

Video Meteor Astrometry

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Video Meteor Astrometry

- Introduction
- Grid of coordinates from reference stars
- Accuracy of estimation of meteor position on frame from camera
- Conclusion

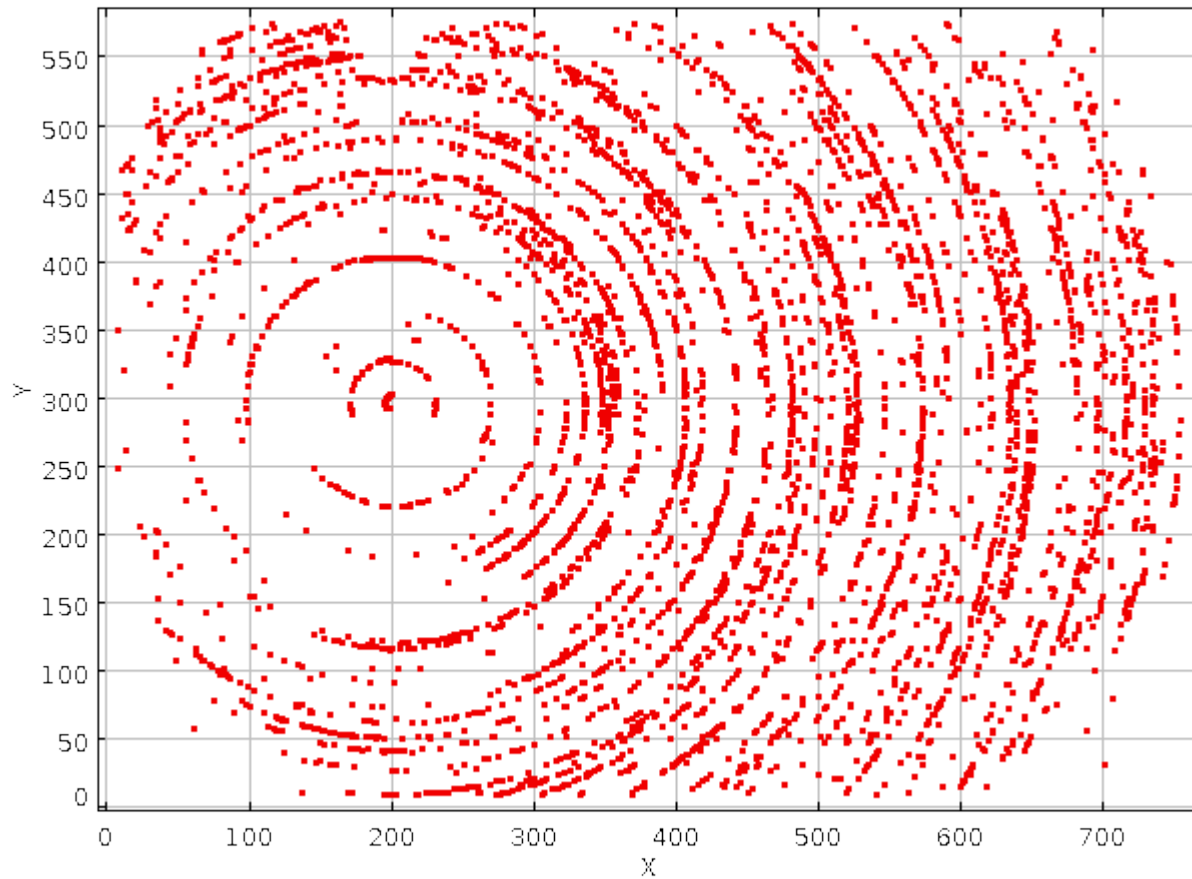
Introduction

Fakeor = Fake meteor ;)

- Simulation of trajectory and two stations
- Optimal configuration of event
- We need at least 1 min accuracy!

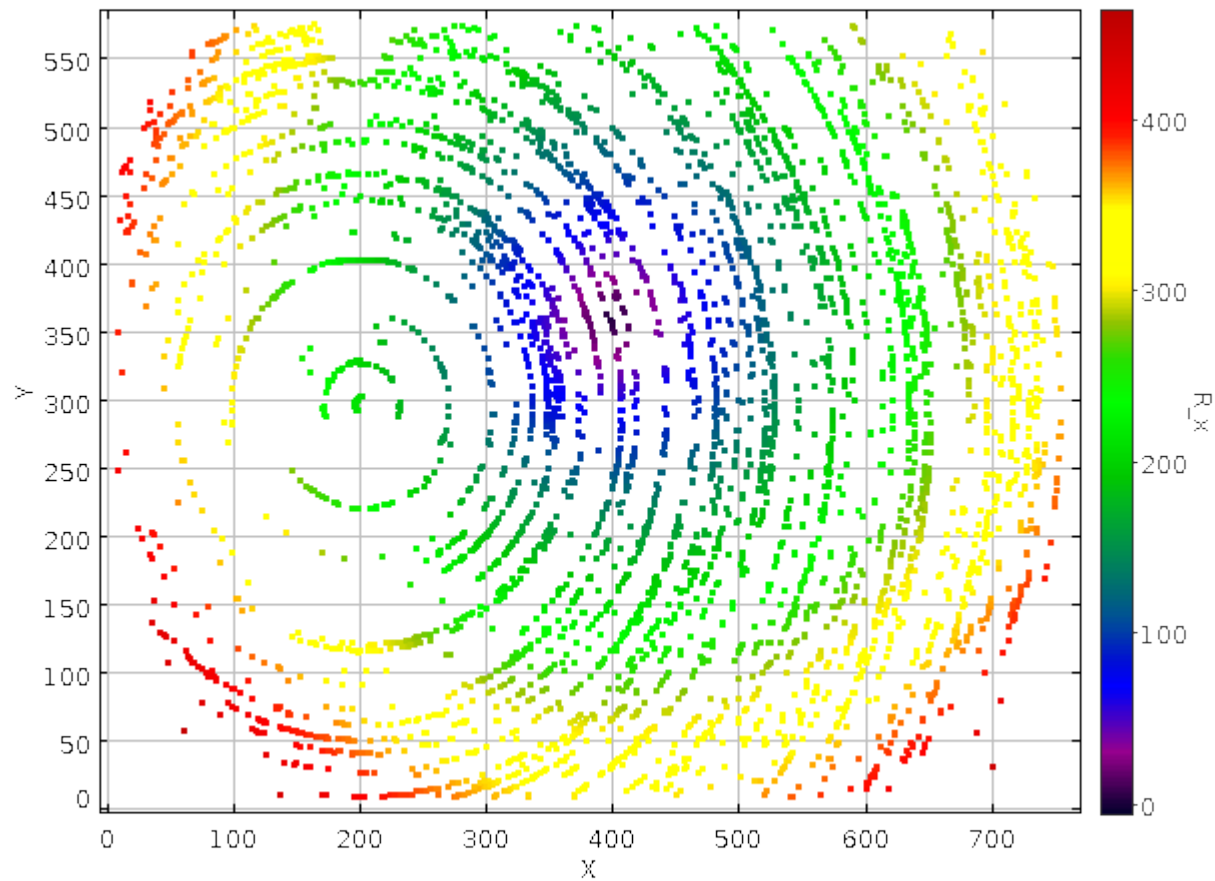
(Barentsen 2010)

Position of all reference stars



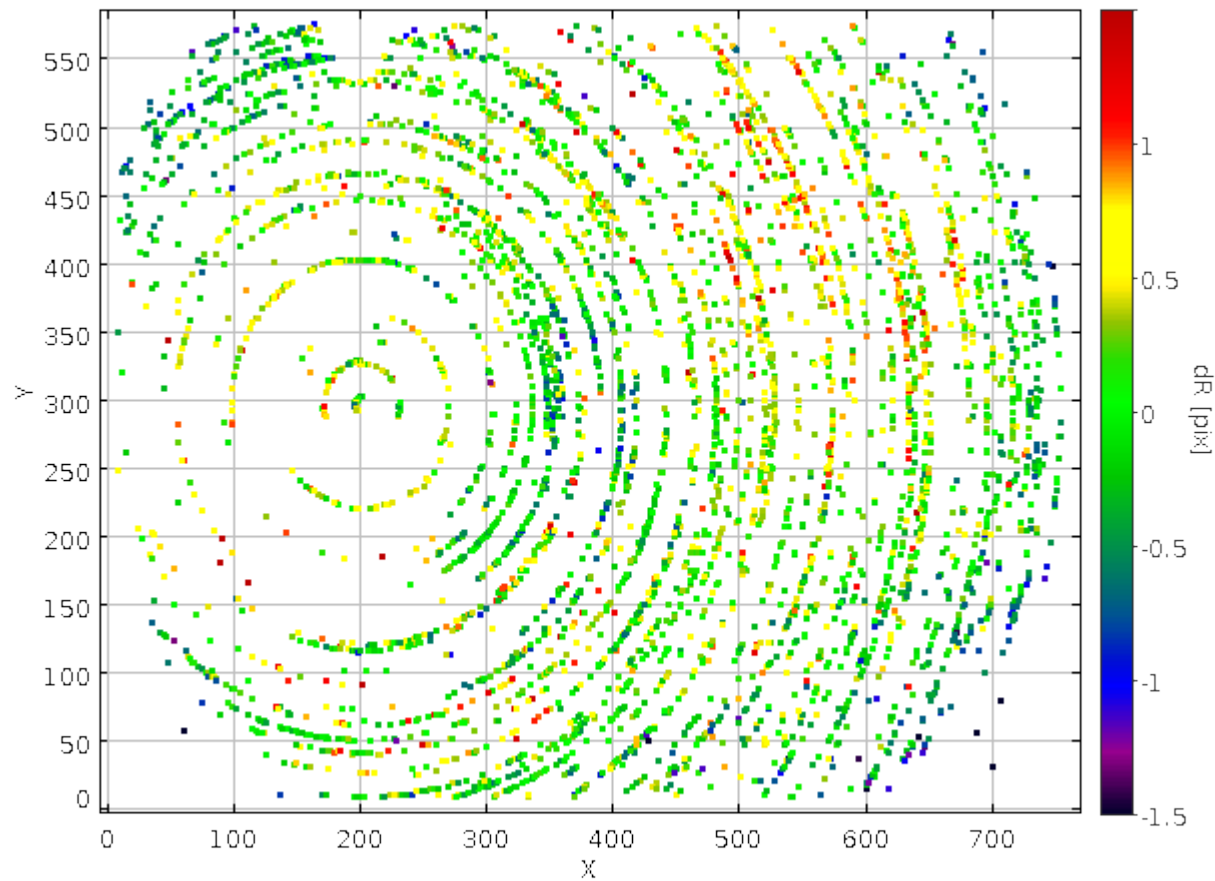
$f_1(dx, dy, xy, ra, dec, t)$

Position of optical centre



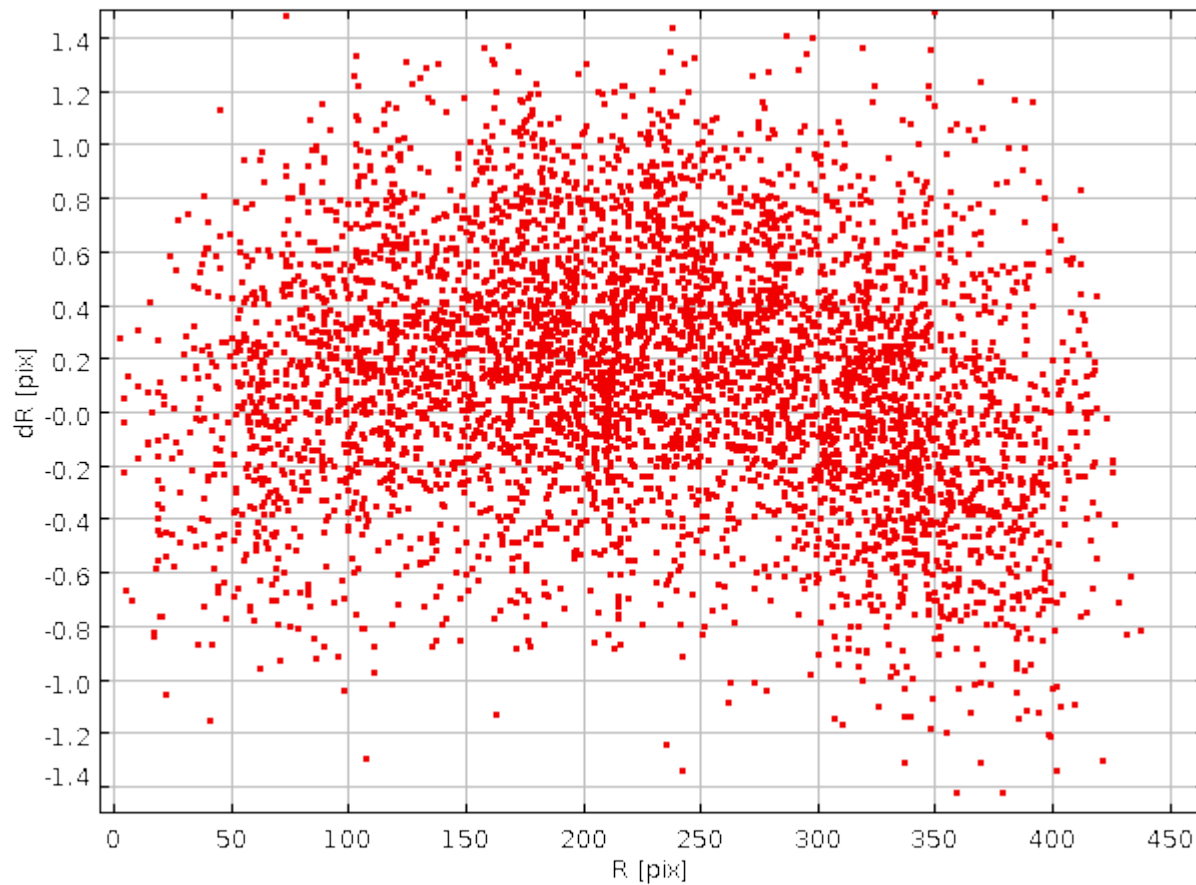
f1(dx,dy,xy,ra,dec,t)

Radial accuracy



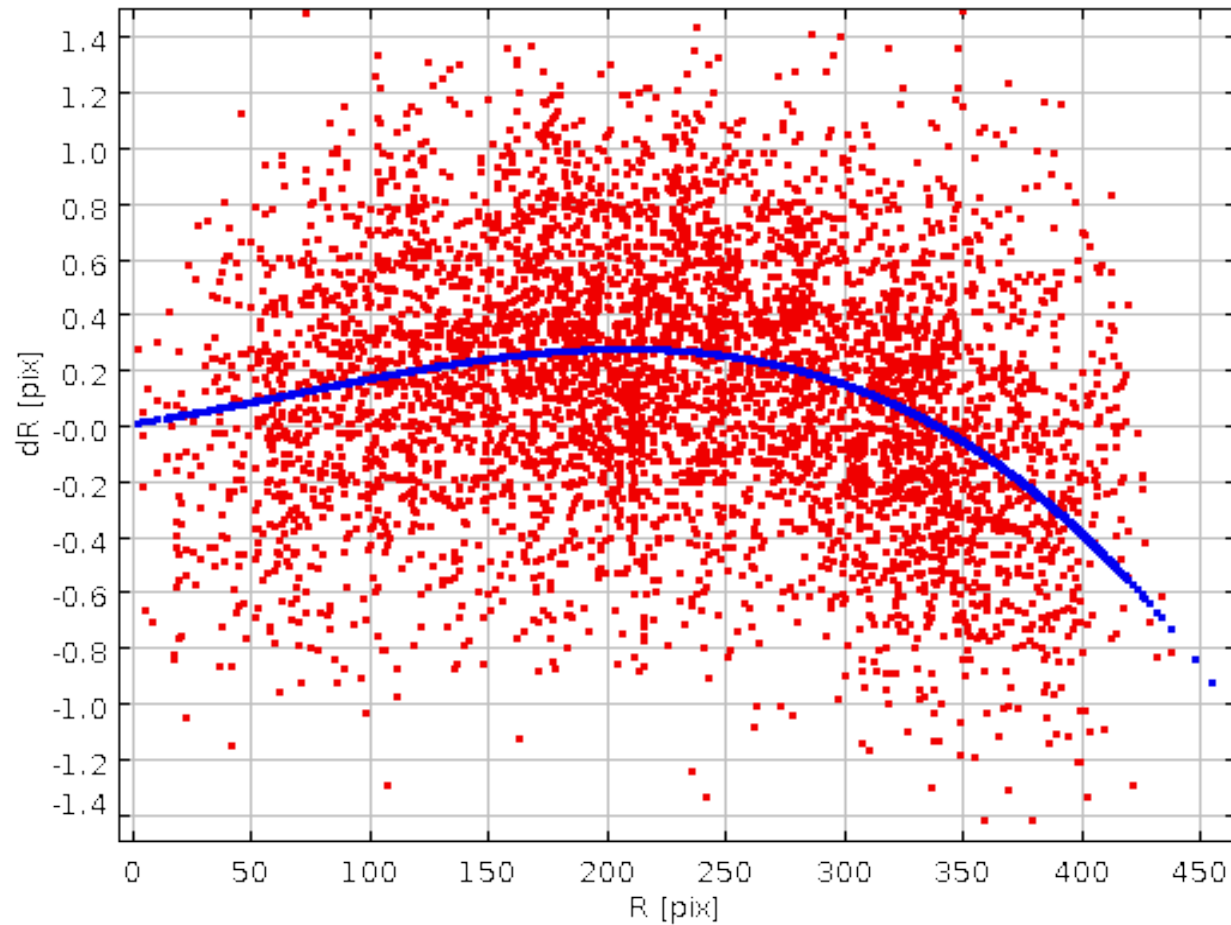
$f_1(dx, dy, xy, ra, dec, t)$

Radial accuracy



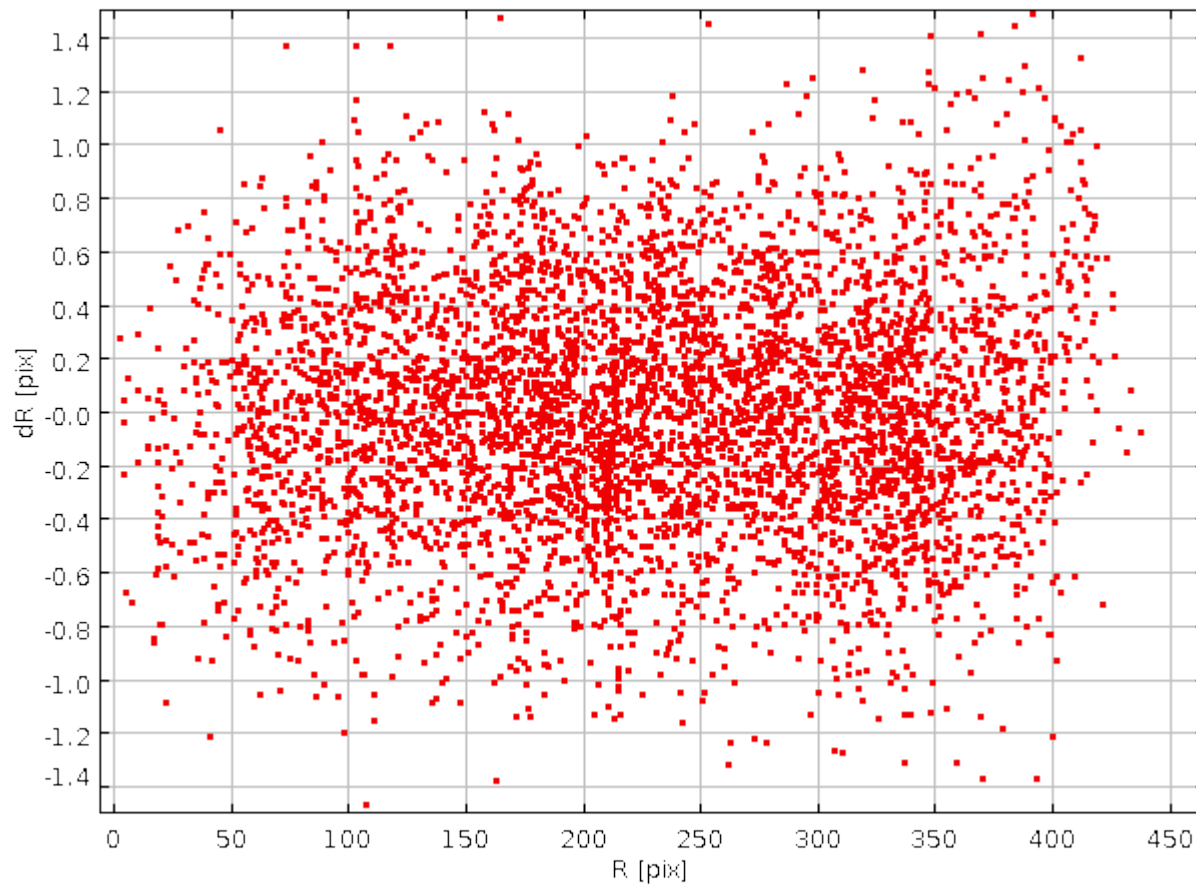
$$f_2(r) = a_1 * r + a_2 * r^2 + a_3 * r^3 + a_4 * r^4$$

Radial accuracy



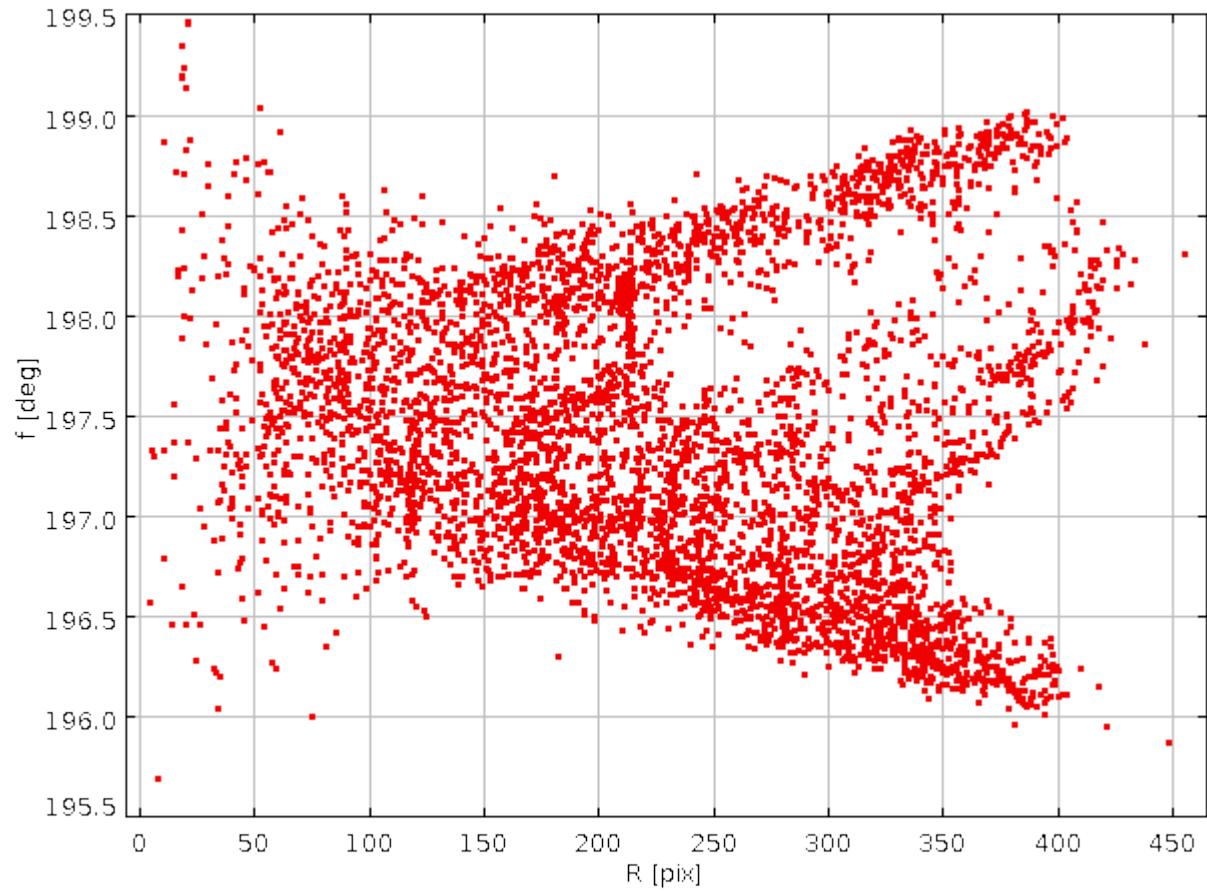
$$f2(r) = a1*r + a2*r^2 + a3*r^3 + a4*r^4$$

Radial Accuracy = 0.41



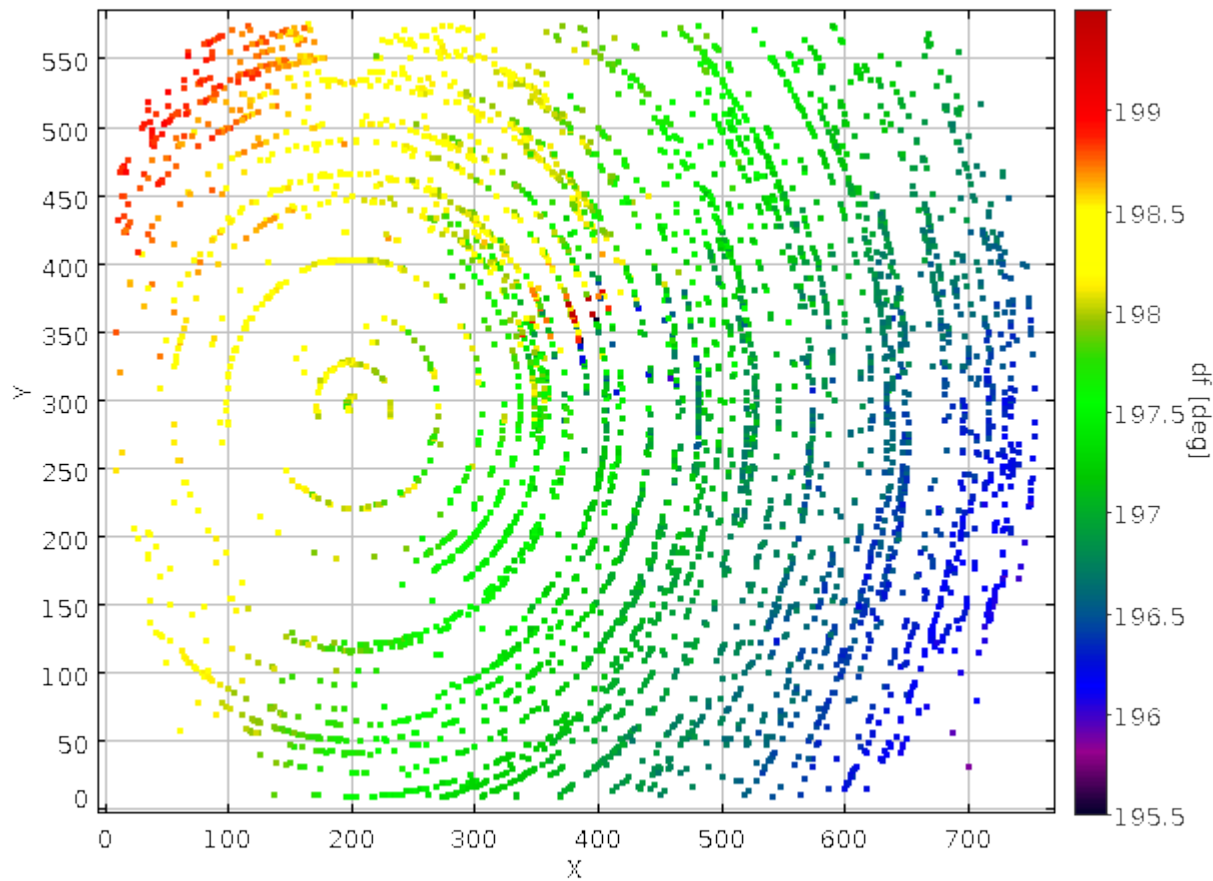
$$f2(r) = a1*r + a2*r^2 + a3*r^3 + a4*r^4$$

Tilt

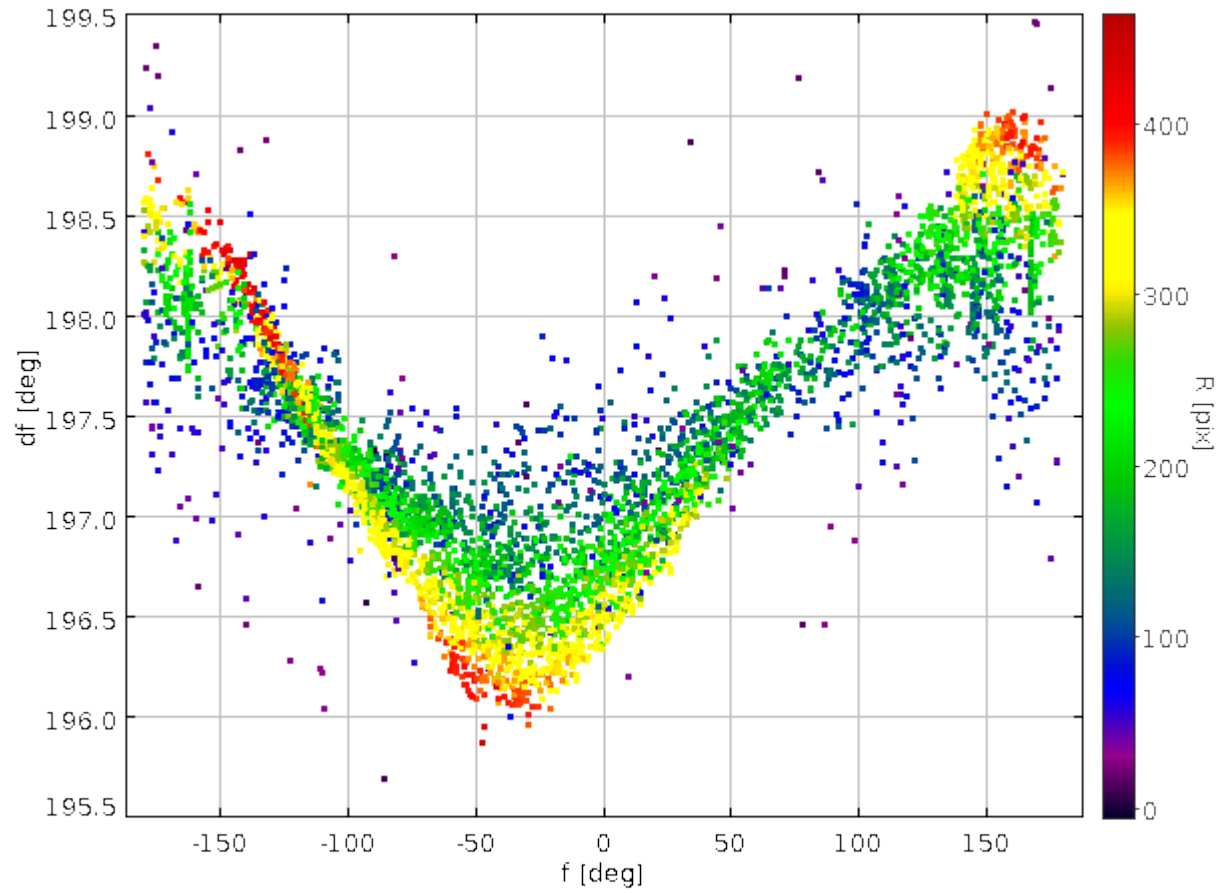


$f_1(dx, dy, xy, ra, dec, t)$

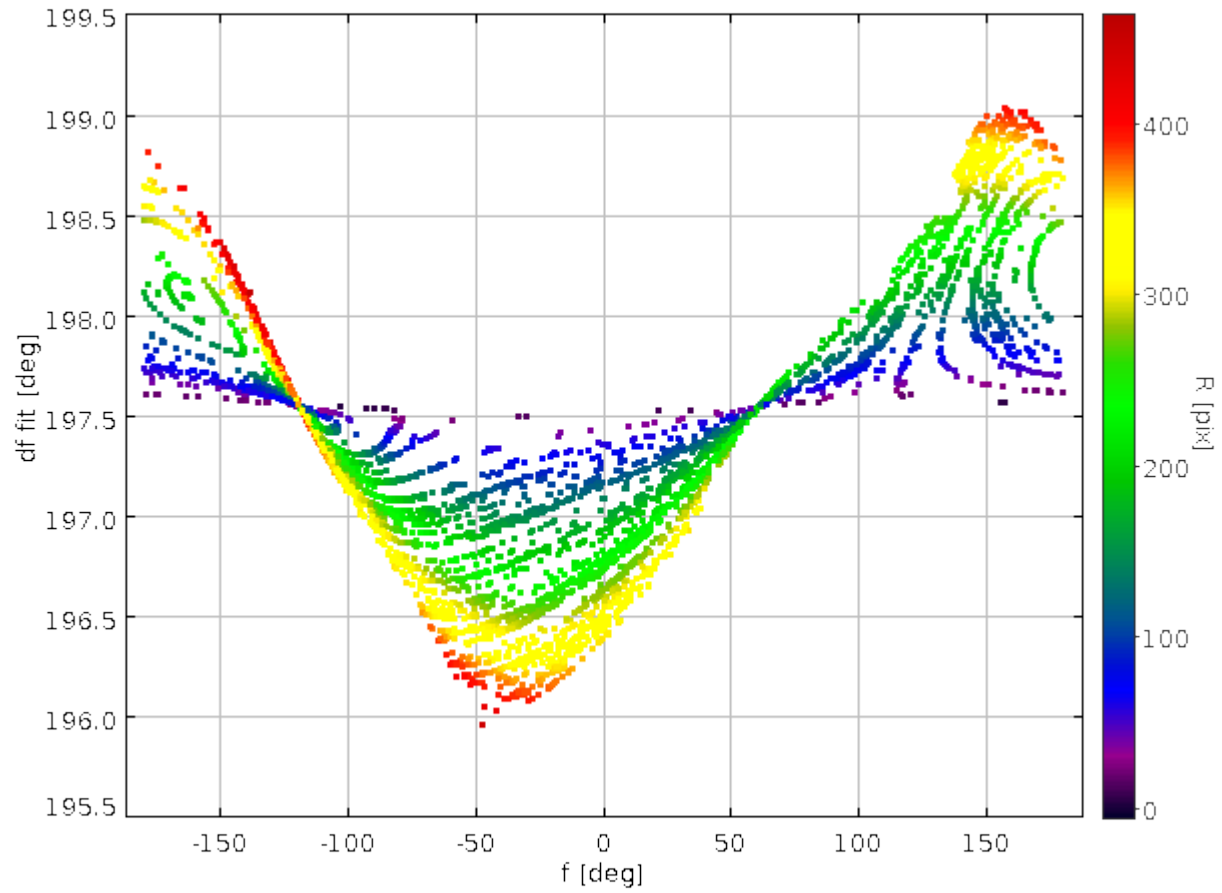
Tilt



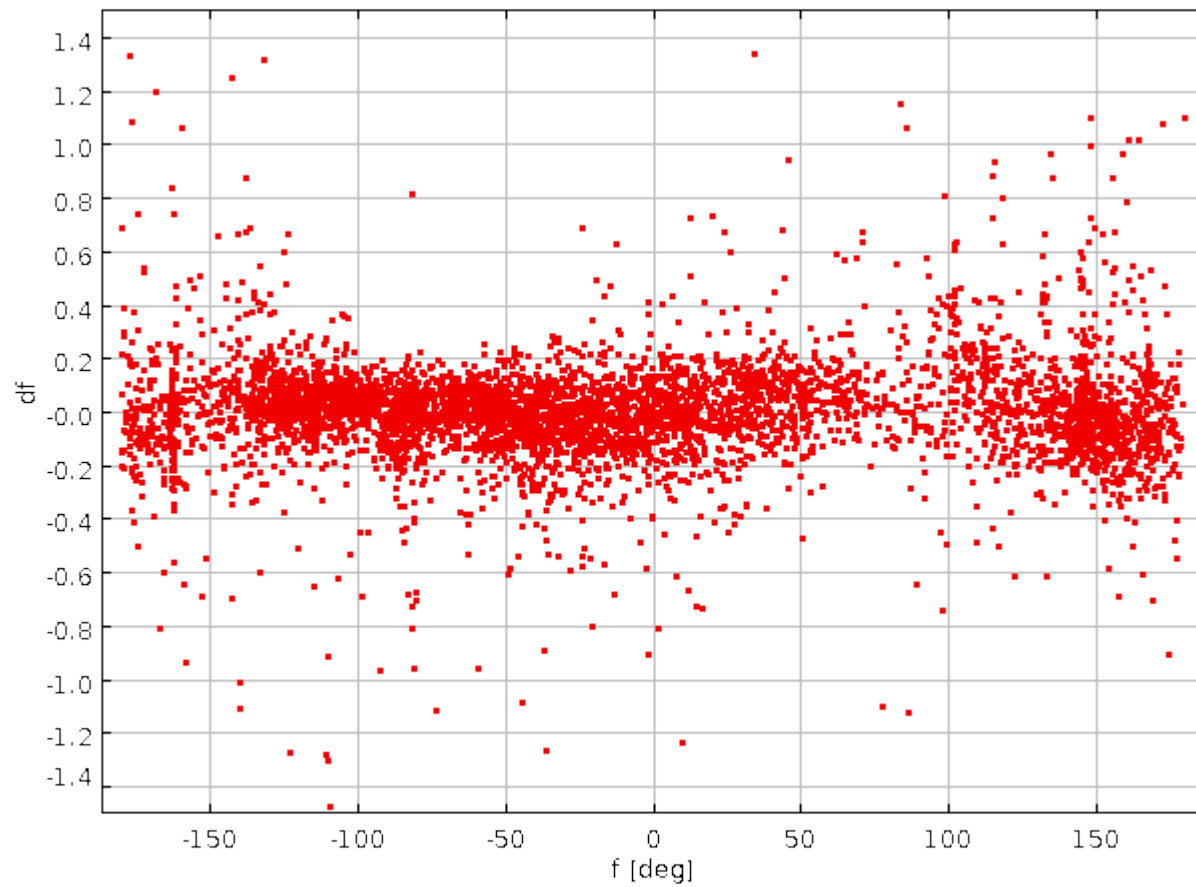
$f_1(dx, dy, xy, ra, dec, t)$



$$f_3(f,r) = A * \sin(f+f_0)$$

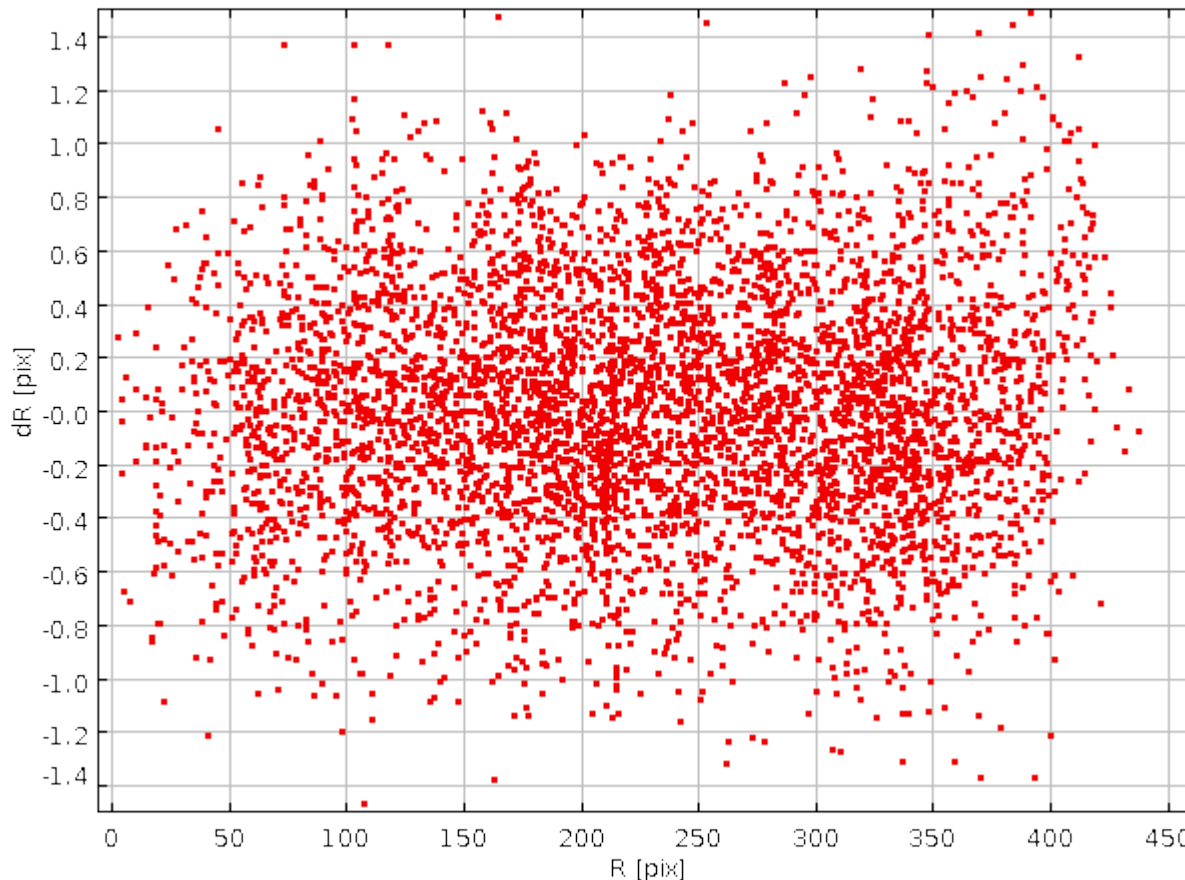


$$f_3(f,r) = A * \sin(f+f_0)$$



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accuracy = 0.47* [pix]



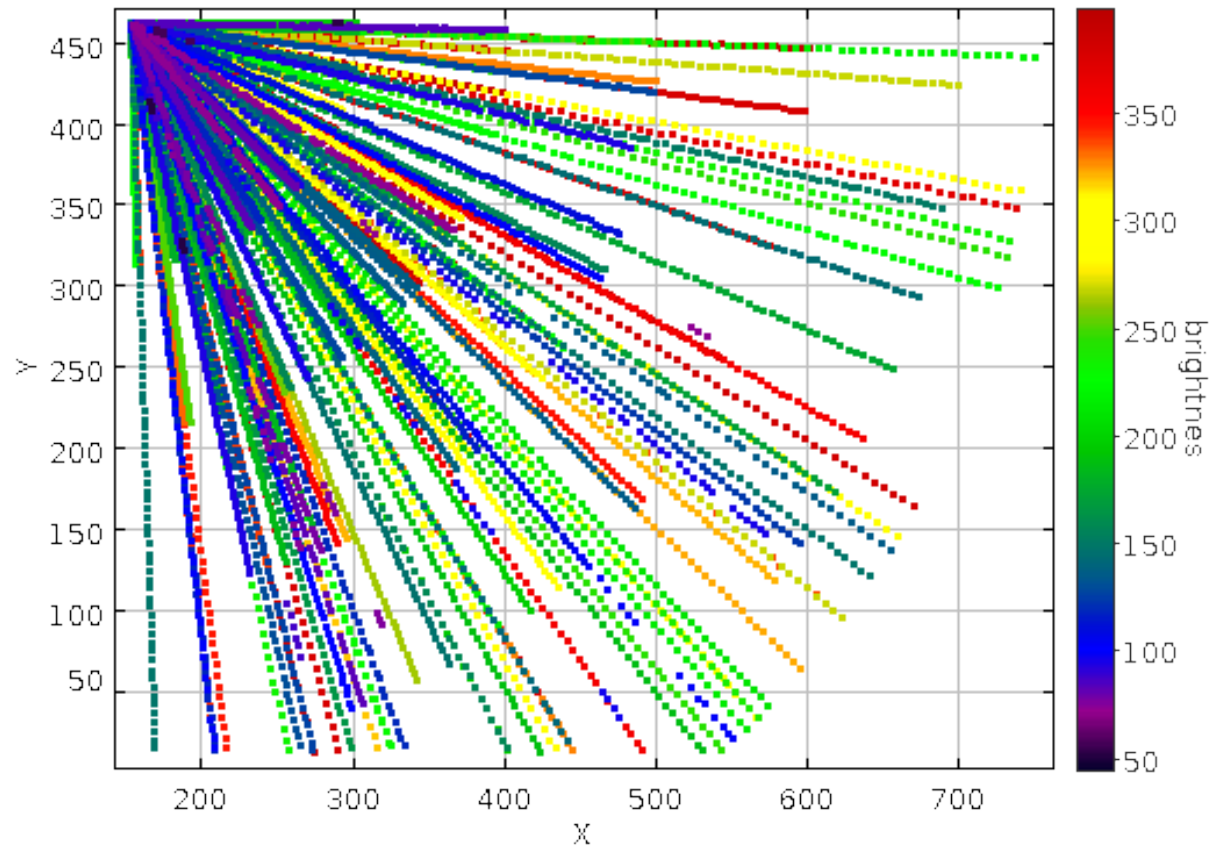
$$f1(dx, dy, xy, ra, dec, t)$$

$$f2(r) = a1*r + a2*r^2 + a3*r^3 + a4*r^4$$

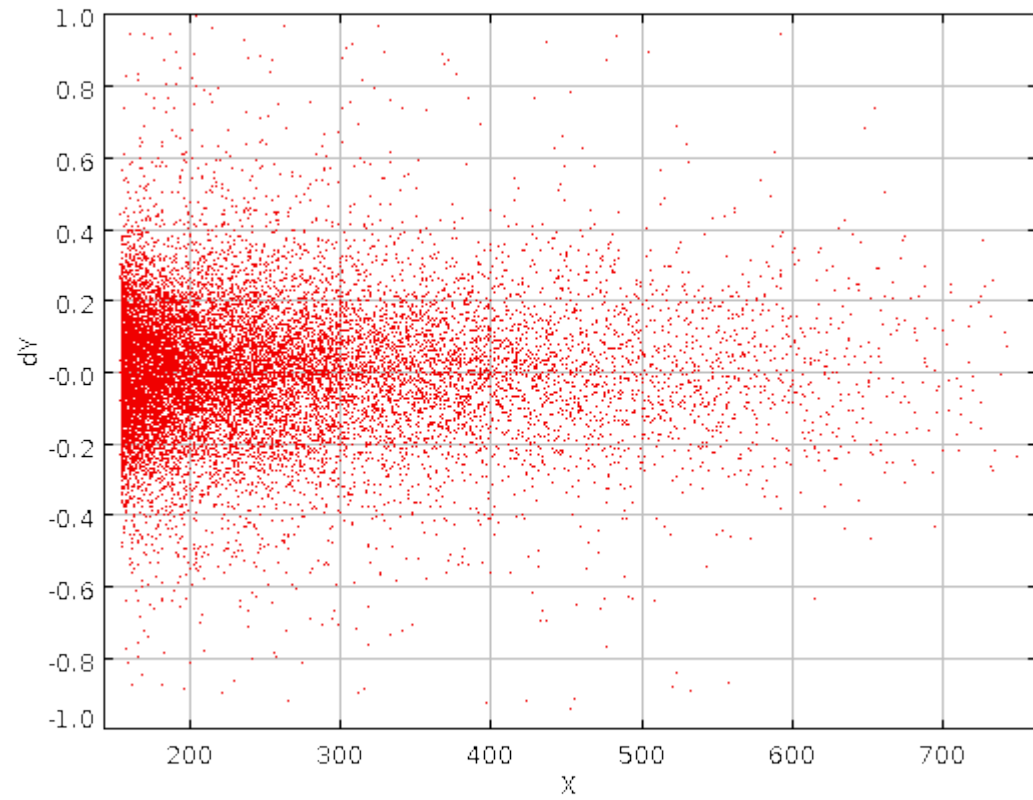
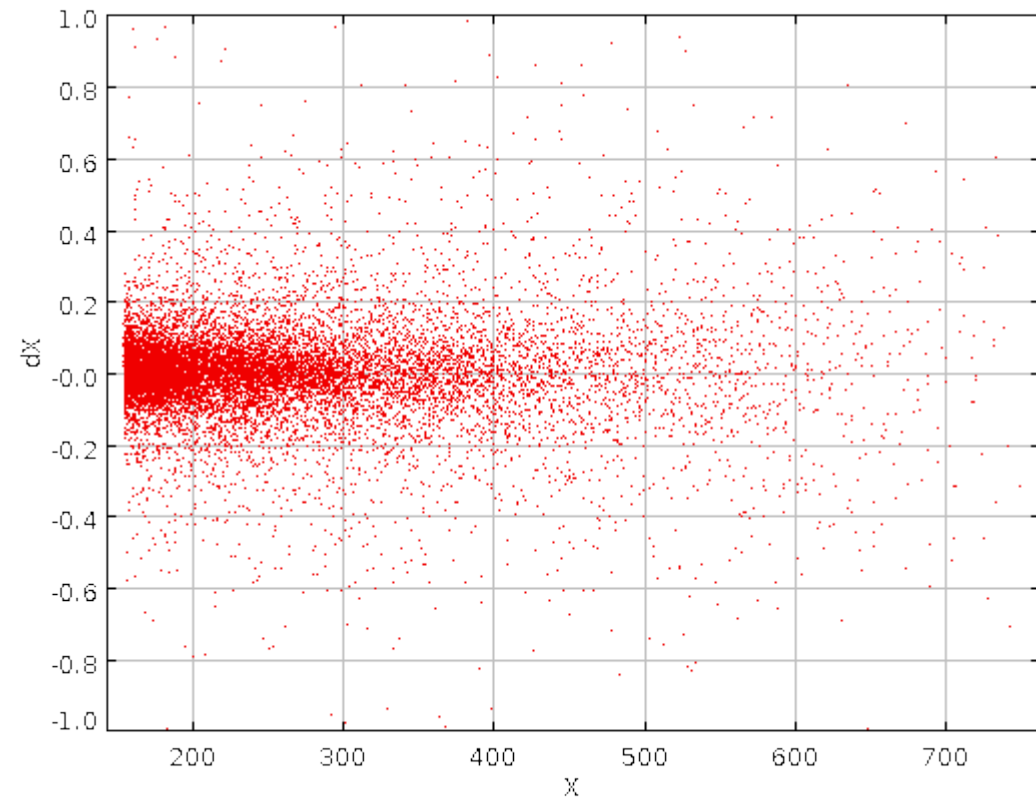
$$f3(f, r) = A * \sin(f + f0)$$

12 parameters + 3 (lon, lat, alt) = 15 parameters

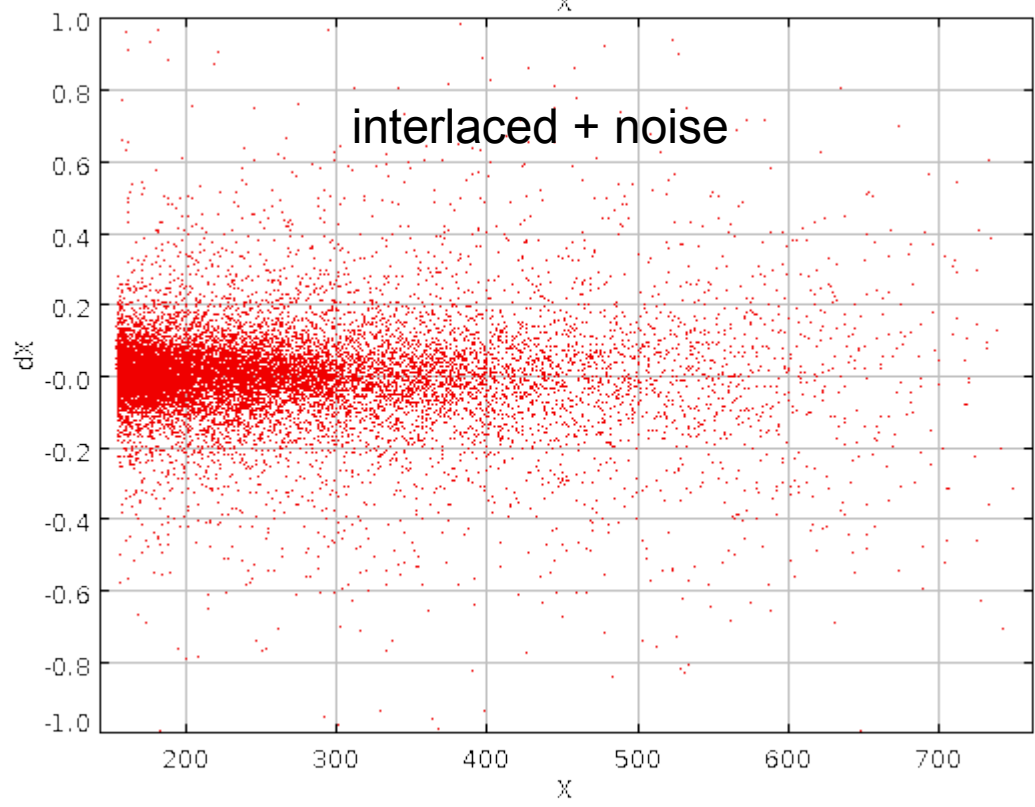
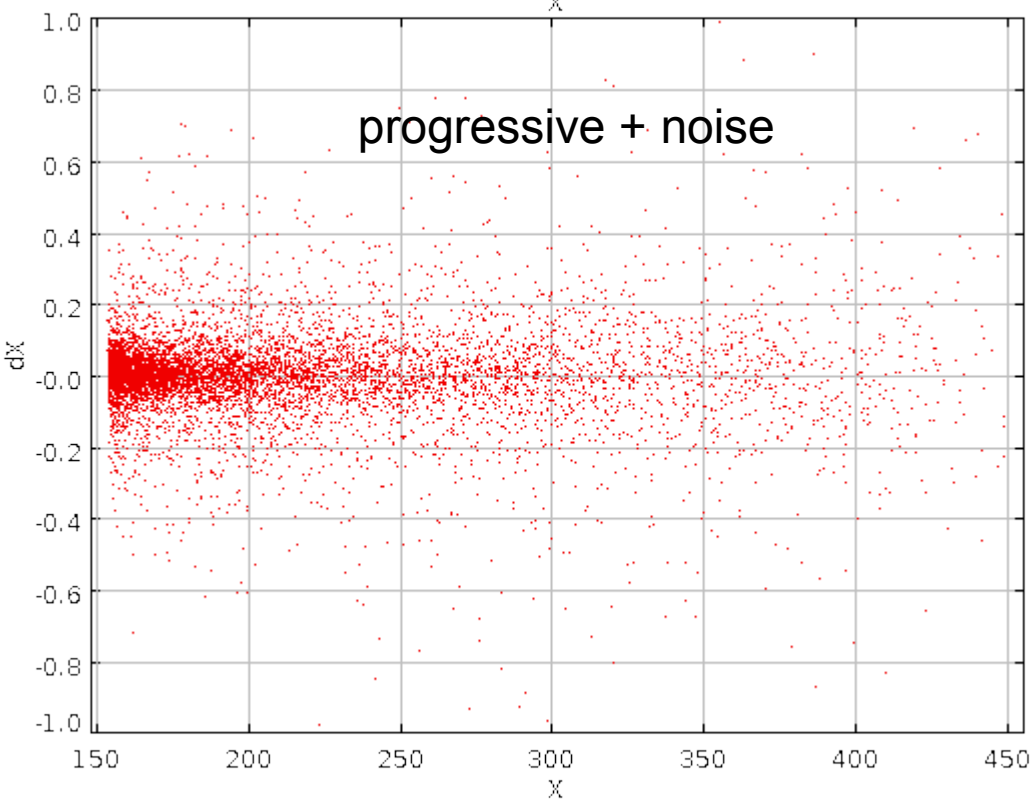
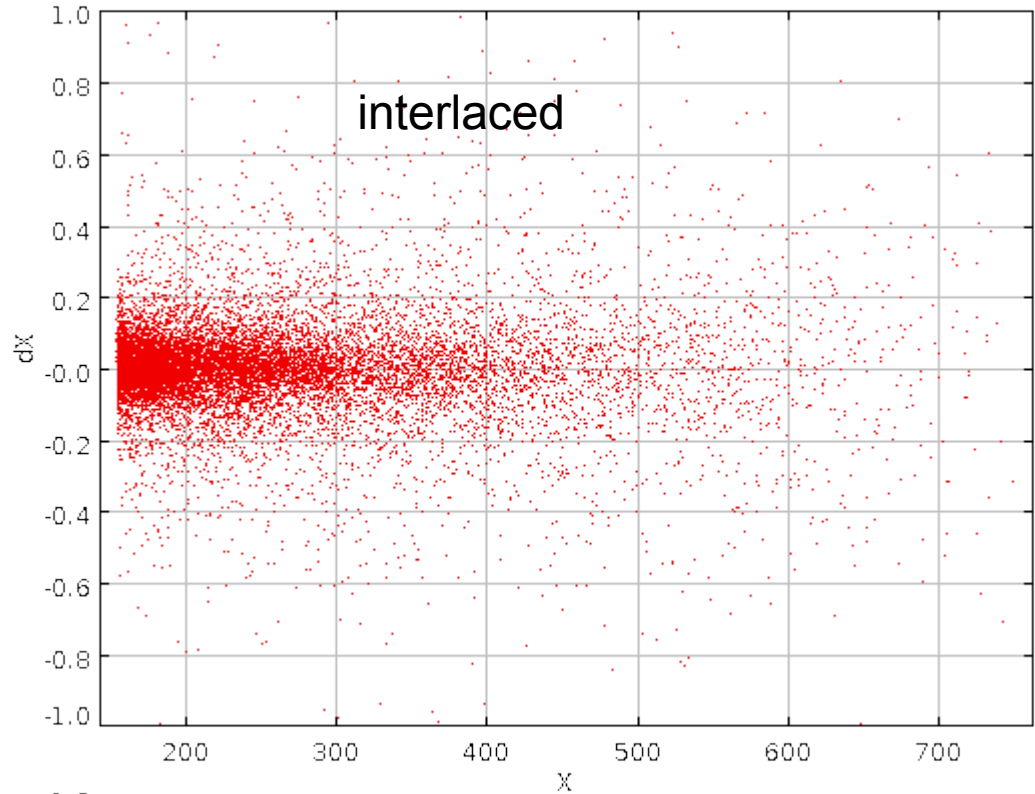
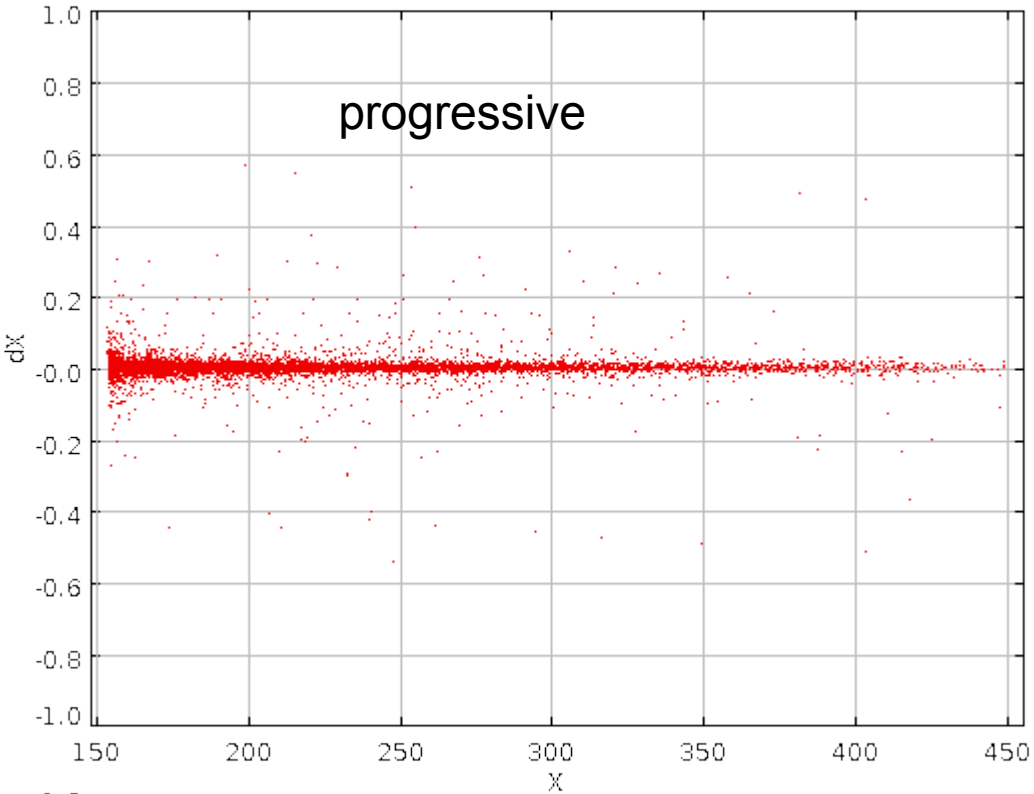
Meteor simulation

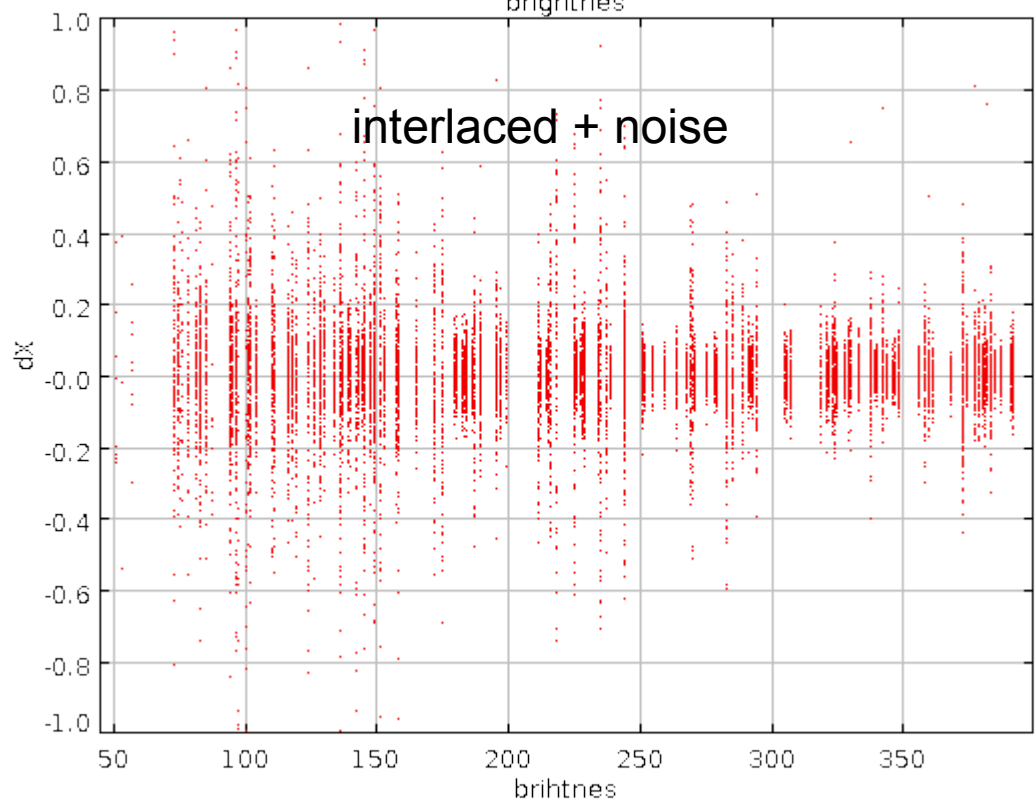
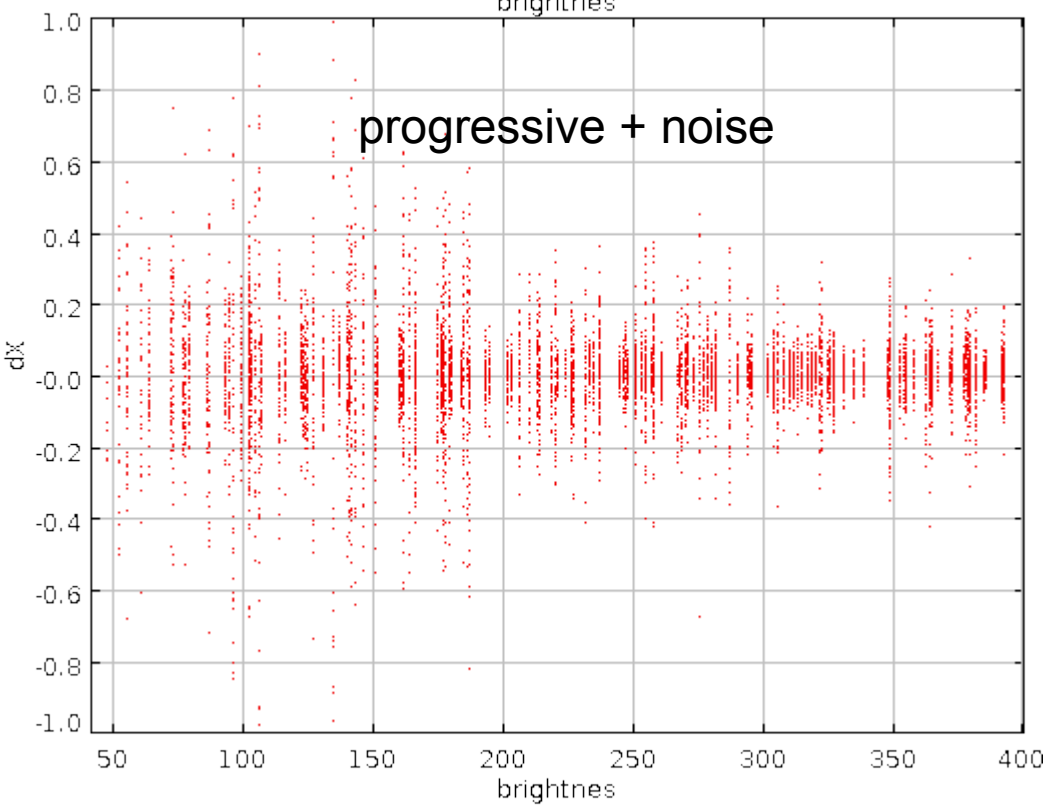
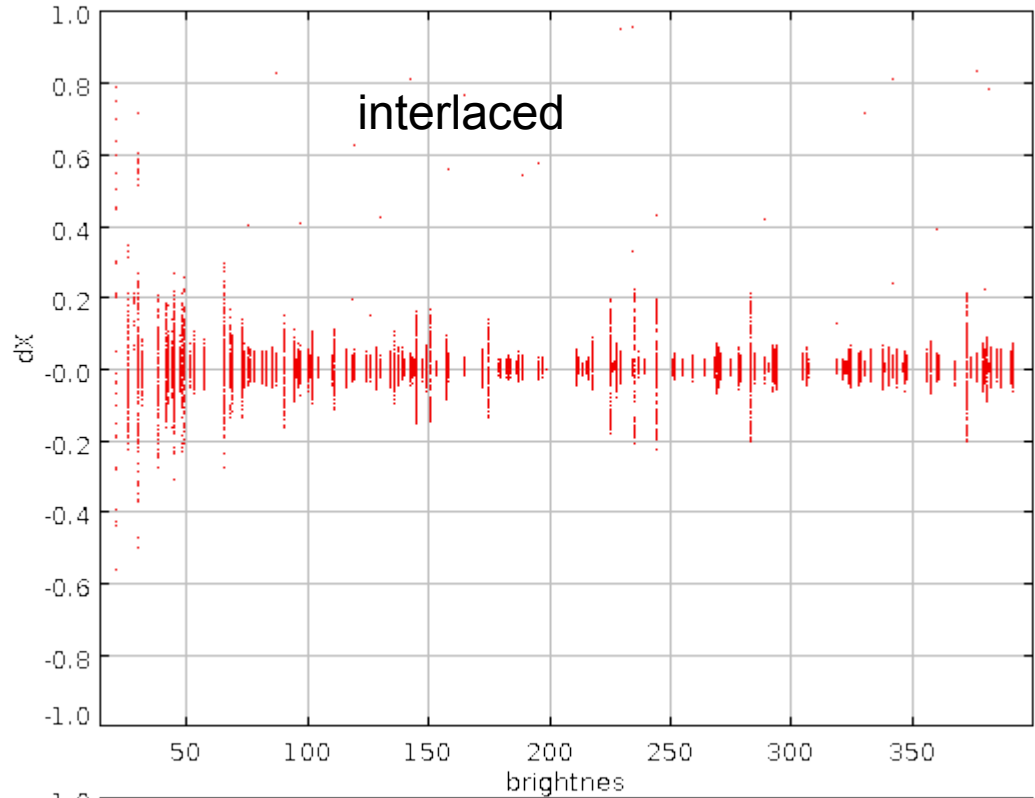
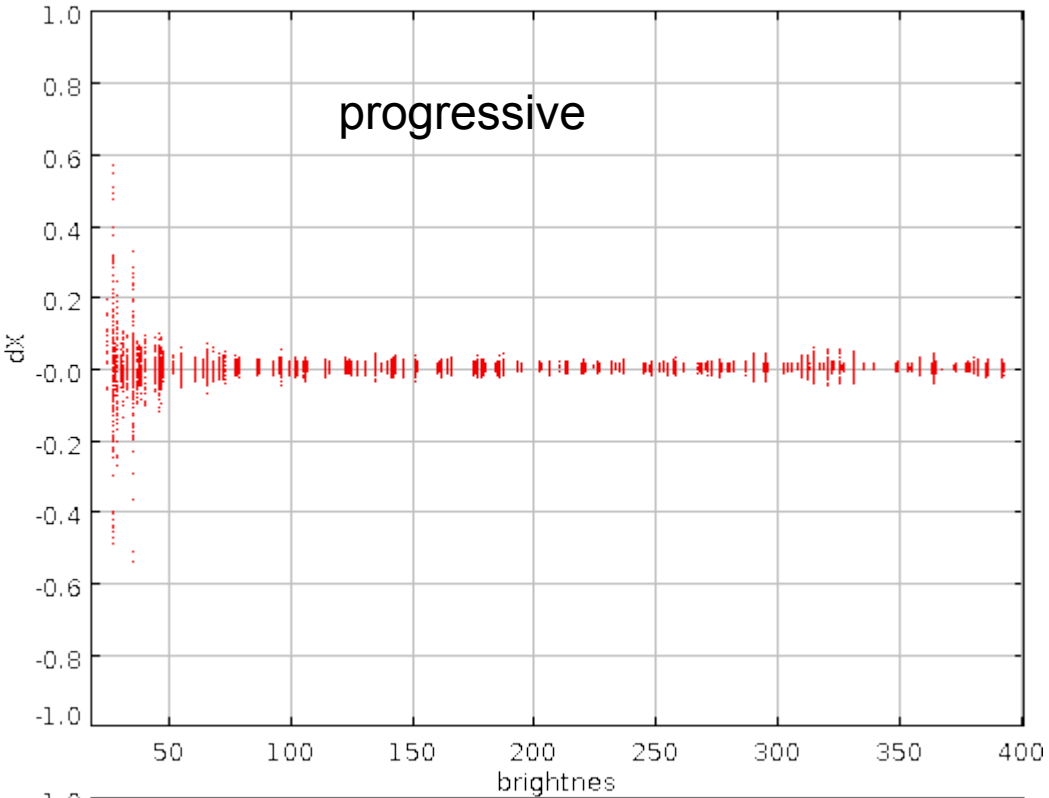


dX, dY

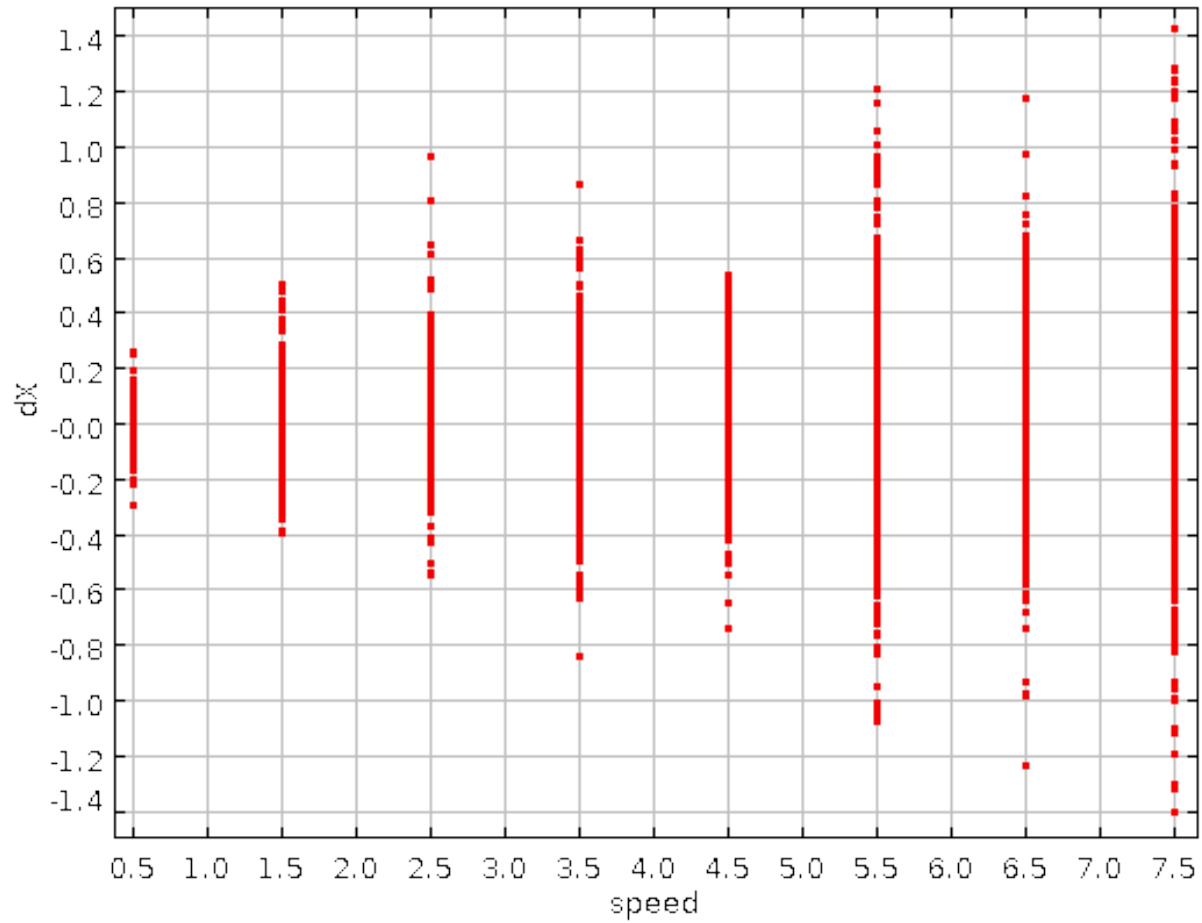


Interlaced + noise



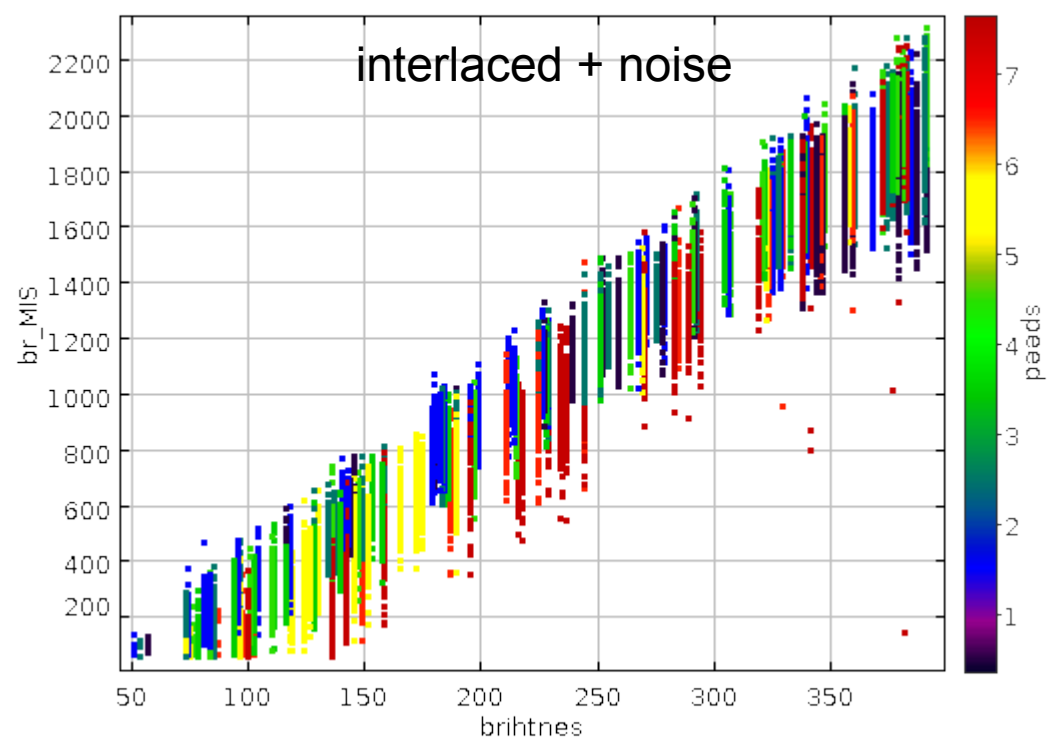
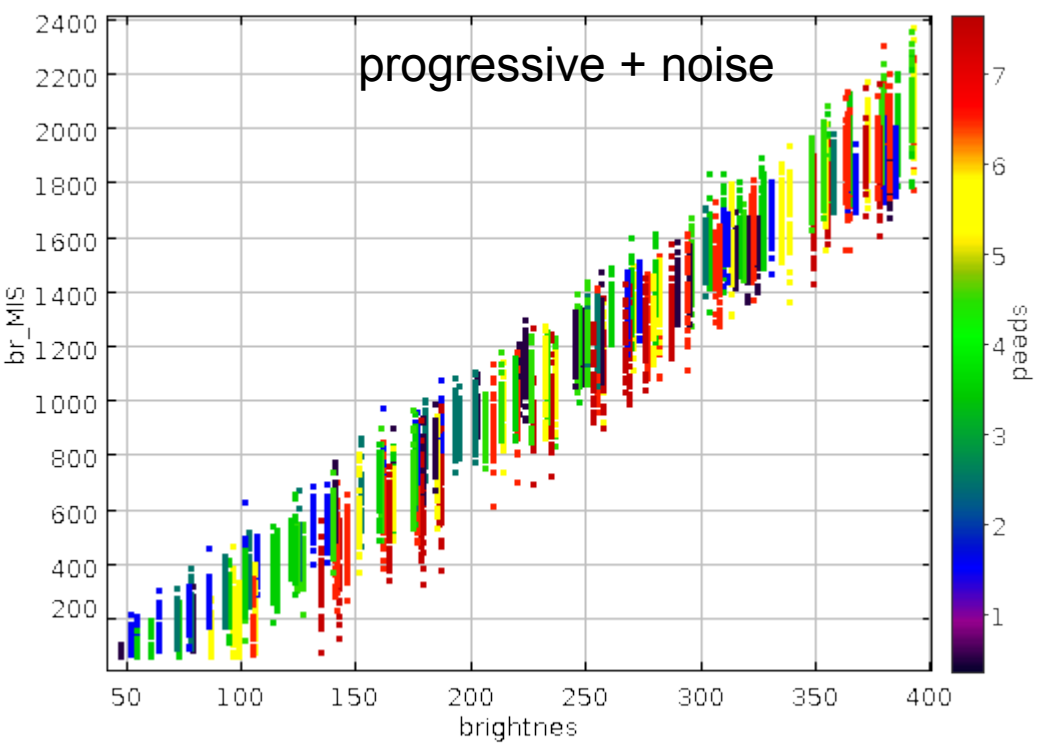
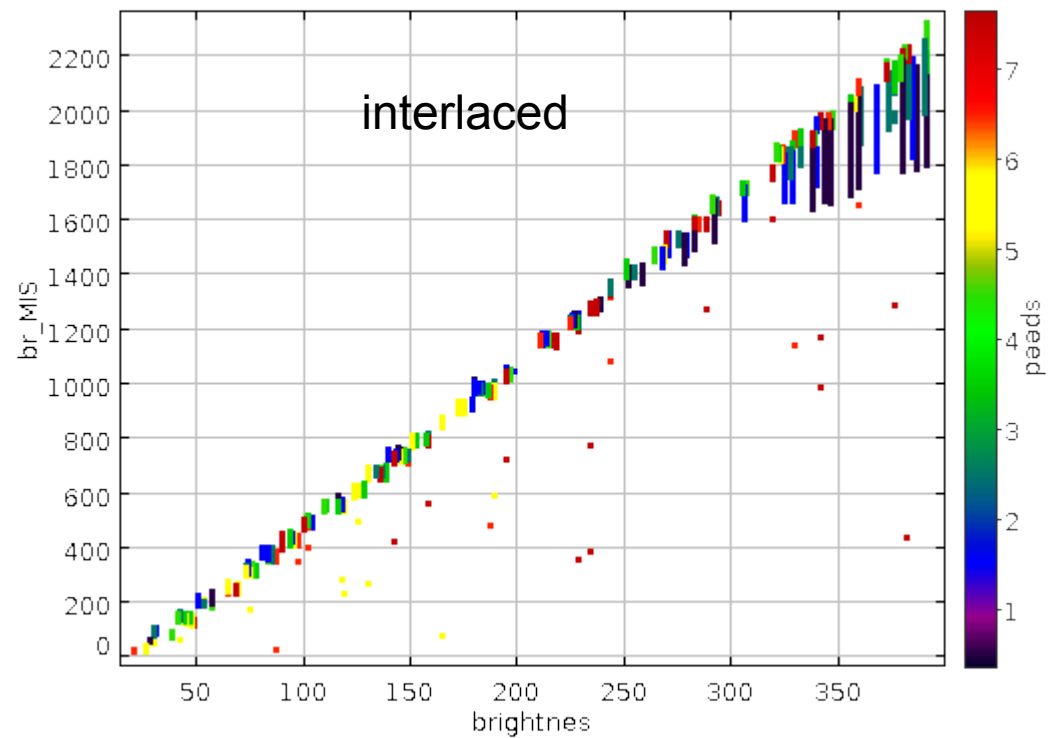
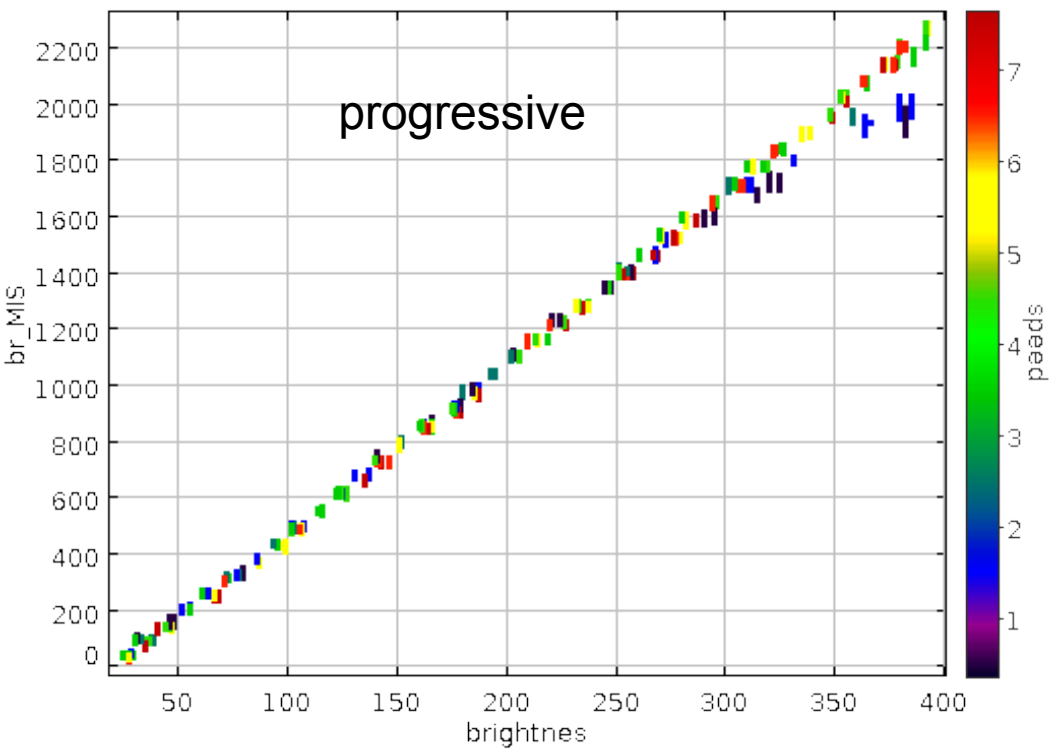


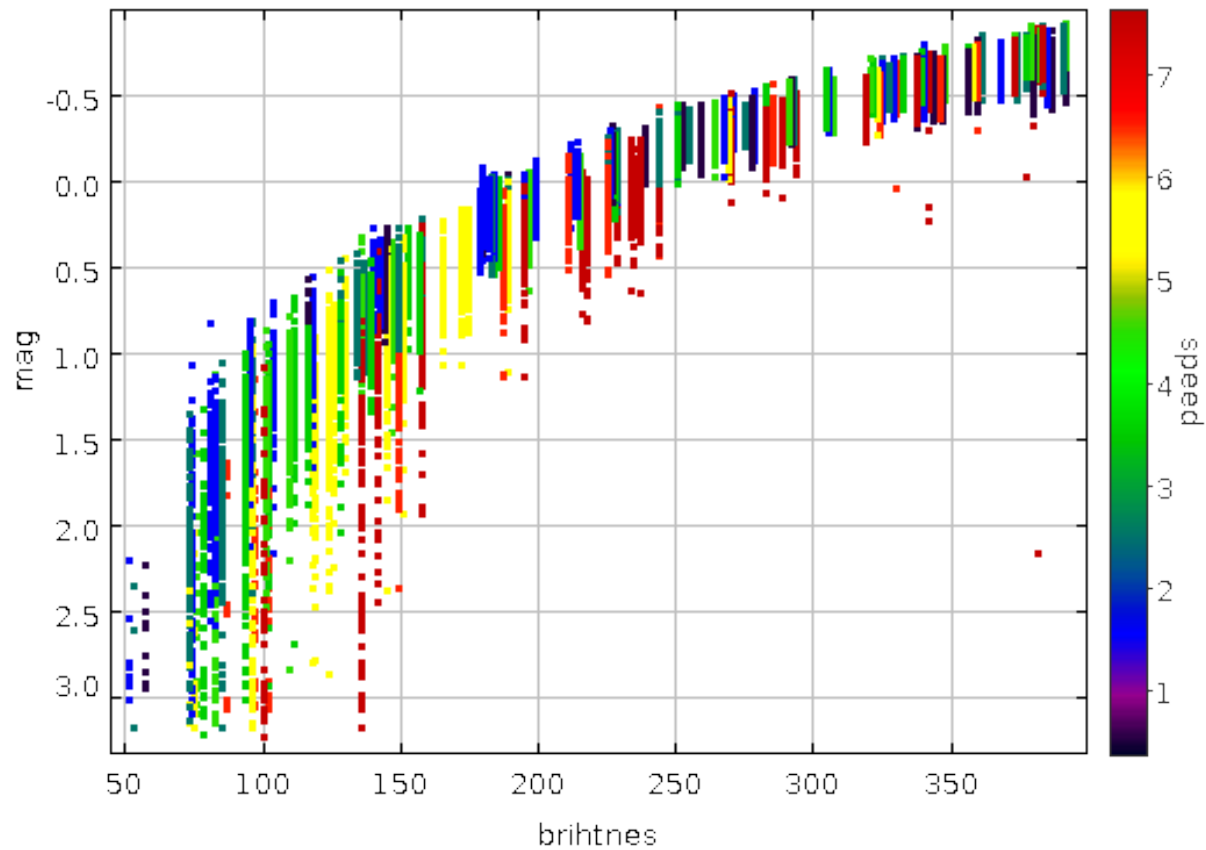
dX (speed)



Meteor position accuracy

	dx	dy	dspeed
interlaced + noise	0.1678	0.2221	0.3125
progressive + noise	0.1474	0.1492	0.2578
interlaced	0.0533	0.1342	0.1742
progressive	0.0343	0.0426	0.0632





Interlaced + noise

Conclusion

$$f1(dx,dy,xy,ra,dec,t)$$

$$f2(r) = a1*r + a2*r^2 + a3*r^3 + a4*r^4$$

$$f3(f,r) = A * \sin(f+f0)$$

- Accuracy of grid of coordinates: 0.41? [pix] \rightarrow 0
- Accuracy of position of meteor: 0.27 [pix]
- Accuracy of brightness: from 1.5 to 0.2 mag

For CCD 1/3' and $f=4$ mm lens: 1 pix = 3 min

Accuracy of position of meteor = **0.8 min**