Outline

• Introduction to Draconids
• Past storms: “who” was responsible?
• The 2011 encounter: how many meteors?
• Consequences: where to go? what to do?
• Conclusion
Introduction to the Draconids

• parent body: comet 21P/Giacobini-Zinner
  - discovered in 1900, most depleted comet (A’Hearn et al. 1995)
  - Trail not always detected by IR obs (Telesco et al. 1986, Pittichova et al. 2008)
  - presence of organic matter in dust (Kiselev 2000)

• storms in 1933, 1946 (+10000/hr), outburst in 1952 (250/hr), 1985 (550 /hr), 1998 (500 /hr)

1946 Draconids by H. Kondo, observed from Japan (scan from P. Jenniskens “Meteor shower & their parent comets”)
Past storms: who was responsible?

Both cases: 1900 & 1907 trails

ZHR~10000/hr

ZHR~12000/hr
Dynamics of the 1900 trail
The 2011 encounter

<table>
<thead>
<tr>
<th>model</th>
<th>time on Oct 8th (UT)</th>
<th>ZHR (/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sato, Watanabe (2008)</td>
<td>17:05</td>
<td>100</td>
</tr>
<tr>
<td>Sato, Watanabe (2008)</td>
<td>20:36</td>
<td>500</td>
</tr>
<tr>
<td>MSFC (Moser 2007)</td>
<td>19:11</td>
<td>800</td>
</tr>
<tr>
<td>Maslov</td>
<td>20:42</td>
<td>40-50</td>
</tr>
<tr>
<td>1900 trail (Vaubaillon)</td>
<td>19:57</td>
<td>~600</td>
</tr>
<tr>
<td>1873-1894 trails</td>
<td>17:09</td>
<td>~60 (?)</td>
</tr>
</tbody>
</table>
Where to observe?

Courtesy D. Moser - MSFC/NASA
Problems - Solutions

- 1985 outburst not explained with this solution \( \Rightarrow \) need much older trails (uncertain by nature)

- Change in comet activity to explain the 1933 and 1946 storms (Watanabe & Sato 2007) \( \Rightarrow \) clues of what happened to the comet by observing the 2011 outburst
Questions to answer

• What really was the level in 1933 & 1946? => calibration with the 2011 outburst (same trail!)

• Where was the comet before 1900?

• Did the comet change its activity between 1900 and today? How?

• Definitely prove the presence and quantify the number of large grains
Conclusion

• 2011 Draconids: no storm, but almost (!)

• => get orbits from double-stations (see M.K. Kwon Java Applet at www.imcce.fr)

• European Airborne campaign in preparation: come talk to me!!! (proposal deadline: Sept 30th...)

• Clear skies!!!
Acknowledgements

• IMCCE, NAOJ, JSPS grant
• P. Rocher, P. Atreya, I. Sauli, M.K. Kwon, S. Bouley, F. Colas - IMCCE
• Aoki-san - NAOJ
• N. Nagatomi-san
• J. Giorgini - JPL
• IMC2010 LOC & SOC
Expected radiant

1900 trail

1887 trail