THE PREDICTION OF METEOR SHOWERS FROM ALL POTENTIAL PARENT COMETS

M. Hajduková Jr., L. Neslušan, D. Tomko, Z. Kaňuchová, and M. Jakubík

Astronomical Institute,
Slovak Academy of Sciences, Slovakia
MODELING METEOROID STREAMS

Objective: to map the whole meteor-shower complex of a potential parent body which was formed due to **gravitational action**

- Comets in orbits distant from the Earth’s orbit
  - can associate a stream crossing the Earth’s orbit

- Comets in orbits close to the Earth’s orbit
  - can associate several meteor showers

RESULTS

- **New meteor showers** predicted to be observed
- **New parent bodies** associated with known meteor showers suggested
COMET C/1917 F1 MELLISH
LONG-PERIOD COMET C/1917 F1 MELLISH
LONG-PERIOD COMET C/1917 F1 MELLISH

- Video meteors
- Photographic meteors
LONG-PERIOD COMET C/1917 F1 MELLISH

- Video meteors
- Photographic meteors
LONG-PERIOD COMET C/1917 F1 MELLISH

- Video meteors
- Photographic meteors
IDENTICAL METEOR-SHOWER COMPLEXES
COMET 96P/MACHHOLZ
ASTEROID 2003 EH1
COMET 96P/MACHHOLZ
COMET 96P/MACHHOLZ

- Video meteors
- Photographic meteors
COMET 96P/MACHHOLZ

- Video meteors
- Photographic meteors
ASTEROID 2003 EH1
ASTEROID 2003 EH1

- Video meteors
- Photographic meteors
ASTEROID 2003 EH1

- Video meteors
- Photographic meteors
THE EVOLUTION OF THE METEOR–SHOWER COMPLEXES OF ASTEROID 2003 EH1 AND COMET 96P / MACHHOLZ, WHICH BECOME, AFTER SUFFICIENT TIME, NEARLY IDENTICAL

500 years
IDENTICAL COMPLEXES

1000 years

THE EVOLUTION OF THE METEOR–SHOWER COMPLEXES OF ASTEROID 2003 EH1 AND COMET 96P / MACHHOLZ, WHICH BECOME, AFTER SUFFICIENT TIME, NEARLY IDENTICAL
IDENTICAL COMPLEXES

2000 years

THE EVOLUTION OF THE METEOR–SHOWER COMPLEXES OF ASTEROID 2003 EH1 AND COMET 96P / MACHHOLZ, WHICH BECOME, AFTER SUFFICIENT TIME, NEARLY IDENTICAL
IDENTICAL COMPLEXES

2900 years

THE EVOLUTION OF THE METEOR–SHOWER COMPLEXES OF ASTEROID 2003 EH1 AND COMET 96P / MACHHOLZ, WHICH BECOME, AFTER SUFFICIENT TIME, NEARLY IDENTICAL
THE EVOLUTION OF THE METEOR–SHOWER COMPLEXES OF ASTEROID 2003 EH1 AND COMET 96P/MACHHOLZ, WHICH BECOME, AFTER SUFFICIENT TIME, NEARLY IDENTICAL
IDENTICAL COMPLEXES

3100 years

THE EVOLUTION OF THE METEOR–SHOWER COMPLEXES OF ASTEROID 2003 EH1 AND COMET 96P / MACHHOLZ, WHICH BECOME, AFTER SUFFICIENT TIME, NEARLY IDENTICAL
3200 years

THE EVOLUTION OF THE METEOR–SHOWER COMPLEXES OF ASTEROID 2003 EH1 AND COMET 96P / MACHHOLZ, WHICH BECOME, AFTER SUFFICIENT TIME, NEARLY IDENTICAL
IDENTICAL COMPLEXES

THE EVOLUTION OF THE METEOR–SHOWER COMPLEXES OF ASTEROID 2003 EH1 AND COMET 96P / MACHHOLZ, WHICH BECOME, AFTER SUFFICIENT TIME, NEARLY IDENTICAL

4000 years
NEW METEOR SHOWERS IN THE SOUTHERN HEMISPHERE PREDICTED
122P/DE VICO

$t_{\text{max}} = \text{June 24}$

$\alpha = 317.0^\circ$

$\delta = -52.4^\circ$
161P/HARTLEY-IRAS

t_{\text{max}} = \text{Sept. 25}
\alpha = 76.2^\circ
\delta = -23.4^\circ
MODELED STREAMS WITH DISPERSED RADIANTS
SYMMETRY ON THE SKY
SYMmetry with respect to the Earth’s Apex

Ecliptic-Toroidal Structure

C/1917 F1 MELLISH

122P/DE VICO

2003 EH1

96P/MACHHOLZ
CONCLUSIONS

- A single parent body can associate multiple showers.
- A shower can be associated to multiple parent bodies.
- Shower radiants of a complex are distributed on the sky symmetrically with respect to the Earth’s apex.
- Ecliptic-toroidal structure of complexes was found.
Comets 14P/Wolf and D/1892 T1 as parent bodies of a common, α-Capricornids related, meteor stream.
L. Neslušan (1999), A&A 351, 752

The parent bodies of the Quadrantid meteoroid stream.


Prediction of meteor shower associated with Comet 122P/de Vico.
D. Tomko (2014), CAOSP 44, 33

The meteor-shower complex of 96P/Machholz revisited.

Meteor-shower complex of asteroid 2003 EH1 compared with that of comet 96P/Machholz.

The meteor-shower complex of comet C/1917 (Mellish).

Ecliptic-toroidal structure of the meteor complex.