

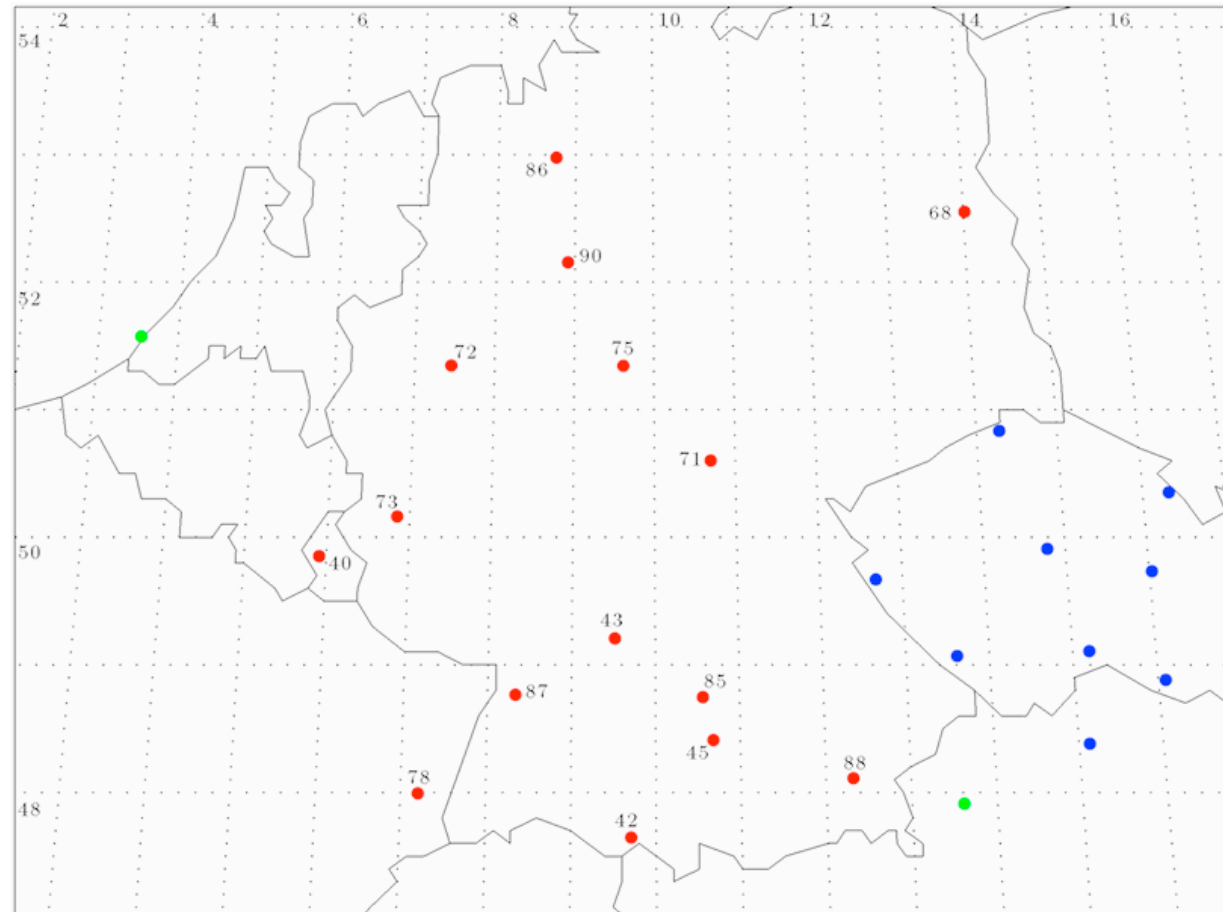
The European Fireball Network 2011 – Status of Cameras and Observation Results in Germany

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German Aerospace Center / Institute of Planetary Research Berlin**



The European Fireball Network: Locations of the 15 German Cameras

- operating since 1966
- classical type cameras
- ~1 Mio qkm
- ~30 fireballs / year
- <http://www.dlr.de/feuerkugelnetz>





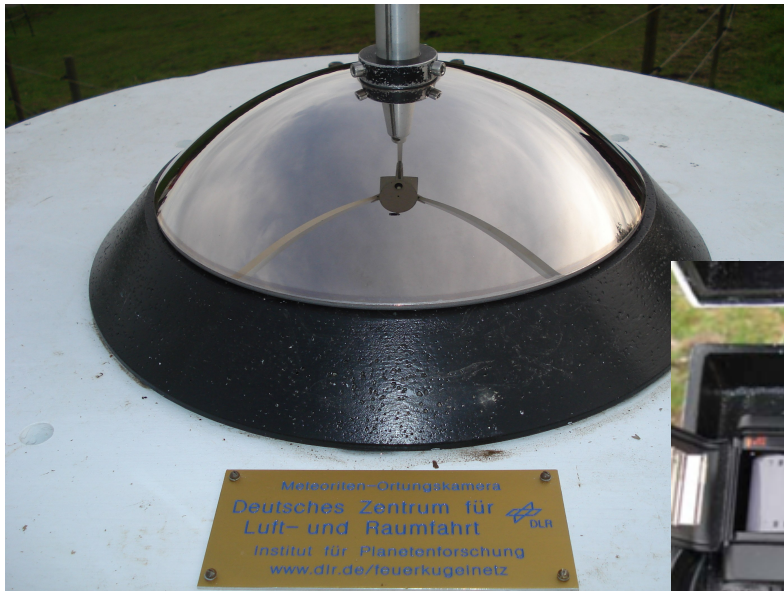
The European Fireball Network

- ~26 camera stations in Czechia, Germany, Slovakia, Netherlands, Luxembourg, France and Austria
- Mean distance: about 100 km
- Classical cameras on a tripod take a photo (one per night) of a parabolic all-sky mirror (cameras in Germany)
- Rotating 12.5 Hz shutter to measure angular velocity
- From observations of at least two stations calculation of meteor trajectory and solar orbit
- More meteor observers with mostly video cameras in Spain, France, Poland, North Ireland, ...
- Loose collaboration of all observers via IMO (International Meteor Organisation; <http://www.imo.net/>)
- Annual meeting of amateurs and professionals at IMC (International Meteor Conference)



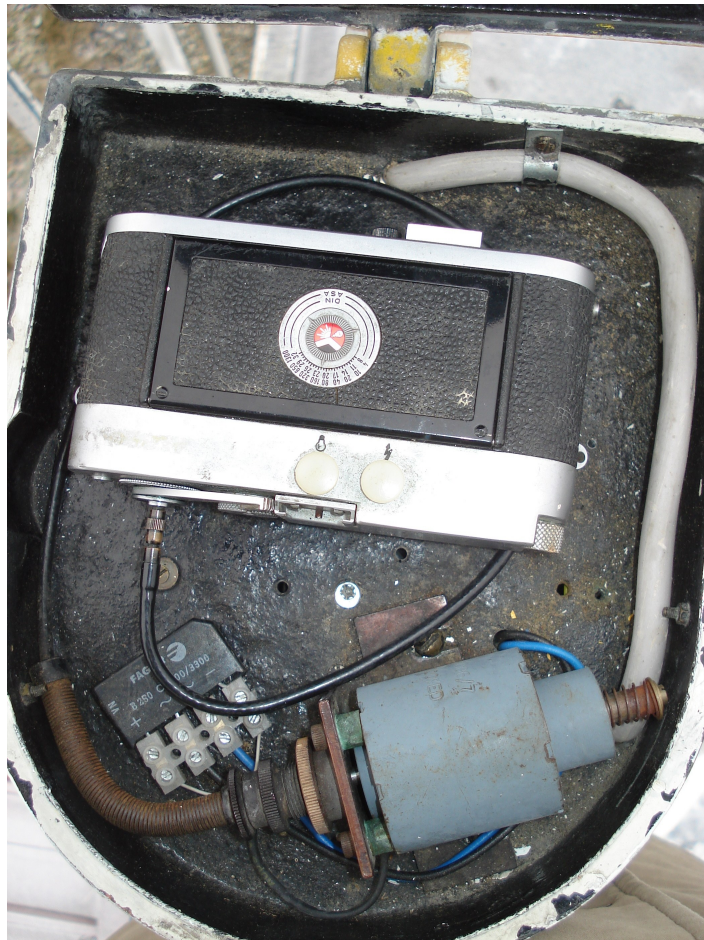
Classical All-Sky Mirror Stations

Robust design, suitable for bad weather conditions, not requiring complex protection



Change to Automatic Cameras

Leica cameras (in regular operation since 1966): Manual film transport



Some old Leica bodies were replaced by Konica Hexar RF: Automatic film transport





Station: EN42 Neukirch (Lake Constance)



Fireball Statistics 2011

- Number of observed bright meteors in 2011 was even higher than 2010 !

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Fireballs	24	17	31	35	38	31	41	29	36	59
Images	65	36	58	58	52	55	61	43	82	81

- Stations particularly successful: #40 Grevels, #42 Neukirch, #45 Streithelm, #68 Liebenhof, #71 Suhl, #73 Daun, #75 Benterode, #88 Oberreith, and #90 Kalldorf
- Data reduction and orbit reconstruction was carried out for 6 meteors (Ondřejov Observatory, P. Spurný and team)
- New „quick“ data reduction scheme was tested (DLR/TU Berlin, D. Heinlein and A. Margonis)
- Brightest meteor recorded in 2011: magnitude of -10^m (May 4).
- No meteorites found, but 1 suspected meteorite dropper (May 23)



Simultaneous Observations

- 58 fireball co-registrations with other EN stations
- 21 simultaneous events jointly observed with Ondřejov, Czech Republic, e.g.



Detail image of the fireball of
2011, May 21, 21:48:22 UTC
fish-eye camera #4 Churánov/CZ

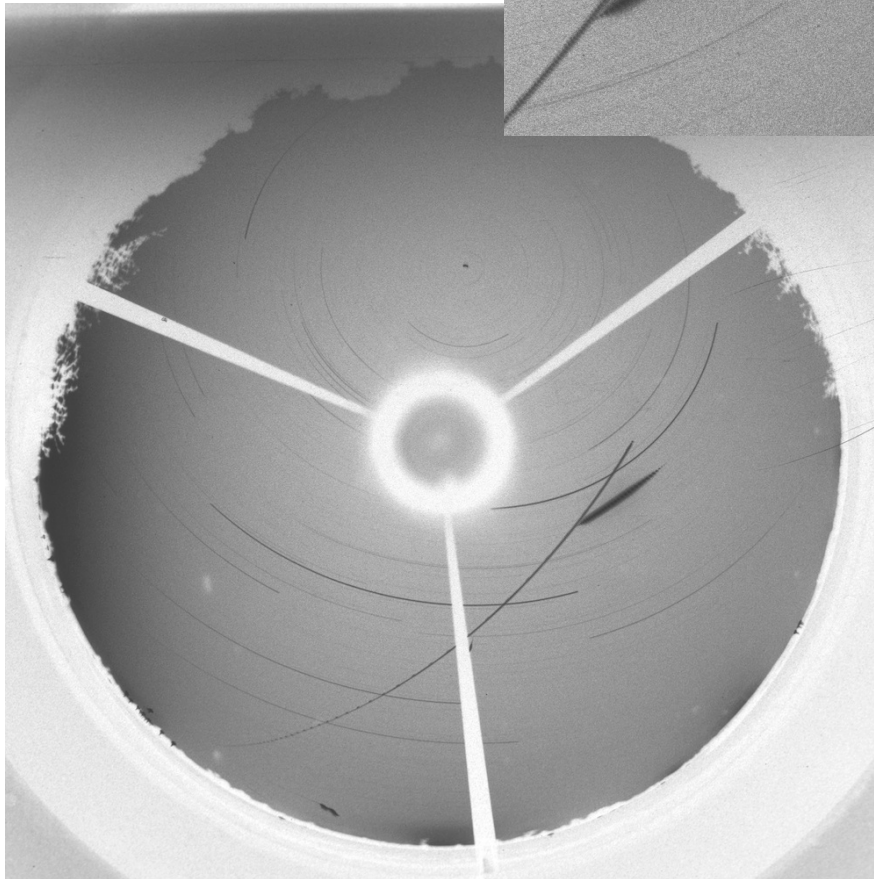
(Heinlein/Spurný, Meteoros 12/2011, p.291-295)

- >20 simultaneous registrations with amateur cameras and with cameras on meteorological stations in Poland, Austria, and Germany

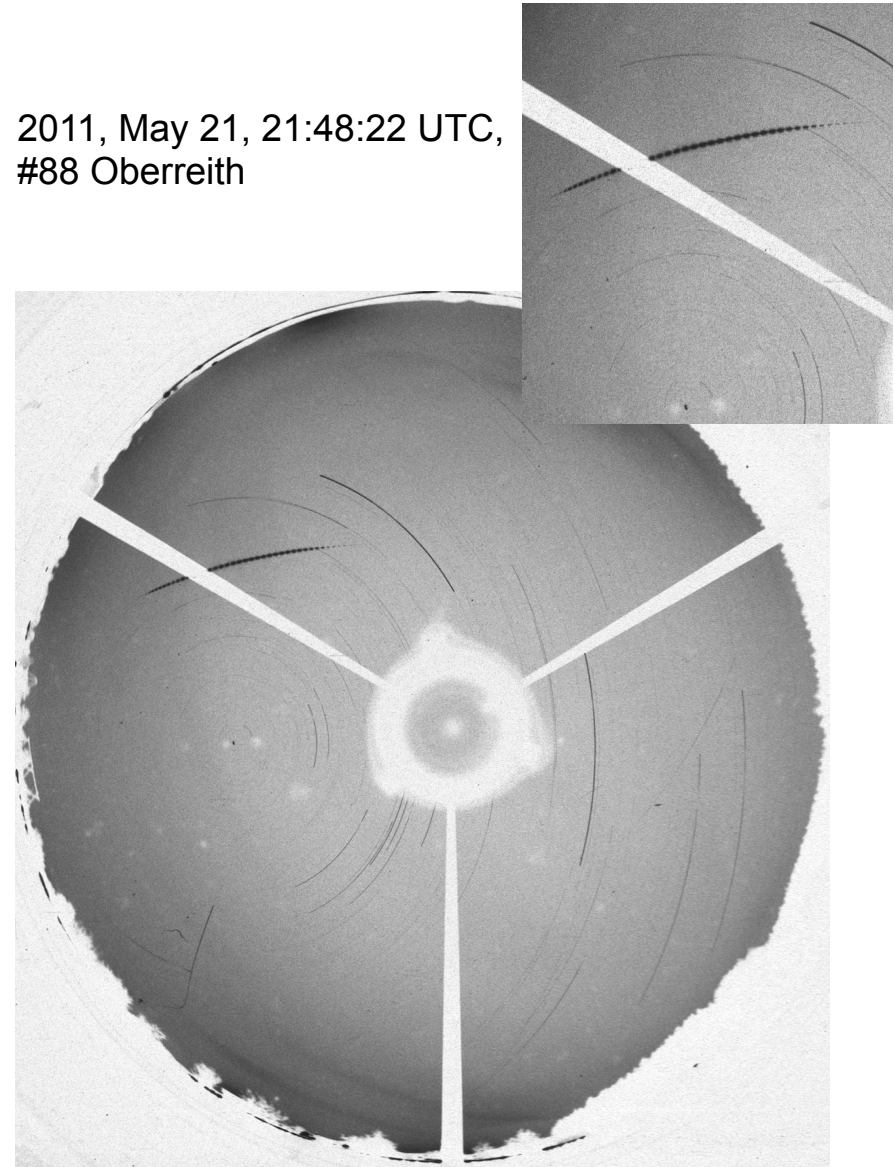


Fireballs

2011, May 4, 23:12:37 UTC,
#68 Liebenhof near Berlin



2011, May 21, 21:48:22 UTC,
#88 Oberreith



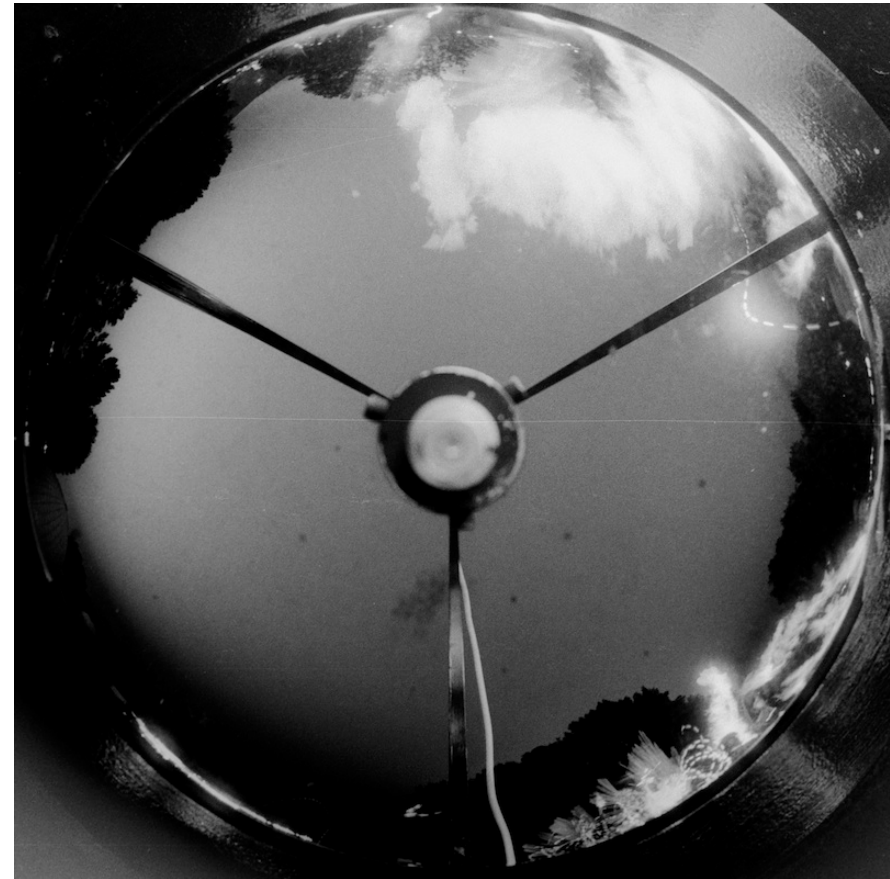


„Fireballs“

2011, June 4/5
#72 Hagen, Thunderstorm



2011, July 29/30
#71 Suhl, Fireworks

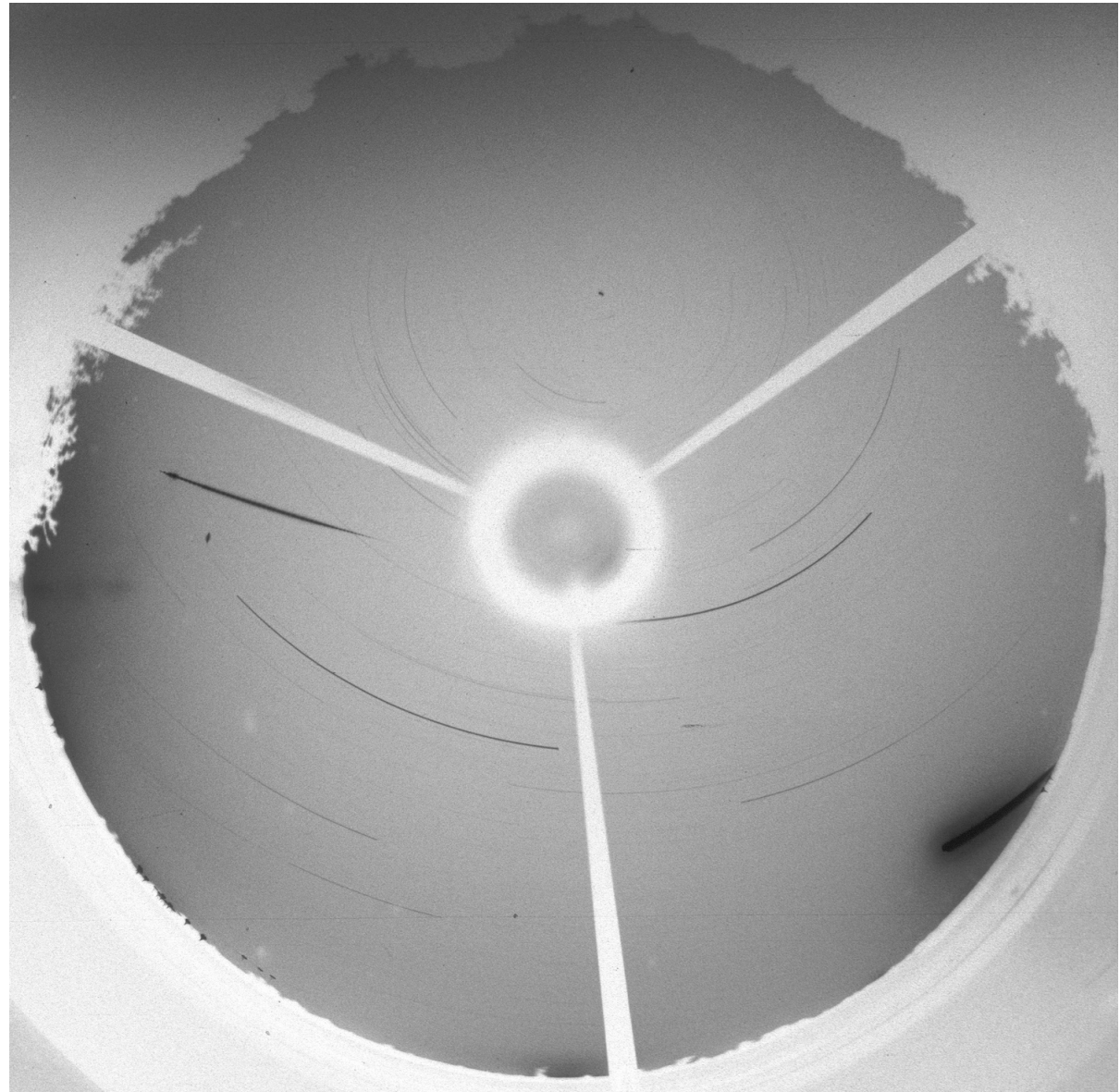
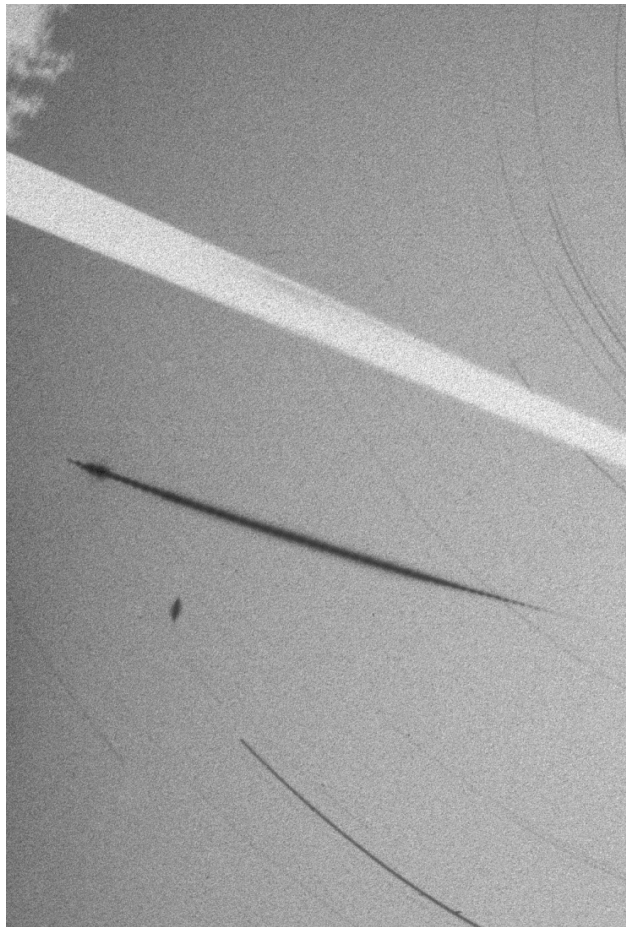




Fireballs

„Berlin-Tegel meteorite“ (cf. next slides)

2011, May 23, 21:14:20 UTC,
#68 Liebenhof near Berlin





Berlin-Tegel Meteorite

- Fireball observed by A. Knöfel with MOBOTIX camera at the meteorological station Lindenberg south-east of Berlin and by P. Spurný et al. in Ondřejov
- Ondřejov team quickly recognized the event to be „meteorite dropper“ ➡
- Data processing (carried out by P. Spurný and Ondřejov team; using images from Czech stations, Lindenberg and Liebenhof) showed that the fireball occurred just above downtown Berlin !
- But: **No** reports from eye and ear witnesses, **no** hype in local media!
- No evidence in the noise records regularly made by Berlin's two airports
- But: event was identified in data from infrasound station IS26, Freyung, Bavarian Forest (range: 400 km)



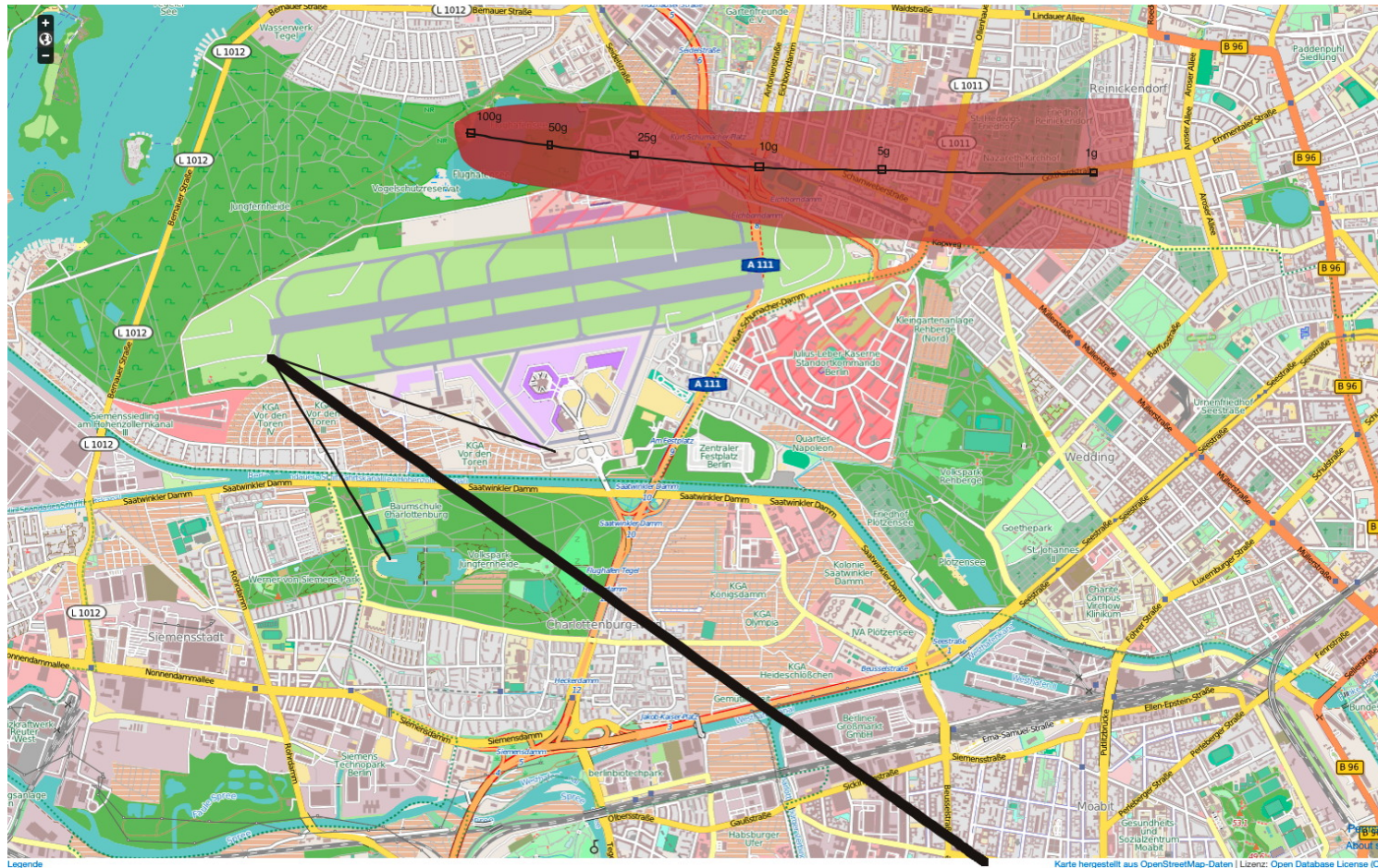
Berlin-Tegel Meteorite



Fireball trajectory above the city of Berlin (analysis: P. Spurný et al.)



Berlin-Tegel Meteorite

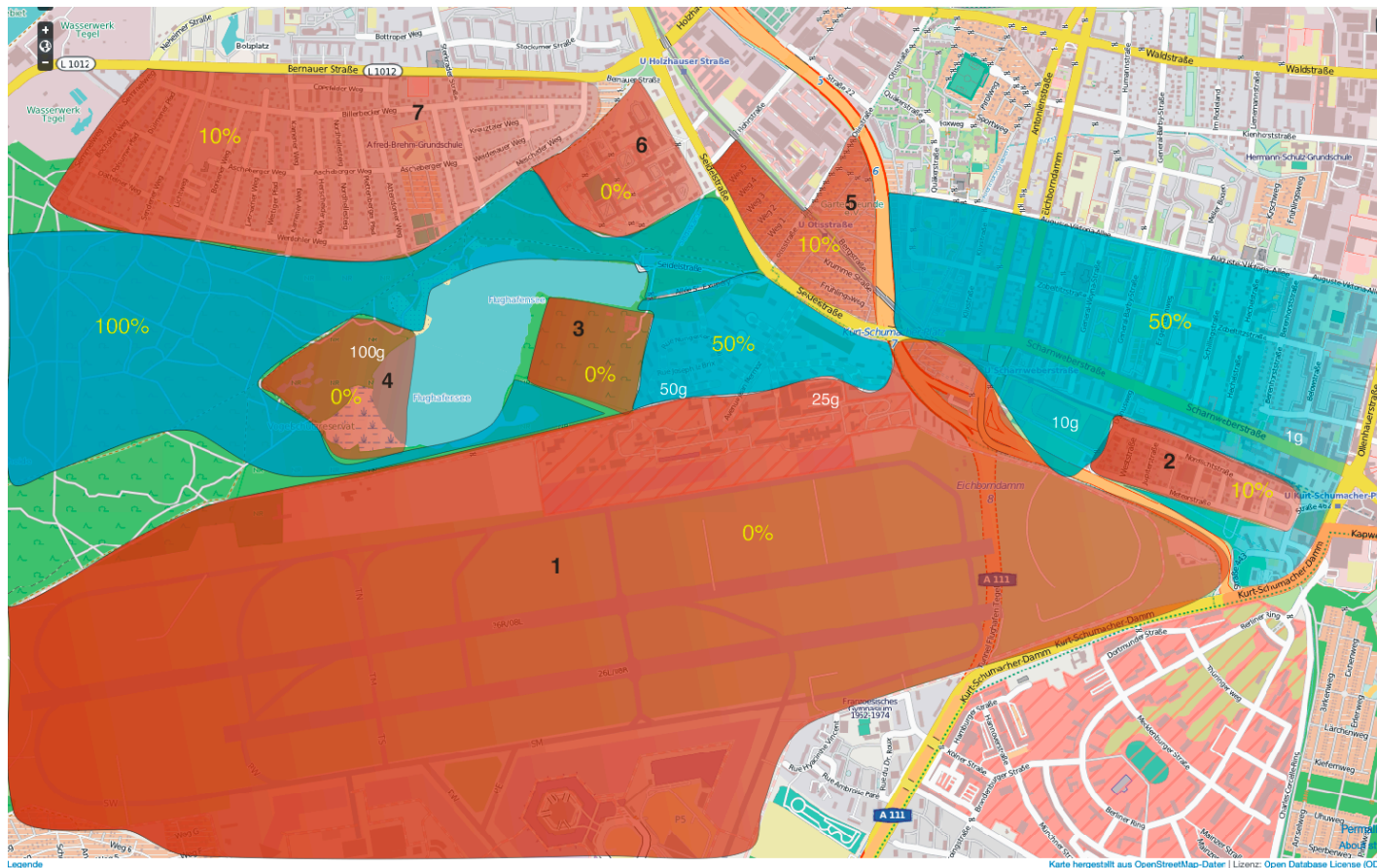


The arrowhead shows the end of the luminous trail of the meteoroid trajectory

Due to strong wind the fall area is significantly displaced

(analysis: P. Spurný et al.)

Berlin-Tegel Meteorite



The fall area is very uncomfortable for meteorite „hunting“:

airport Tegel (1), military restricted area for government aircraft (1), lake, forest, wildlife sanctuary (4), prison (6), otherwise densely populated (much „private property“, many roofs) (2,5,7); etc. (e.g. 3); human activities like regular lawn cutting, street cleaning

Percentage of accessibility

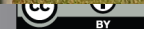
Berlin-Tegel Meteorite



No meteorite recoveries, only meteorite-like waste from 2nd World War...
(pictures: T. Grau)



Deutsches Zentrum
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EPSC2012

Berlin-Tegel Meteorite

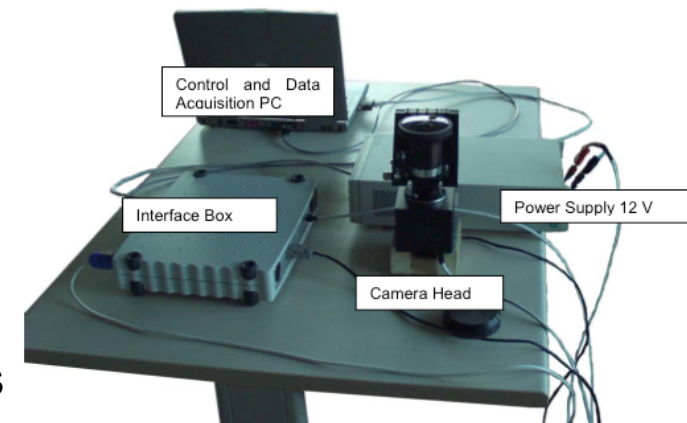


No meteorite recoveries, only meteorite-like waste from 2nd World War...
(pictures: T. Grau)



SPOSH Camera (Smart Panoramic Optical Sensor Head)

- Developed at DLR and Jena Optronik under ESA contract
- Cameras designed for space applications
 - Custom-made optical system, high light-gathering power
 - Highly sensitive 1024 x 1024 CCD
 - Operating at high image rate (image/2 s)
 - DPU with built-in event detection software
- Also popular for running meteor campaigns
- 4 cameras currently available (2x DLR, 1x ESTEC, 1x Jena Optronik)





SPOSH Camera (Smart Panoramic Optical Sensor Head)



jena**op**tronik
Aerospace and Security



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EPSC2012

Perseids Campaign 2011

- Two observation locations: Mainalon & Mt. Parnon in Greece
- This campaign: monitoring of early Perseids activity (July 22 ... 30)
- ≈ 3.000 meteors recorded (Perseids, sporadics, κ -Cygnids, δ -Aquarids, Capricornids)
- Great support by Greek amateurs!
- This year's campaign report on a separate poster!!

