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FRIPON
orbit and strewn field determination software

IMC 2014 - Giron

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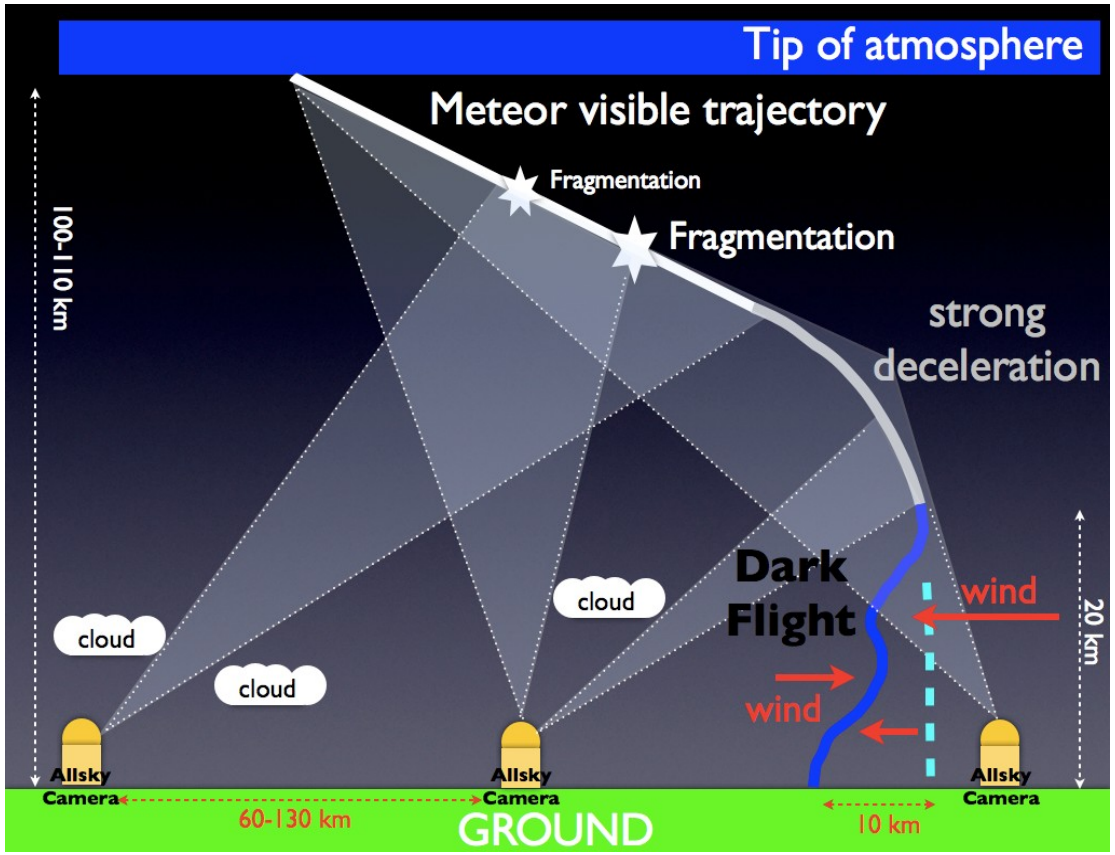
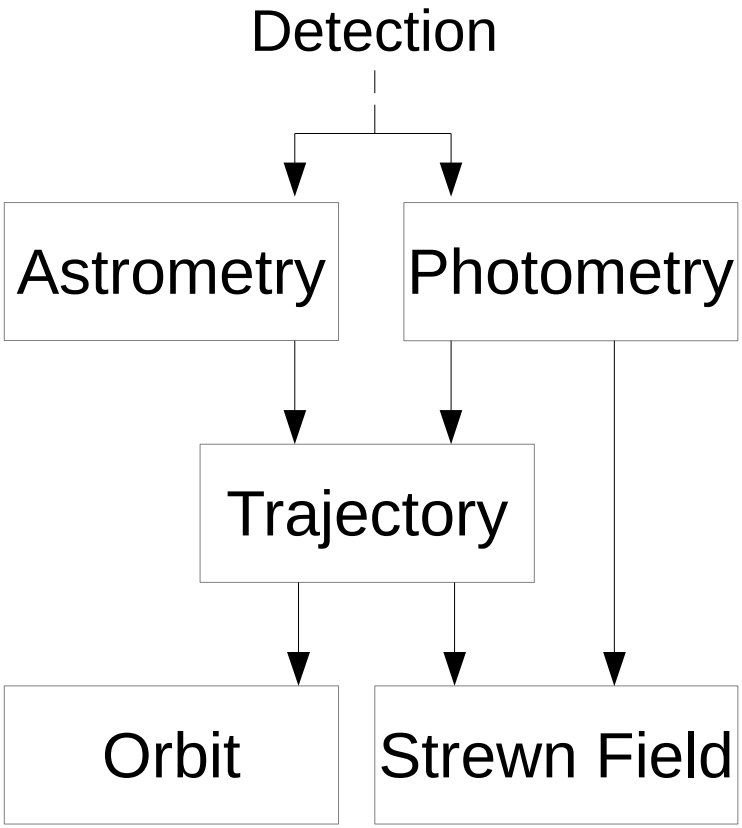
FRIPON pipeline





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Astrometry with fish eye lens

- Very large field of view : 180°

  → Strong distortion

- Existing methods : Z. Ceplecha (1987),

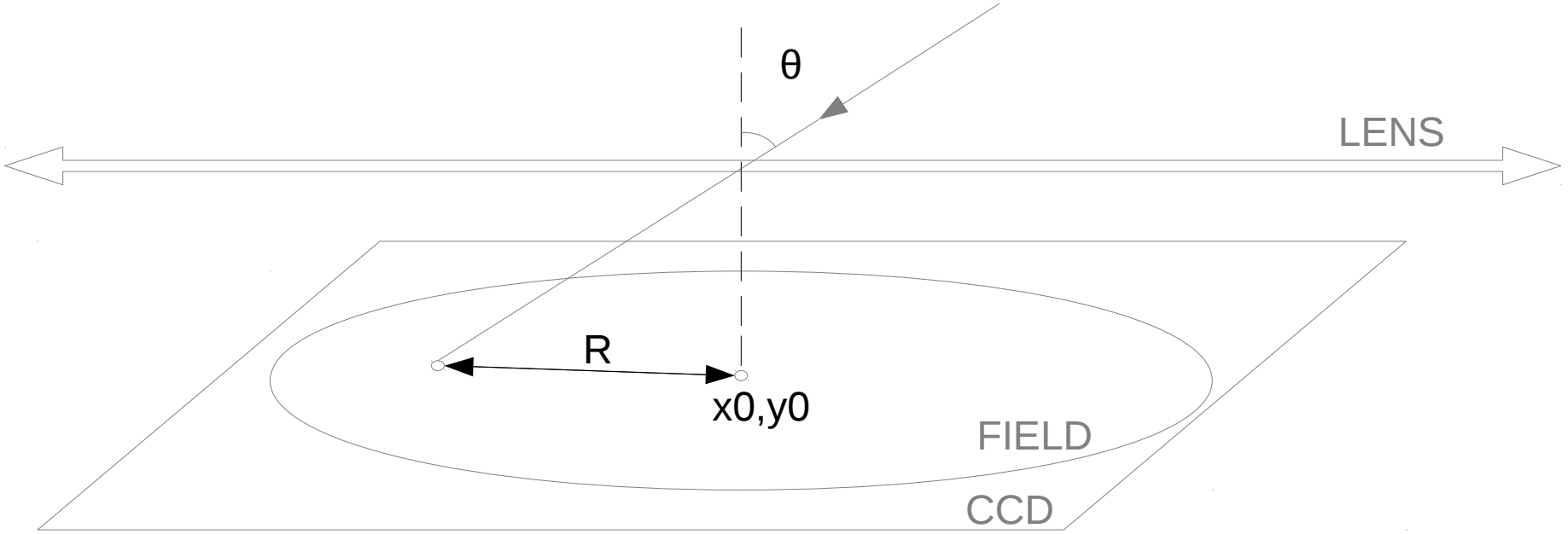
  J. Borovicka (1995)

- What we tried :
  - SCAMP (E. Bertin) : automatic astrometry software
    http://www.astromatic.net/software/scamp
  - Calibration on an optical bench

    http://www.pierretoscani.com/echo_fisheyes.html

Astrometry with fish eye lens

- Our method : $R = k_1 * \sin(\theta / k_2)$



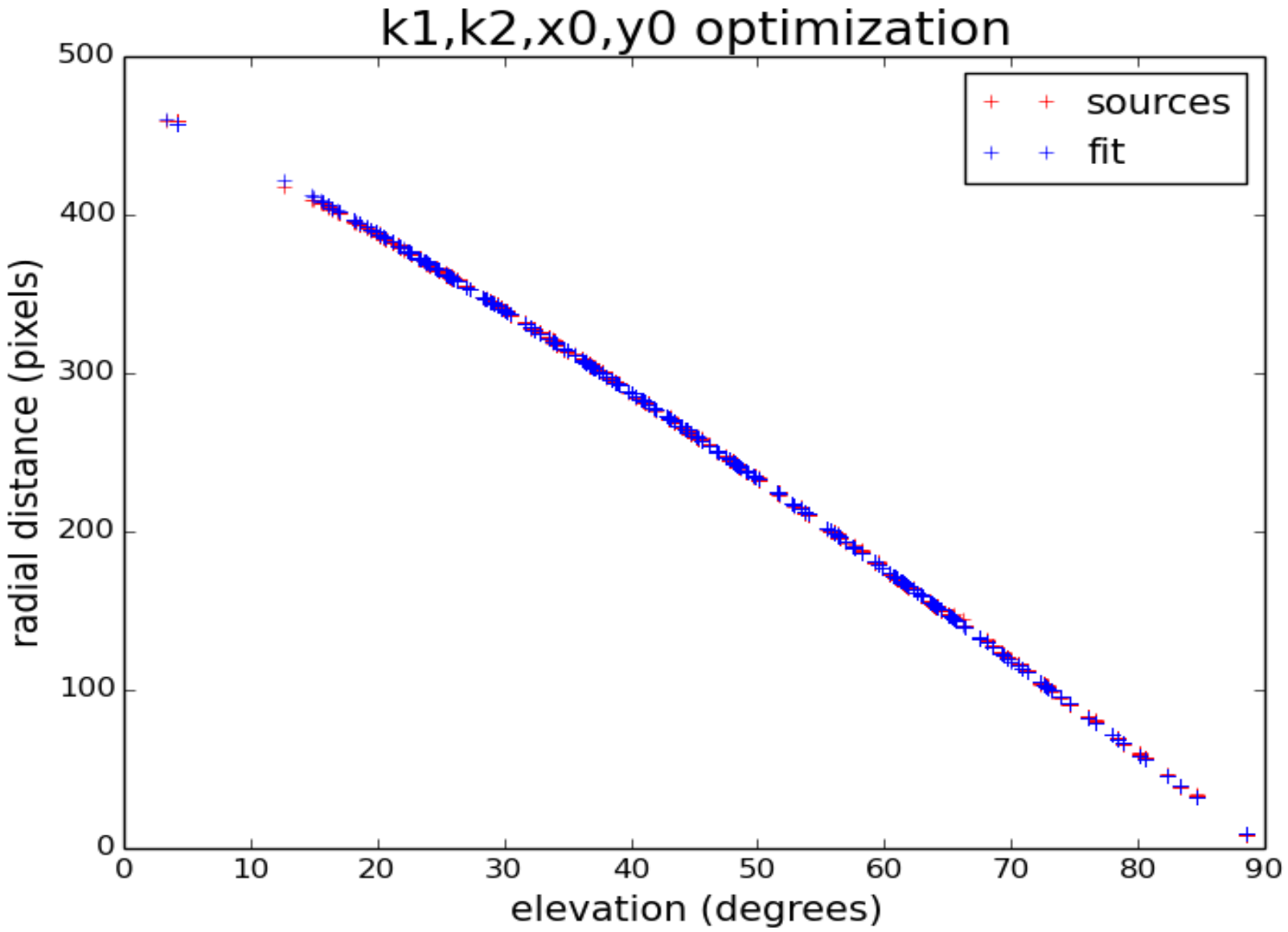
Astrometry with fish eye lens

- Parameters to optimize $R = k_1 * \sin(\theta / k_2)$
  - k_1, k_2
  - Center of the field x_0, y_0
  - Rotation of the field
  - Tilt
- Manual fit → first guesses for an optimization by least squares method

Preliminary results

- Implemented optimizations :
  - k_1, k_2
  - x_0, y_0
- Matches 158 / 269 stars within a range of 13° to 90°

  → We do tolerate a loss of 15° above the horizon because our network is dense enough
- Converges until 0,4 pixel of precision


k1,k2,x0,y0 optimization
sources
fit
radial distance (pixels)
elevation (degrees)
0
100
200
300
400
500
0
10
20
30
40
50
60
70
80
90

Future improvements

- Field's rotation angle
- Tilt angle
- Expected result : 0,1 pixel (almost 1 arcmin)
- User friendly graphical interface
- Photometry and trajectories

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Thank you for your attention

Any question ?