FIRST RESULTS OF THE PLANETFOUR CITIZEN SCIENCE PROJECT

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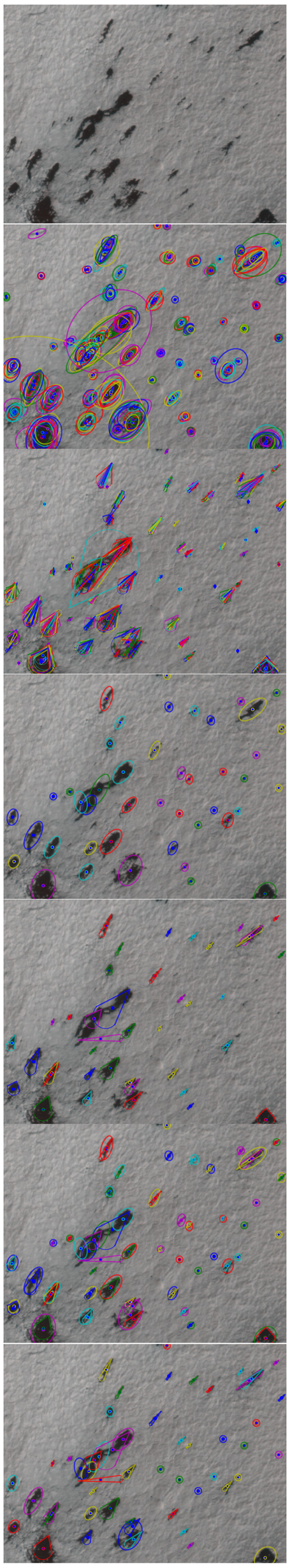
We report preliminary results of the analysis of crowd-sourcing data on fan-shaped deposits that are produced by CO_2 gas jets depositing sand and dust on top of the seasonal CO_2 ice layer at the Martian south pole A database of over 98,000 HiRISE subframes has been produced that is embedded into a web-based graphical interface for marking the position and outline of the fan deposits.
Clustering techniques (DBSCAN) are used to combine these data into coordinates and orientations to provide data on the intra- and inter-seasonal developments of the fan-shaped deposits in several active south polar regions.

PlanetFour tile



This is one of the 98000 840x648 HiRISE tiles that is shown to the Citizens in the PlanetFour project.
In the right column a zoom into the lower left is shown.

These data show all the PlanetFour markings for “blotches”, i.e. jet deposits that don’t show any discernible direction or similarity to a wind-blown fan.

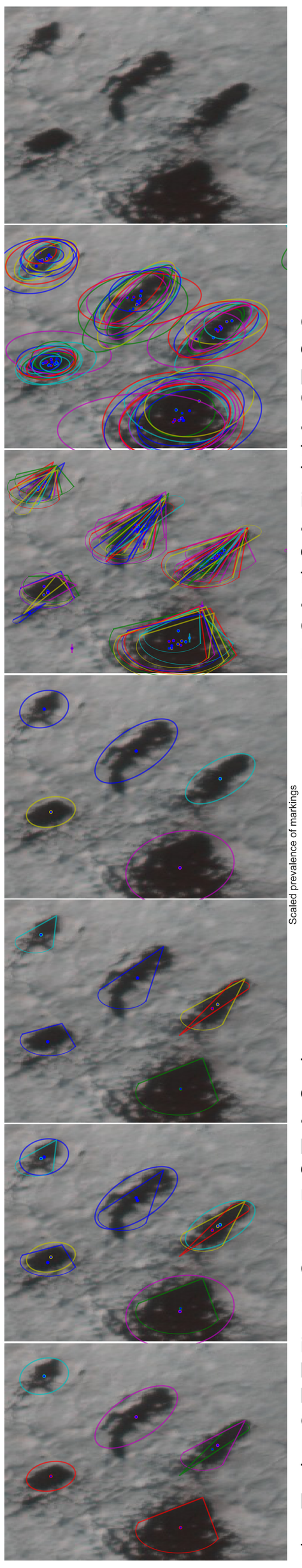
These data show all the PlanetFour markings for “fans”, i.e. jet deposits that show a clear ‘directivity. One can see that the Citizens have a hard time deciding between both.

First, we cluster fans and blotches independently, using DBSCAN with a distance parameter of 10 px and a minimum cluster member of 3.
One a cluster has been defined, we take the average of all marking parameters to determine a mean marking for each fan and blotch cluster respectively.
The mean markings closely outline the deposits in the image.

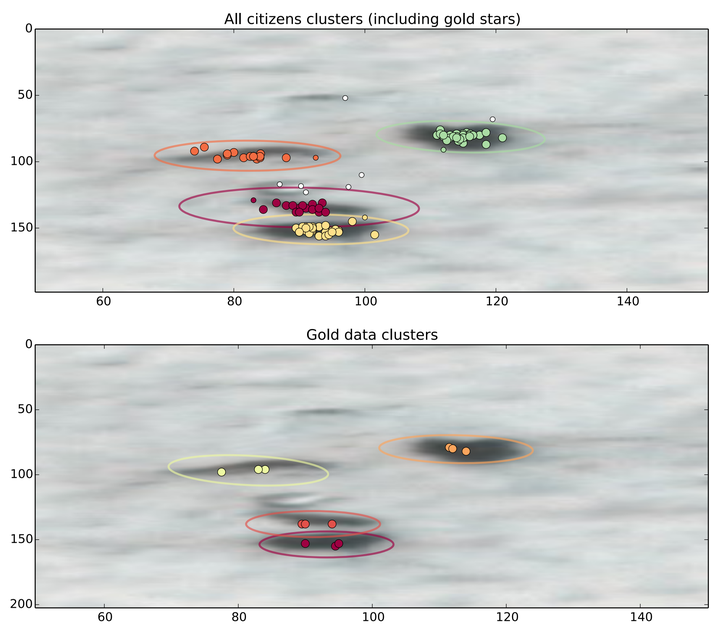
Due to the confusion of the Citizens, most markings have been both classified as blotches and fans as can be seen in this overlay of the mean markings.

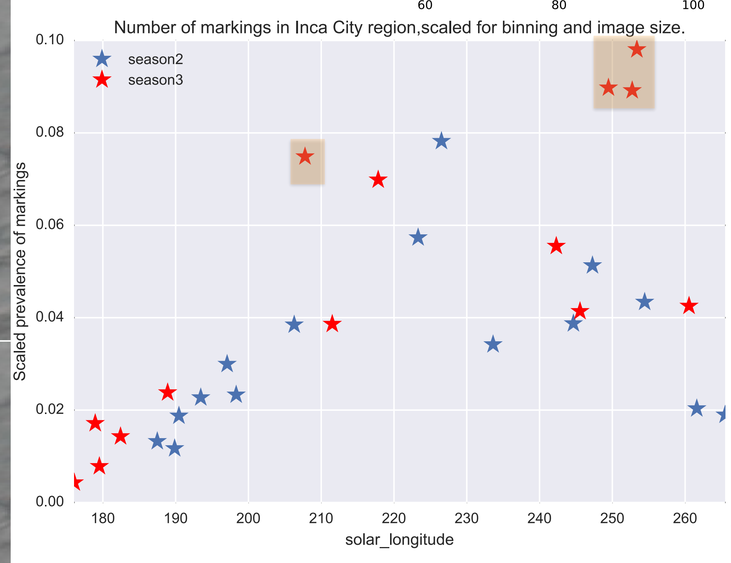
This requires to store the number of Citizens that mark both to create relative weights, on which we can apply cuts for a final decision on the kind of marking, shown here.

Lower-left corner zoom



Comparison of classifications produced by the Citizen scientists and members of the science team. The science team is looking at approx. 3% of the data to cross-check the reproducibility and validity of the Citizen science results.





Preliminary results of seasonal activity for the Inca City region for season 2 and season 3. The marked data points indicate the highest resolution data of HiRISE that relatively overestimates the amount of activity due to the higher resolving power. The spring peak at ~Ls 220 can be seen where it was expected.

The PlanetFour data reduction and analysis pipeline. It consists of 4 main lines:
Data cleanup (green)
Clustering (orange)
FNotching(combining fan and blotch results, blue) and
Ground-Projection (red).
The ground-projection is required due to the fact that the project is based on unprojected data.