

# Update of the FRIPON project and the determination of meteor trajectory

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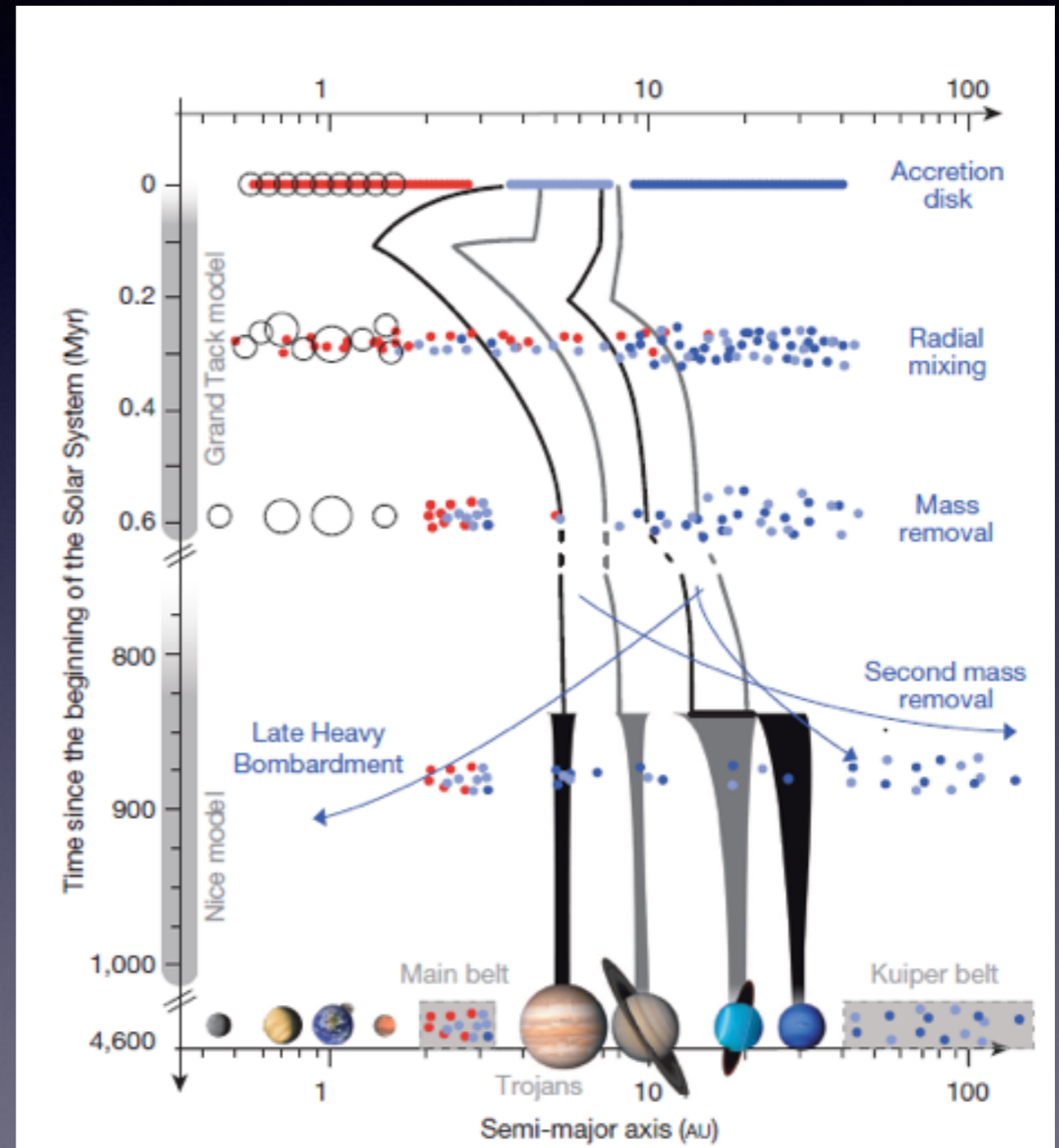
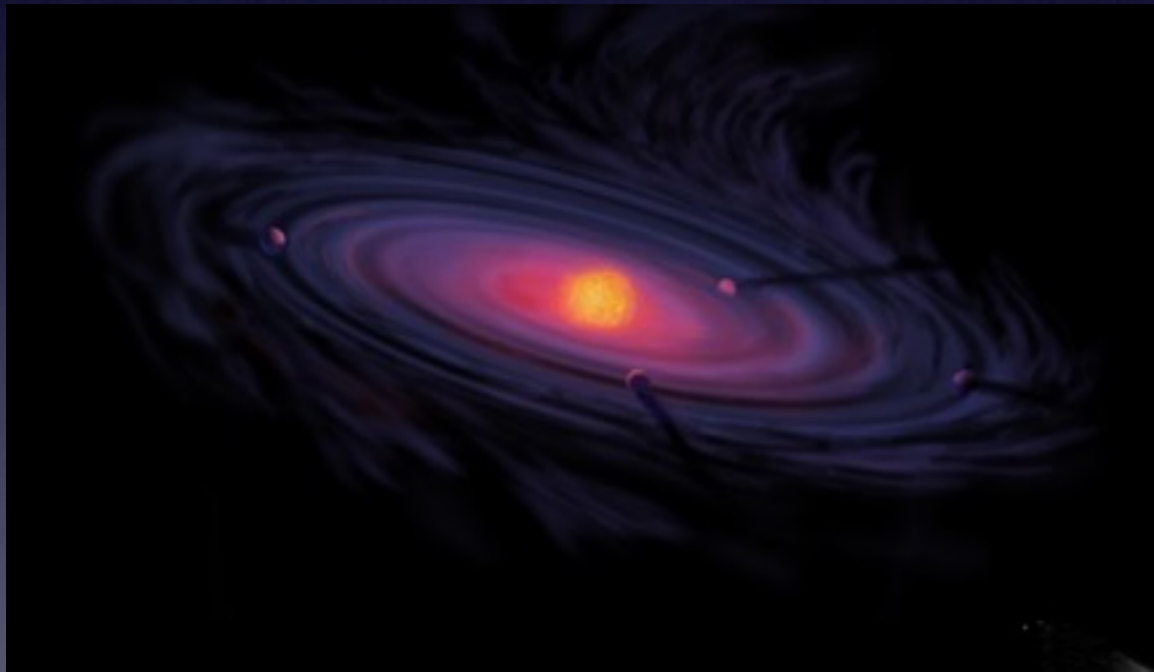
and C. Marmo, Y. Audureau, S. Bouley, B. Zanda, C. M. Birlan, P. Vernazza, J. Gattacecca, S. Caminade, L. Maquet

BRAMS 2015, Brussels

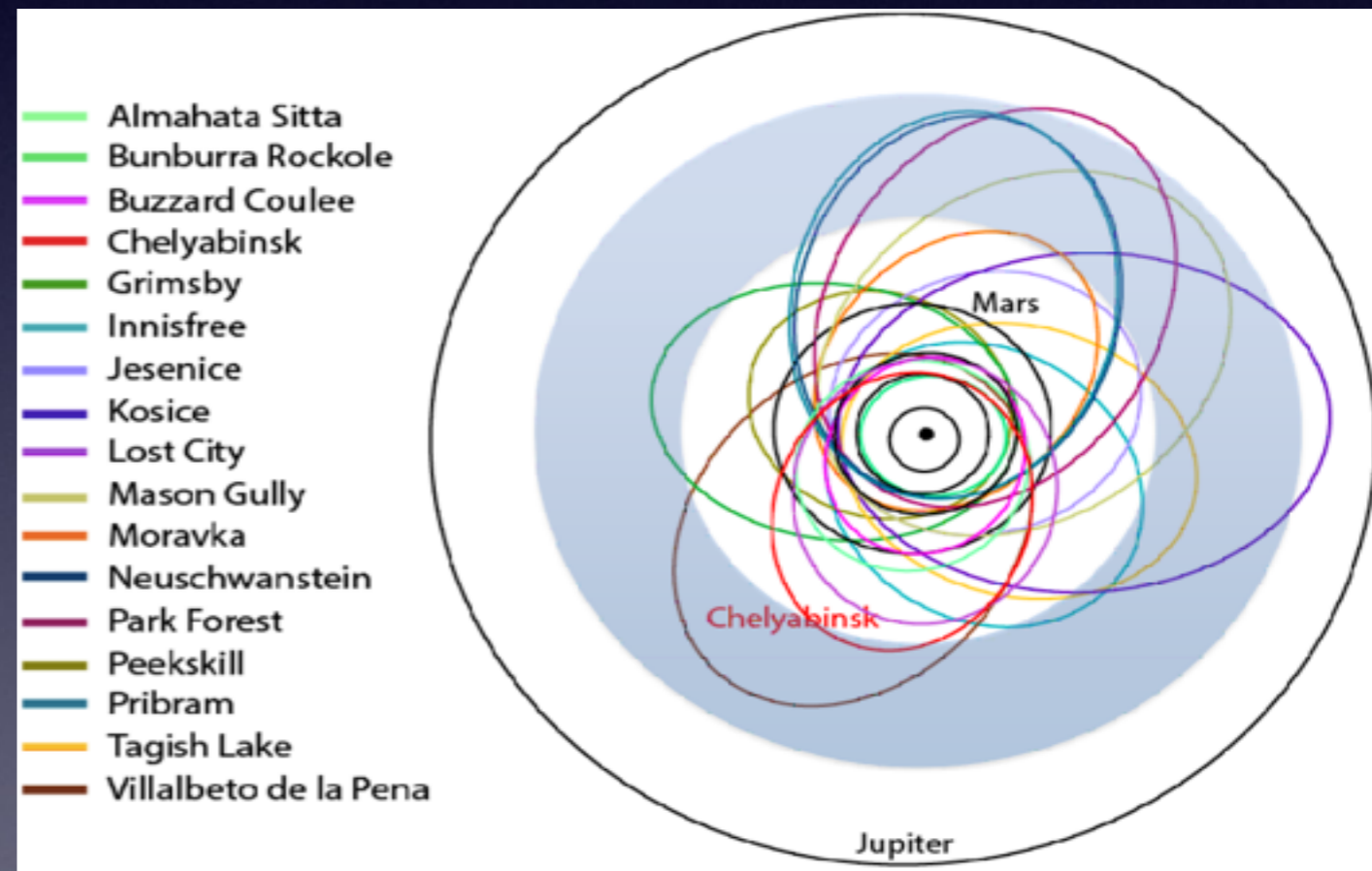
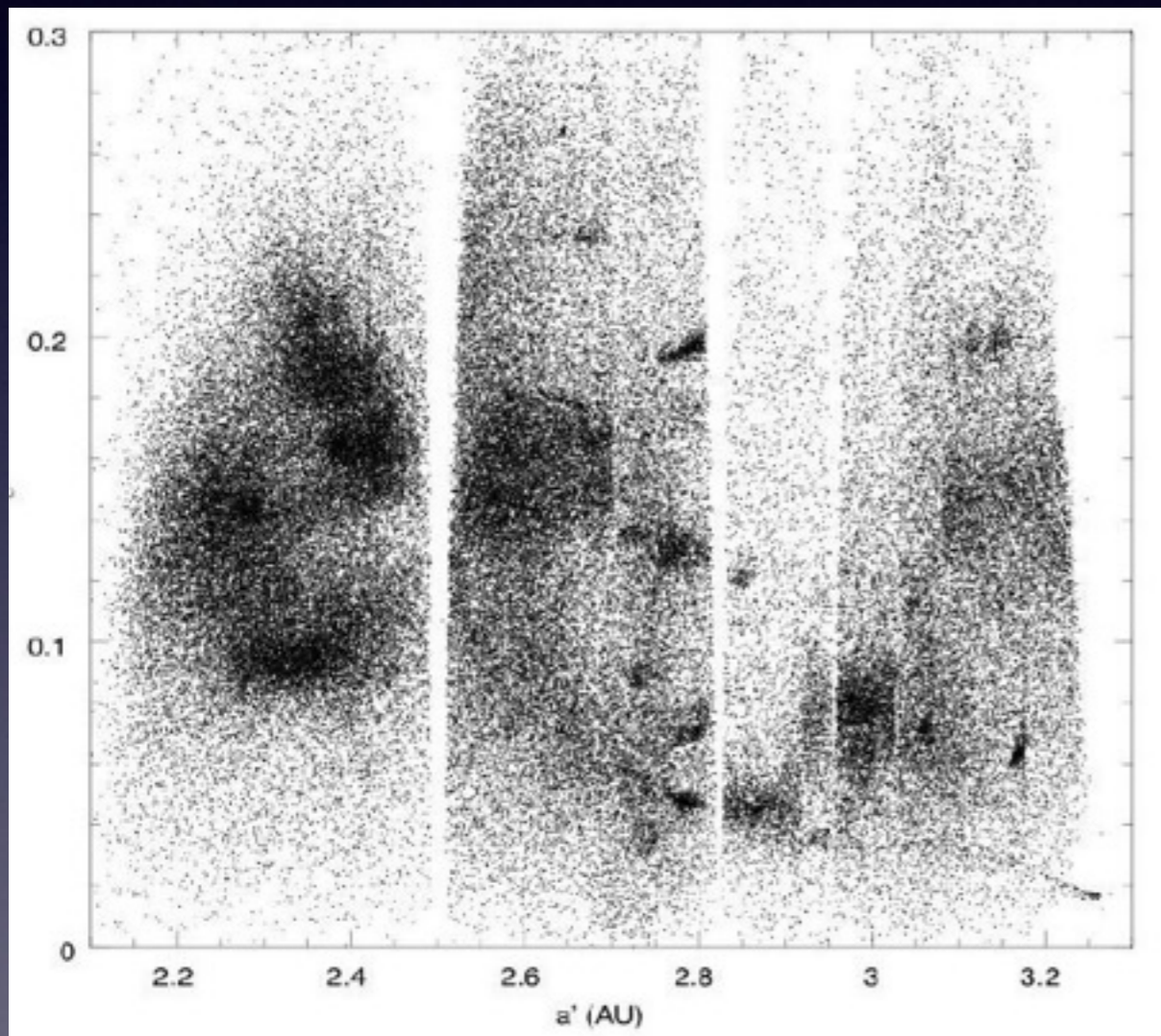
# Outline

- FRIPON project in short
- Network
- Hardware
- Software
- Connection with BRAMS
- Towards understanding/reproducing a meteorite fall

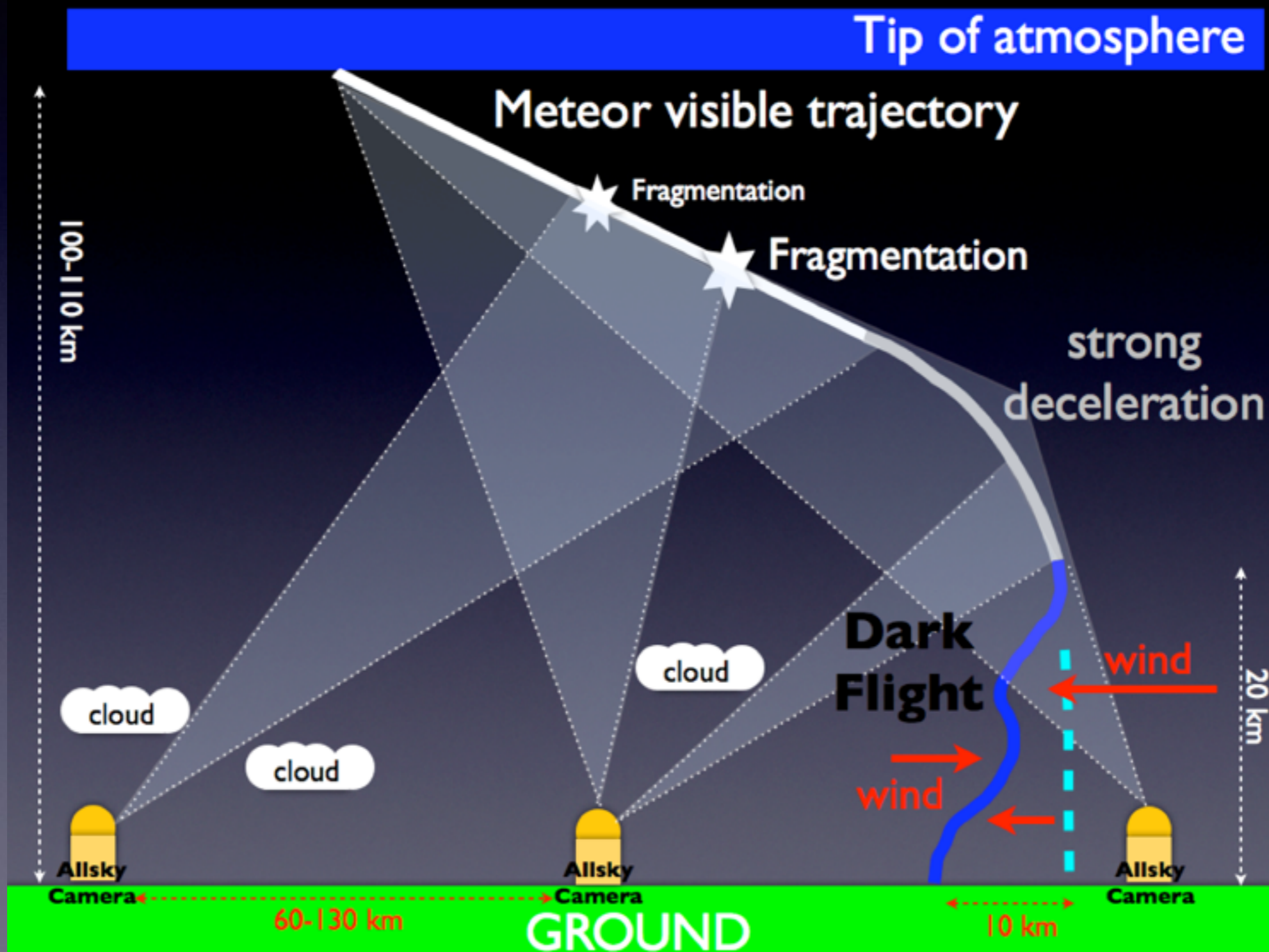
# Origin of the Solar System



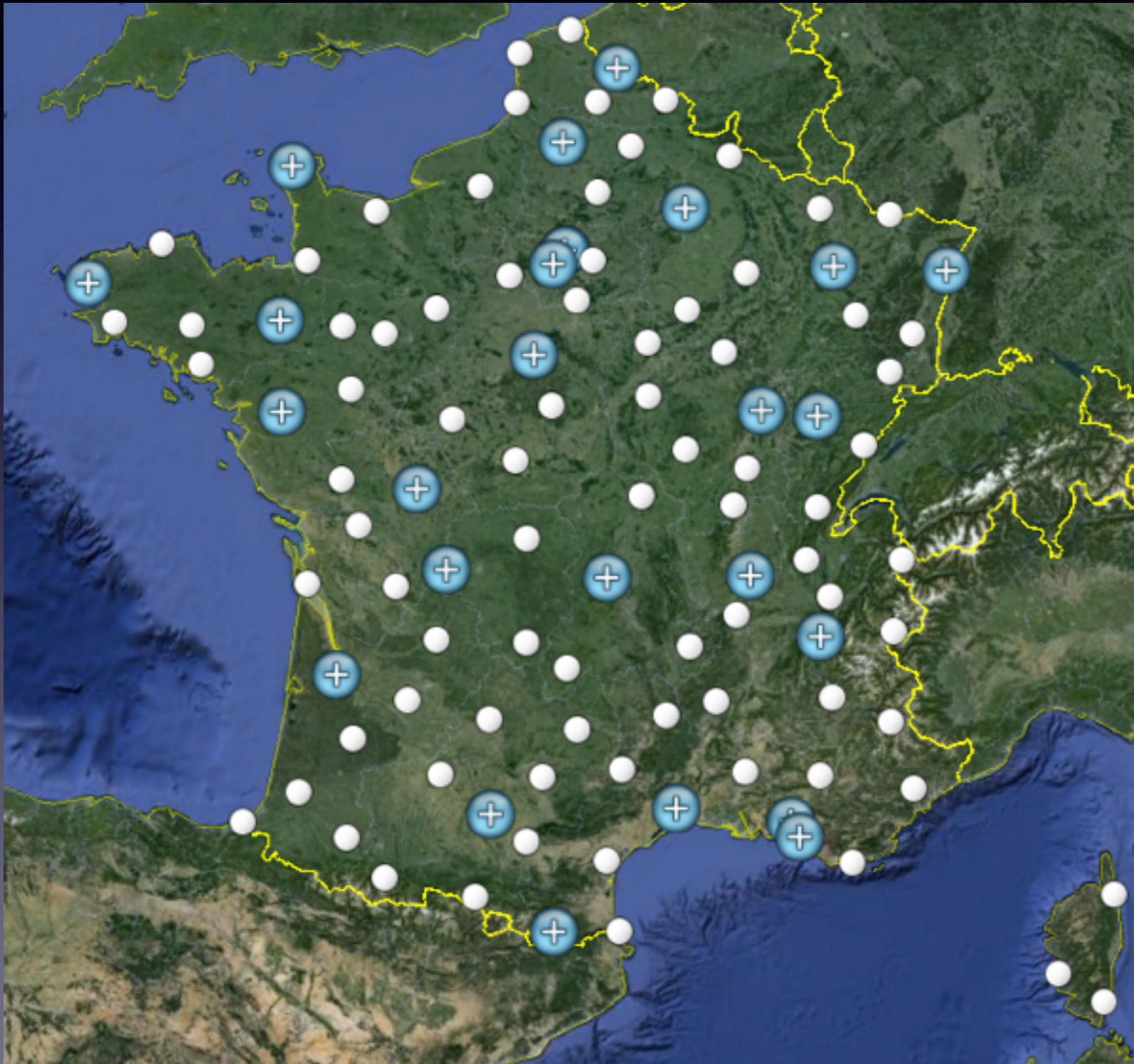
# Origin of real meteorites



# FRIPON principle



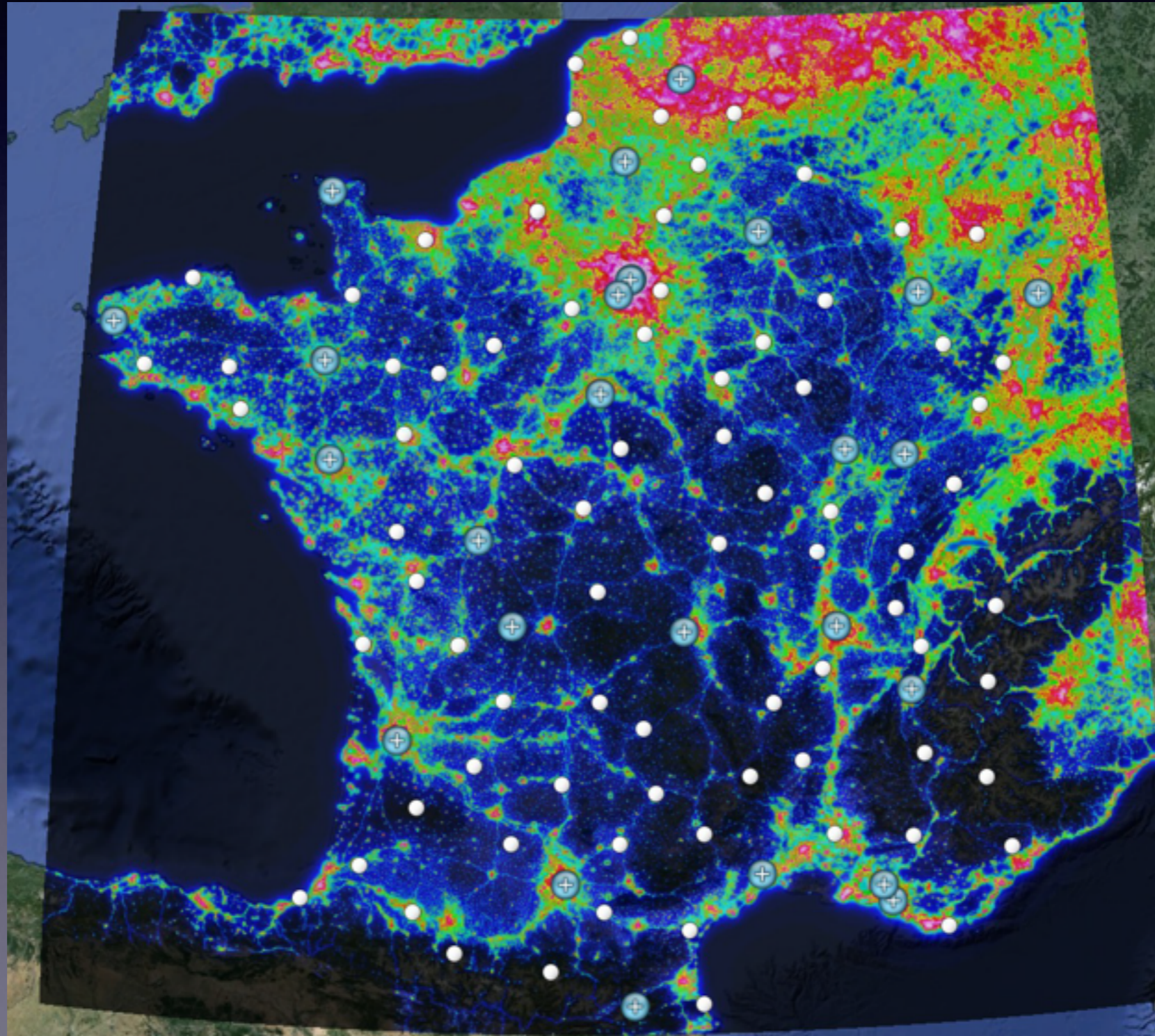
# FRIPON network



06/2015:  
~50 cameras

whole network  
running by 2016

# FRIPON vs light pollution





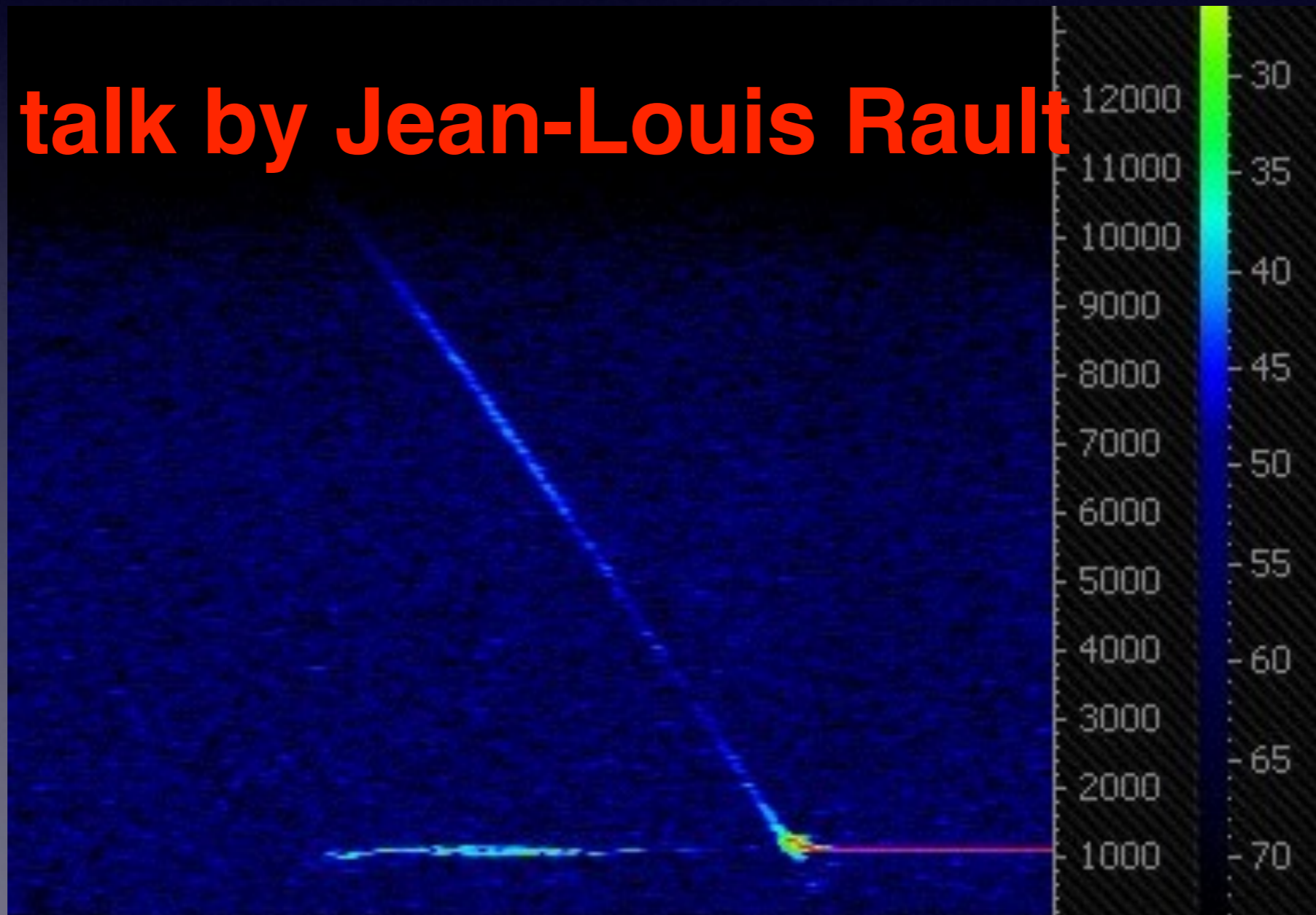
# The camera





# Radio device

- **cf talk by Jean-Louis Rault**



# Softwares

- Detection: FreeTure: available on ghitub since Dec 2014
- Astrometry: dev. by M.K. Kwon & C. Marmo: 0.1-0.3 pixels (1') accuracy so far: may be perfected, (90% done)
- Trajectory & Orbit: dev. by M.K. Kwon, with participation of A. Egal (see next slides): may be perfected, 90% done
- Dark Flight: dev. by M. Mougeot (2013) & M.K. Kwon (2015), to be perfected, 90% done

# Trajectory & orbit determination

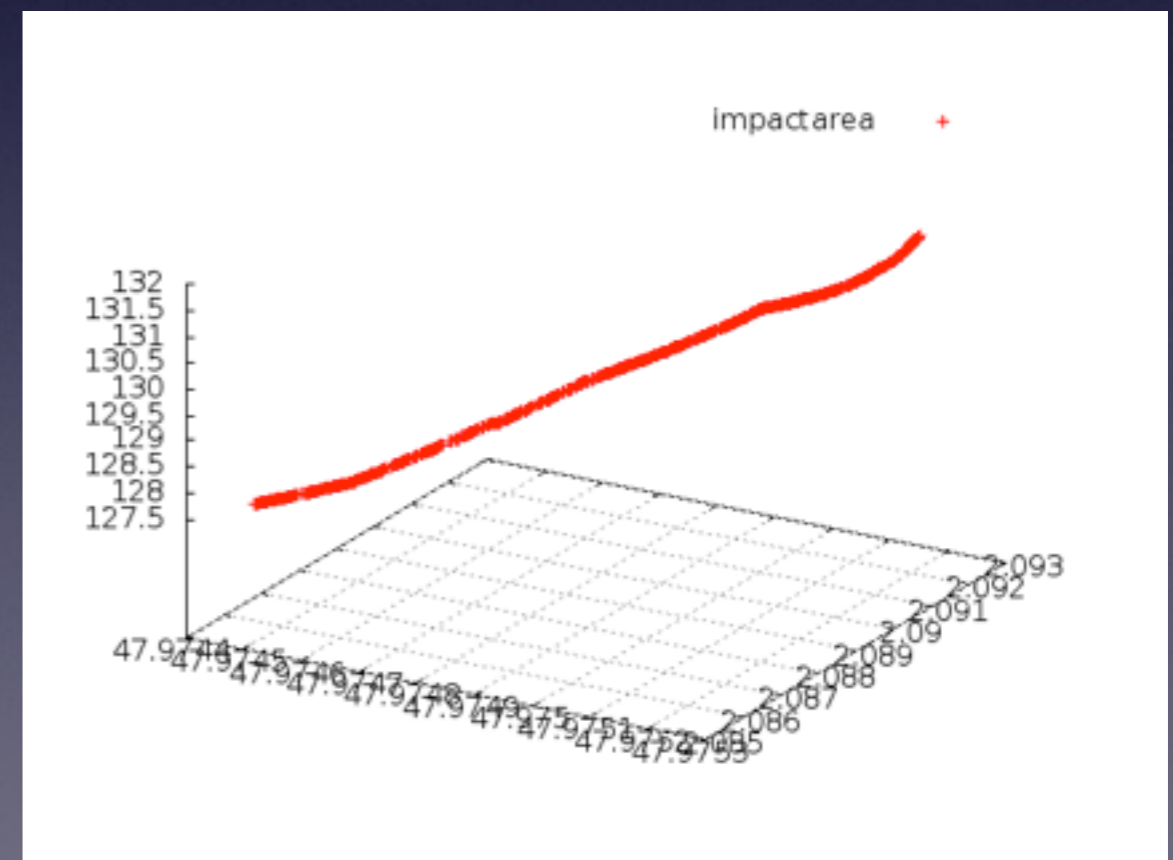
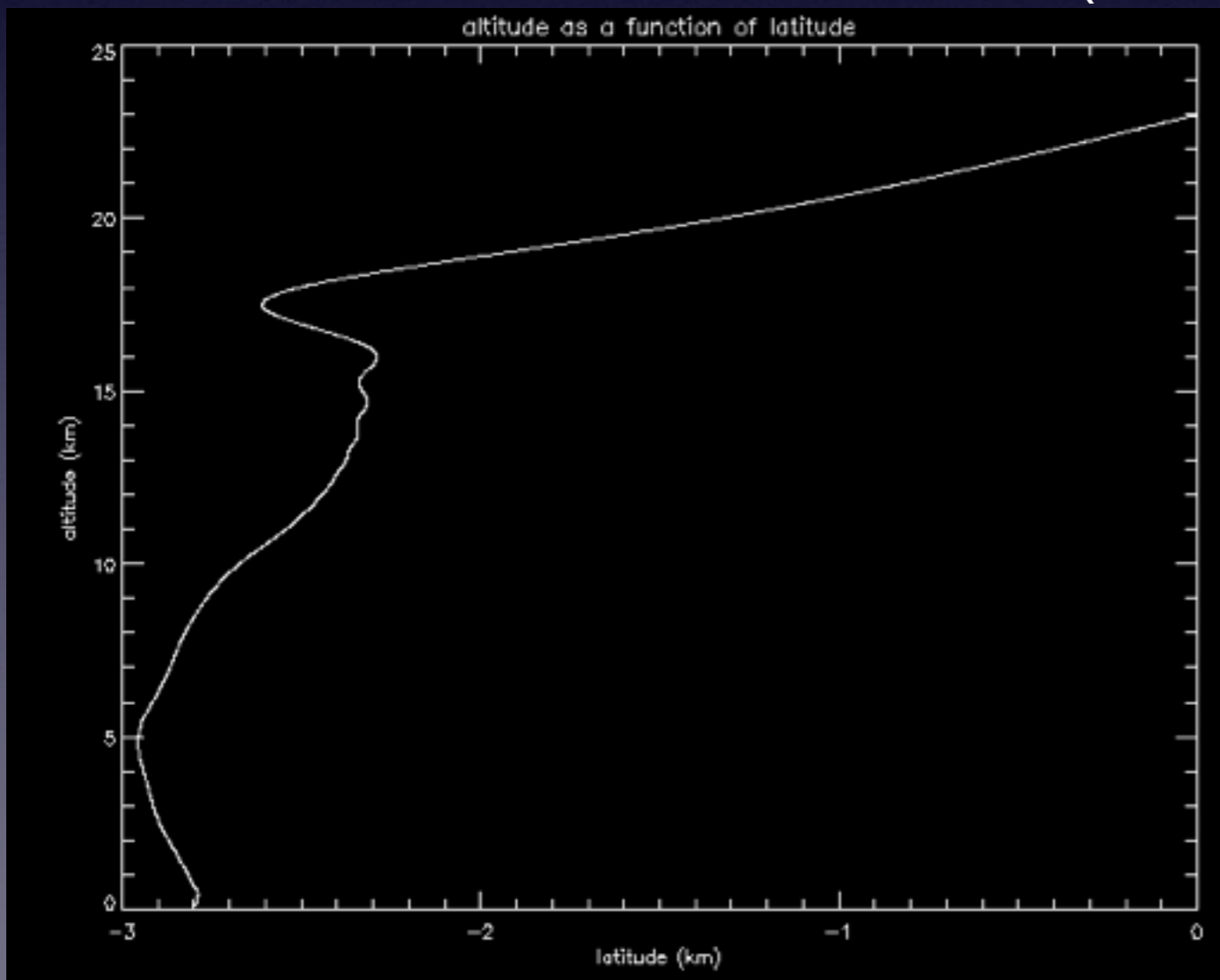
# Dark Flight simulation

(M. Mougeot - IMCCE, 2014)

Input: position, velocity, mass-density,

Wind=f(alt) (from MeteoFrance)

MNT (from IGN)



# Connection with BRAMS

- Observe with BOTH radar and video
- Compare: magnitude, duration, profile
- Complement: electron density vs light curve ;  
role of velocity, mass
- Extend network and capabilities

# Towards reproducing/ understanding a meteorite fall

## Disintegration

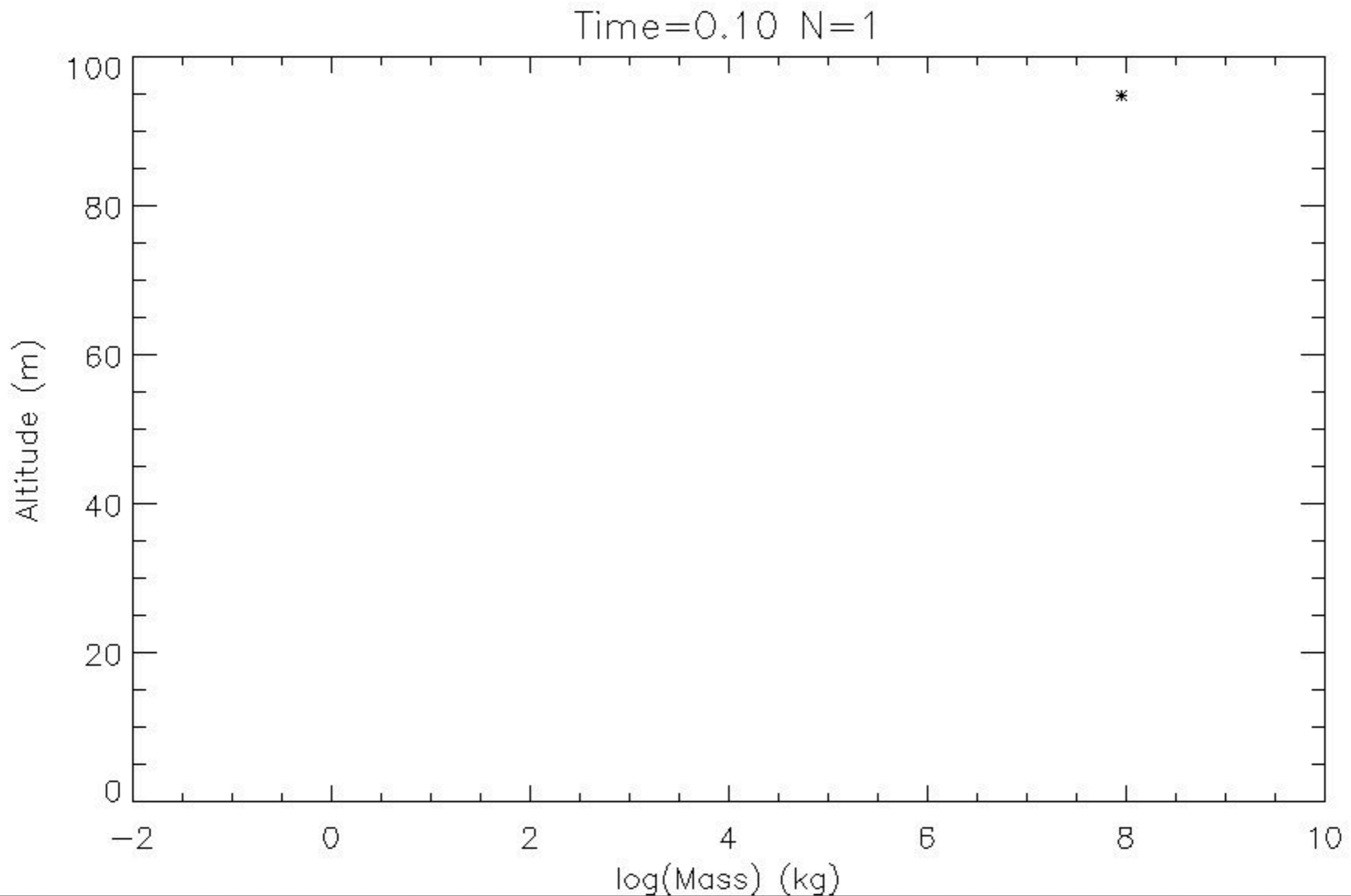
$$dm/dt \propto 1/Q_{\text{heat}} \rho_{\text{atm}} V_{\text{met}}^3$$

$$dV/dt \propto C_x V_{\text{met}}^2/r_{\text{met}} \rho_{\text{met}}/\rho_{\text{atm}}$$

## Fragmentation

$$P \propto \rho_{\text{atm}} V_{\text{met}}^2$$

# Chelyabinsk: Simulations



# Conclusion

- Network ready
- Software: making progress in all aspects
- 90% ready, meaning we still need 90% of time to fix the last 10%...
- FRIPON@BRAMS: in 2015 :-)