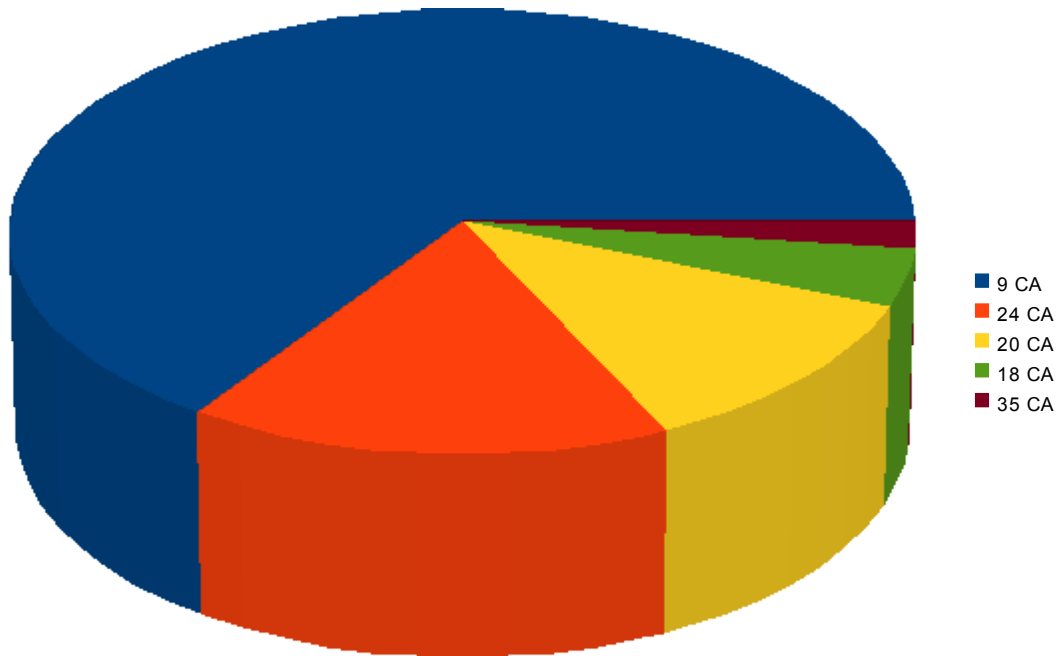
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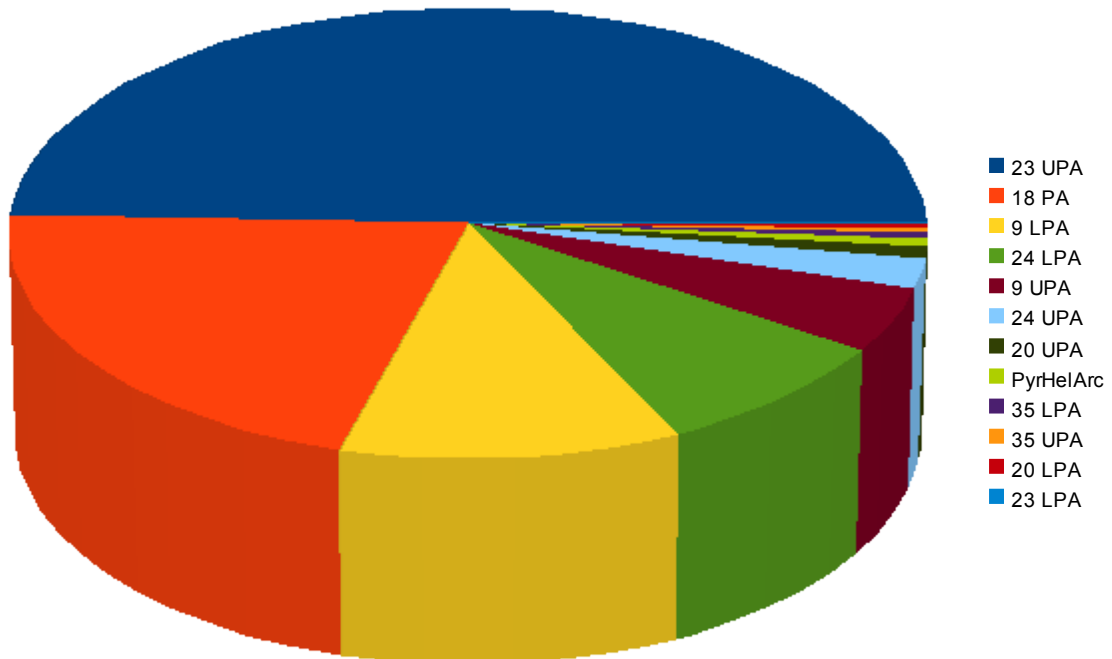
Odd radius column arcs:

1. **9° column arcs** (95 observations)
2. **24° column arcs** (24 observations)
3. **20° column arcs** (17 observations)
4. **18° column arcs** (6 observations)
5. **35° column arcs** (3 observations)



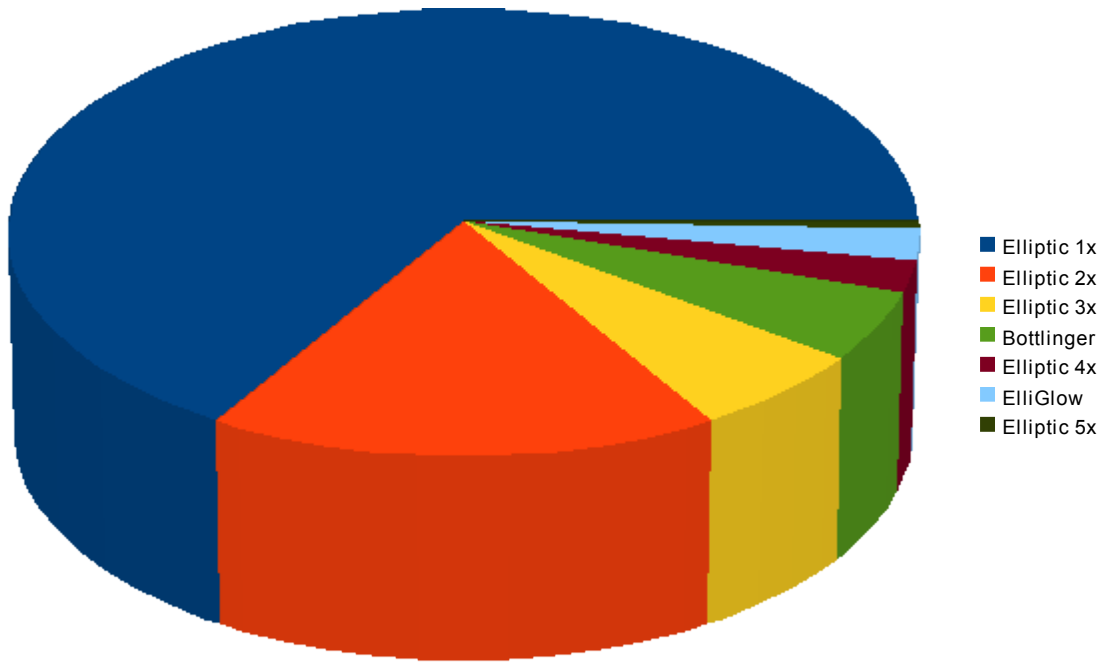
Odd radius plate arcs:

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3. **9° lower plate arcs** (123 observations)
4. **24° lower plate arcs** (90 observations)
5. **9° upper plate arcs** (50 observations)
6. **24° upper plate arcs** (22 observations)
7. **20° upper plate arcs** (9 observations)
8. **Pyramidal heliac arcs** (7 observations)
9. **35° lower plate arcs** (4 observations)
10. **35° upper plate arcs** (3 observations)
11. **20 lower plate arcs** (3 observations)
12. **23 lower plate arcs** (2 observations)



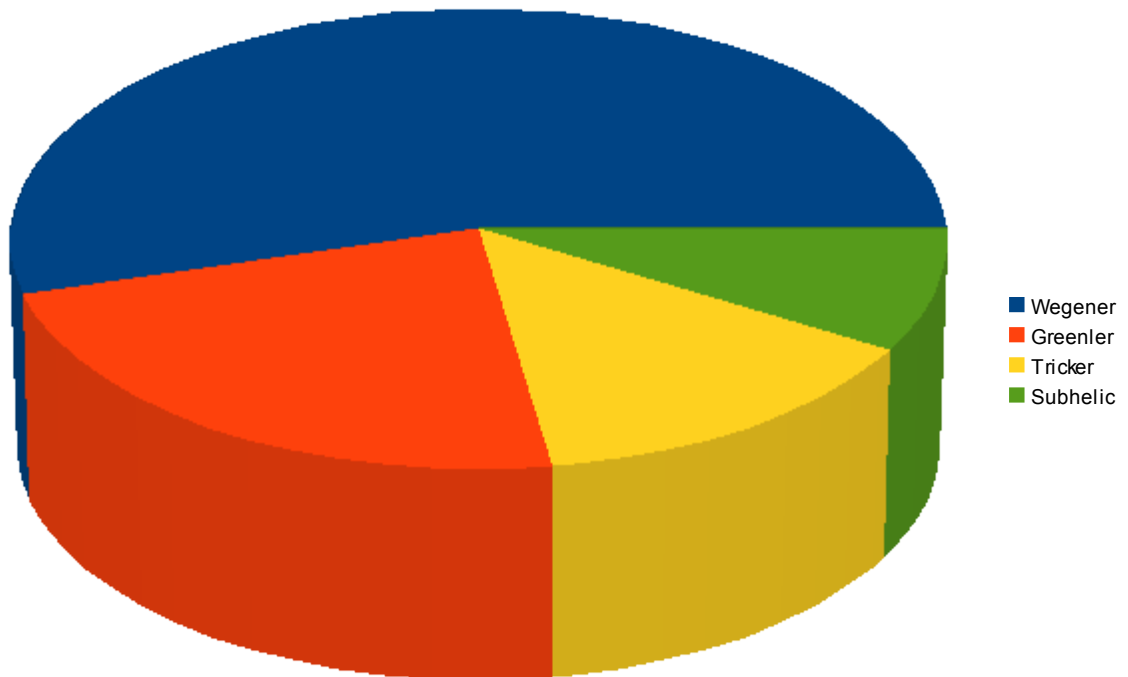
Elliptical halos:

1. **Elliptical halo 1x:** 118 observations
2. **Elliptical halo 2x:** 31 observations
3. **Elliptical halo 3x:** 11 observations
4. **Bottlinger rings:** 9 observations
5. **Elliptical halo 4x:** 4 observations
6. **Elliptical glow:** 4 observations
7. **Elliptical halo 5x:** 1 observation



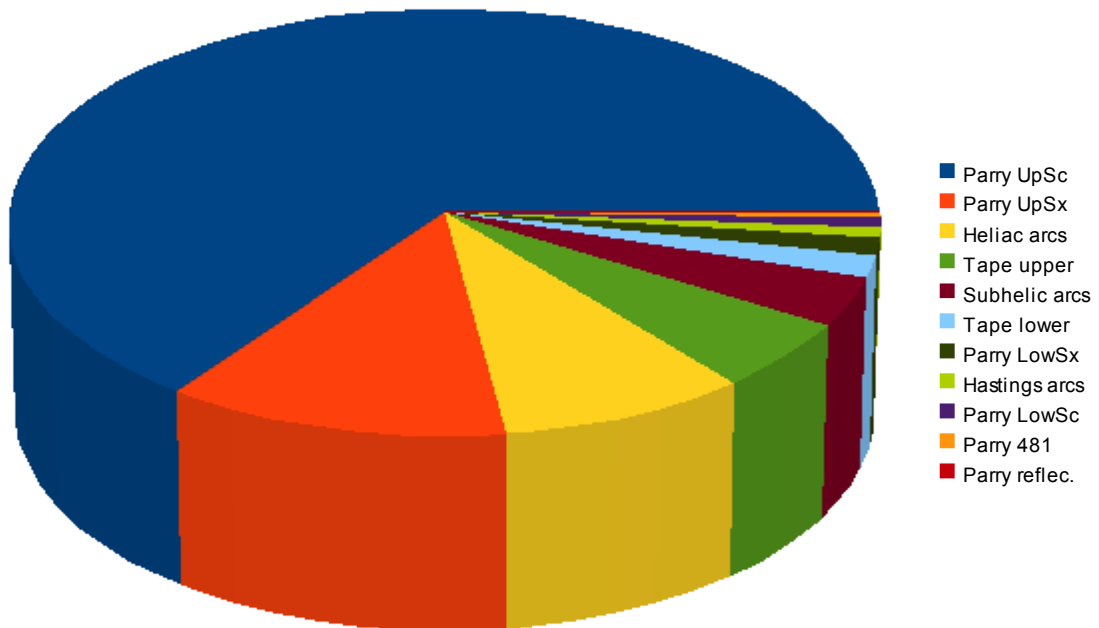
Halos from singly oriented columns:

1. **Wegener arcs:** 232 observations
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 3. **Tricker arcs:** 59 observations
 4. **(Subhelic arcs: 37 observations)***
- *origin from Parry oriented columns too



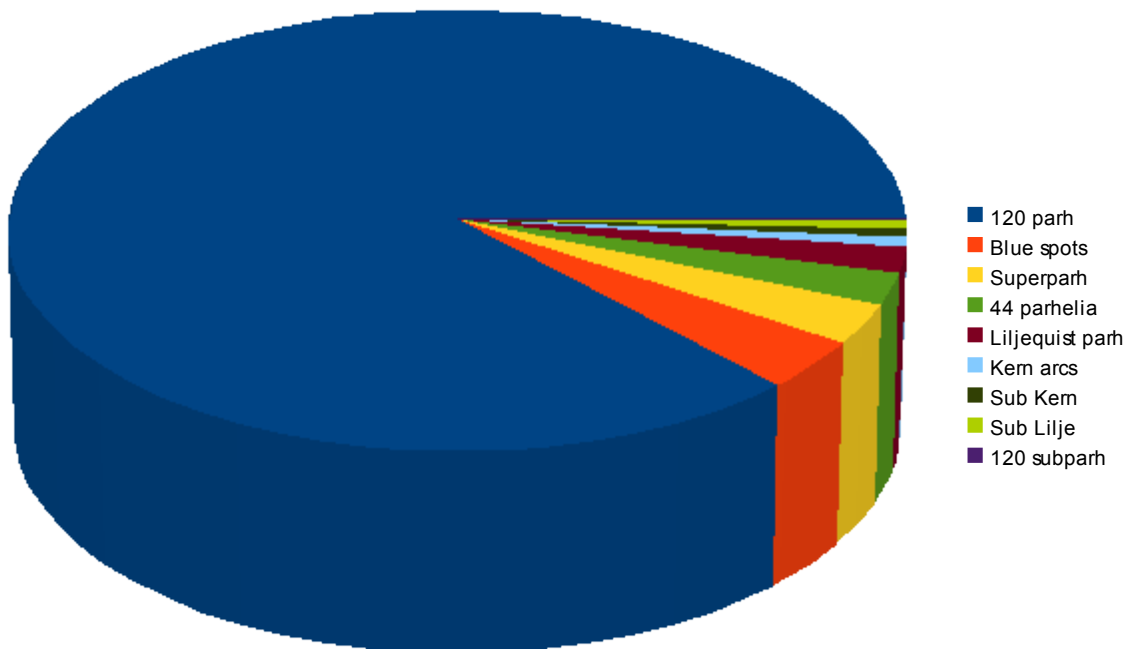
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1. **Parry upper suncave arcs:** 637 observations
 2. **Parry upper sunvex arcs:** 120 observations
 3. **Heliac arcs:** 87 observations
 4. **Tape upper arcs:** 52 observations
 5. **(Subhelic arcs: 37 observations)***
 6. **Tape lower arcs:** 16 observations
 7. **Parry lower sunvex arcs:** 13 observations
 8. **Hastings arcs:** 8 observations
 9. **Parry lower suncave arcs:** 7 observations
 10. **Parry raypath 4-8-1 arcs:** 3 observations
 11. **Parry reflected lower sunvex arcs:** 1 observation
- * origin from singly oriented columns too



Halos from singly oriented plates:

1. **120° parhelia**: 612 observations
 2. **Blue spot**: 26 observations
 3. **Superparhelia**: 21 observations
 4. (**44° parhelia**: 17 observations)*
 5. **Liljequist parhelia**: 13 observations
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 8. **Liljequist subparhelia**: 4 observations
 9. **120° subparhelia**: 1 observation
- *origin from multiple scattering



Halos from Lowitz oriented plates:

1. **Lowitz arcs:** 366 observations
2. **Lowitz reflected arcs:** 40 observations
3. **46° contact arcs:** 4 observations

