Online pollen counting
Bernard Clot, Benoît Crouzy, Thomas Konzelmann, Bertrand Calpini
EAACI 2016, WS 4 Automation in pollen counting, Vienna
Critical aspects of pollen monitoring

- Representative sampling
- Identification of different taxa
- Outdoor conditions → reliability

- “Truth” is unknown (no absolute reference)
Present standard: high quality manual monitoring

Daily concentrations [pollen grains/m³]
Which time resolution / availability of the data is desirable?

A. Day / once a week (present situation)
B. Day / every day
C. Hour / + 10 minutes
D. 10 minutes / +1 minute

© MeteoSwiss
Bioaerosol air flow cytometry using fluorescence

PA-300
www.plair.ch
## Calibration data

### Predicted label

<table>
<thead>
<tr>
<th>True label</th>
<th>Betula</th>
<th>Carpinus</th>
<th>Corylus</th>
<th>Dactylis</th>
<th>Fraxinus</th>
<th>Plantago</th>
<th>Platanus</th>
<th>Quercus</th>
<th>Recall</th>
<th>Precision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betula</td>
<td>849</td>
<td>27</td>
<td>5</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>31</td>
<td>0.91</td>
<td>0.86</td>
</tr>
<tr>
<td>Carpinus</td>
<td>75</td>
<td>422</td>
<td>0</td>
<td>18</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0.81</td>
<td>0.92</td>
</tr>
<tr>
<td>Corylus</td>
<td>1</td>
<td>0</td>
<td>466</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>0.99</td>
<td>0.97</td>
</tr>
<tr>
<td>Dactylis</td>
<td>27</td>
<td>4</td>
<td>1</td>
<td>439</td>
<td>29</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>0.87</td>
<td>0.90</td>
</tr>
<tr>
<td>Fraxinus</td>
<td>5</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>525</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td>0.95</td>
<td>0.89</td>
</tr>
<tr>
<td>Plantago</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>98</td>
<td>16</td>
<td>2</td>
<td>0.75</td>
<td>0.86</td>
</tr>
<tr>
<td>Platanus</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>606</td>
<td>0</td>
<td>0.99</td>
<td>0.97</td>
</tr>
<tr>
<td>Quercus</td>
<td>28</td>
<td>0</td>
<td>6</td>
<td>8</td>
<td>21</td>
<td>3</td>
<td>0</td>
<td>304</td>
<td>0.82</td>
<td>0.89</td>
</tr>
</tbody>
</table>

**Recall**: 0.91

**Precision**: 0.89
Pollen season 2015: total pollen / grasses

Daily concentrations [pollen grains/m$^3$]

© MeteoSwiss
Future: real-time observations + modeling

COSMO-7 FORECAST  Version: 947
Mean Birch Pollen Concentration on Thu 21 Apr 2016  21.04.2016 00UTC +24h

© MeteoSwiss
Summary

Air flow cytometry (Plair PA-300):
- real-time data
- hourly data instead of daily data (high sampling)
- reliable
- simultaneous identification of pollen, spores, PM, pollutants
- validation ongoing

➢ Timely information, input for forecasts and models
Discussion

How many taxa needed?

Hirst (Switzerland): 48
Automatic: ?