Jupiter and Saturn impact detection project

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➢ Sixth impact flash discovery since 2010 by Ethan Chappell (TX, USA) on 2019.08.07

➢ First discovery using DeTeCt software!
Excellent quality observation, medium flash brightness, no simultaneous observation.
➢ **Boost in project participation** in 15 months
   (+28% observers, +62% observations, simultaneous observations now 6%)

➢ **Users** doing a **regular monitoring** for impact detection and/or **providing >10d** of Jupiter observation coverage
   (Z. Pujic, M. Jacquesson, B. Loyola, P. Rolet,)

➢ **Regular planetary observers** joining in analyzing their **old acquisitions archives**
   (C. Foster, M. Lewis, ...)

➢ **Three discoverers in** the project
   (J. McKeon, S. Pedranghelu, E. Chappell) providing 3.3d of data

➢ **Professional initiatives** in the project

➢ **More systematic additional check of the detection images** by M. Delcroix
### DeTeCt impact frequency estimation (as of 2019.08.30)

<table>
<thead>
<tr>
<th>Planet</th>
<th>Frequency</th>
<th>Observers</th>
<th>Videos</th>
<th>Videos Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jupiter</td>
<td>~8.5 impacts/year</td>
<td>96</td>
<td>~112,000</td>
<td>~129 days</td>
</tr>
<tr>
<td>Saturn</td>
<td>&lt;24 impacts/year</td>
<td>30</td>
<td>~7,000</td>
<td>~15 days</td>
</tr>
</tbody>
</table>

### Discovery Project Results

- **Jupiter**: ~8.5 impacts/year (96 observers, ~112,000 videos, ~129 days of videos)
- **Saturn**: <24 impacts/year (30 observers, ~7,000 videos, ~15 days of videos)

### Software Improvements

Many improvements since beginning of 2019

✓ GUI
✓ Clearer messages / log
✓ Creation of zip file to be sent to delcroix.marc@free.fr
✓ Results in log file more readable
✓ Name of log files more explicit
✓ Counter of files processed
✓ Support of autostakkert session files
✓ Diverse algorithm improvements (alignment, RoI, invalid acquisition detection, ...)
✓ Improvement of datation
✓ (A lot of) bug fixes ;)
✓ Regular releases available through github https://github.com/DeTeCt-PSWS/DeTeCt-MFC
Improvement of interpretation of algorithm and detection images results
✓ Usage of minimum duration for flash candidate brightness change (0.6s)

✓ Refinement of detection criteria:
  1. Differential photometry algorithm and intensity of brightness change
  2. Contrast of brightest part in detection image
  3. Adequation between algorithm and detection image
Refinement leads to:
3 impact detection classification through rating/probability (null, low, high) implemented in v3.2 to decrease number of alerts

<table>
<thead>
<tr>
<th></th>
<th>false detections</th>
<th></th>
<th>real impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>v1, v2</td>
<td>v3-v3.1.11</td>
<td>v3.1.12</td>
</tr>
<tr>
<td>nul</td>
<td>60,3%</td>
<td>60,3%</td>
<td>45,6%</td>
</tr>
<tr>
<td>low</td>
<td>0,0%</td>
<td>23,7%</td>
<td>49,6%</td>
</tr>
<tr>
<td>high</td>
<td>39,7%</td>
<td>16,0%</td>
<td>4,8%</td>
</tr>
</tbody>
</table>
➢ Open topics:
  ➢ still many false detections with lower probability
  ➢ still a few non detected or low probability detected for real impacts
Project

- Help by a second member – Salma Sylla
  (check of detection images, algorithm improvement, ...)
- Pic du Midi T1M monitoring program

Software

- Differential photometry algorithm improvement
- Auto update
- Dozen of other tasks in to-do-list (any suggestion welcome)
Takeaway

✓ First impact flash detection through DeTeCt

✓ Project growing fast

✓ Software with regular improvements/updates

☐ Participate to the project, you might be the 7th impact flash discoverer

☐ Check and send detection images / logs delcroix.marc@free.fr

☐ Keep your version of DeTect up to date
  https://github.com/DeTeCt-PSWS/DeTeCt-MFC/releases/latest