CONNECTING METEORS AND METEORITES: FLIGHT TRACK, SPECTRA, FINDING AND LABORATORY ANALYSIS – SUGGESTION FOR A COLLABORATIVE ACTION


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Work toward: joined European network of meteor observatories, experimental laboratories and geologists.

Existing capacities (Hungary, Czechia, Greece):
- meteor cameras in Europe
- radio observations (SID monitoring and radars).
- meteor spectra observations
- meteorite analysing laboratory facilities
- plasma laboratory facilities

Fast progress in last decade:
- separated projects on the „same meteor” targets
- suggestion for joining forces (from „geology domain”)
But who is this newcomer guy (me) to suggest what IMO members have already thought a lot about?
Hungary, national funding GINOP („Cosmic based risks”) project

- Near Earth asteroid follow-up and discovery
- Fireball cameras → occurrence, frequency, high temporal resolution lightcurve
- Lunar impact flash observation (0.8 m telescope) → impact occurrence, frequency
- Ionsonde (ionosphere analysis) → meteor plasma channel
- Lunar crater analysis (recent impacts) → improve bombardment rate
- Laboratory meteorite sample analysis → provide data for composition of Earth bombarding objects

Nice synergy ... would be interesting to have resemble at international level related to „IMO community”
EXISTING DATA FROM LABORATORY FACILITIES

Existing background:
• optical, infrared, X-ray, Raman, laser, spectroscopes... (mainly non destructive analysis)
• range of meteorite samples + mineral references materials are accessible

Analysis could provide:
• elemental composition $\rightarrow$ element ratio
• spatial heterogeneity $\rightarrow$ lightcurve
• laser ablation tests $\rightarrow$ ratio of released elements
LASER PLASMA LABORATORIES: REGULAR LIBS AND TERAWATT-CLASS LASERS
VALASSKE MEZIRICI OBSERVATORY: VIDEO, SPECTRA, RADAR AND SID MONITORING OBSERVATION
HUNGARIAN METEOR CAMERA FACILITIES
Connect meteorite data with meteor data:

- use existing information on meteorite composition
- support information exchange (cloud database?)
- a software under preparation for trajectories and estimation of elemental composition from spectra (MeteorMaster)
- research on dynamics of meteors
- correlate composition and orbit (statistics)
- cooperation on related topics (evolution of the solar system, origin of life, astrochemistry).
correlate observed fireball element ratios with meteorite composition for main (Fe/Mg/Na) or specific elements (like Cr)
iron meteorites are stronger with higher Fe/Na ratio than stony meteorites → could this be connected to ablation („iron” asteroid vs. non „iron fireballs”, from showers)?
more fragile (stony) meteoroids ablate higher → different spectra?
light curve with terminal peak from stronger/harder meteoroids (?) → more Fe rich spectra?
meteorite fusion crust analysis (which elements are „missing”) → connect to ablation produced spectra
search for scale of heterogeneity → number of fragmentation points?

All these are ideas not more – but could be confirmed/rejected by joint activity.
starting between HU-CZ-GR-RU
focusing on meteor spectra – meteorite composition – fireball lightcurve synergy (first phase: searching for correlations...)
yet only as a „community action”
but potential for larger collaboration exists
further funding is necessary

So here we (as a small group) are
searching for collaborators
open to involve existing projects and networks

Please contact us at the meeting! (Martin Ferus, Krisztian Sarneczky, Jakub Koukal, Antal Igaz, Akos Kereszturi)
THANK YOU FOR YOUR ATTENTION!