

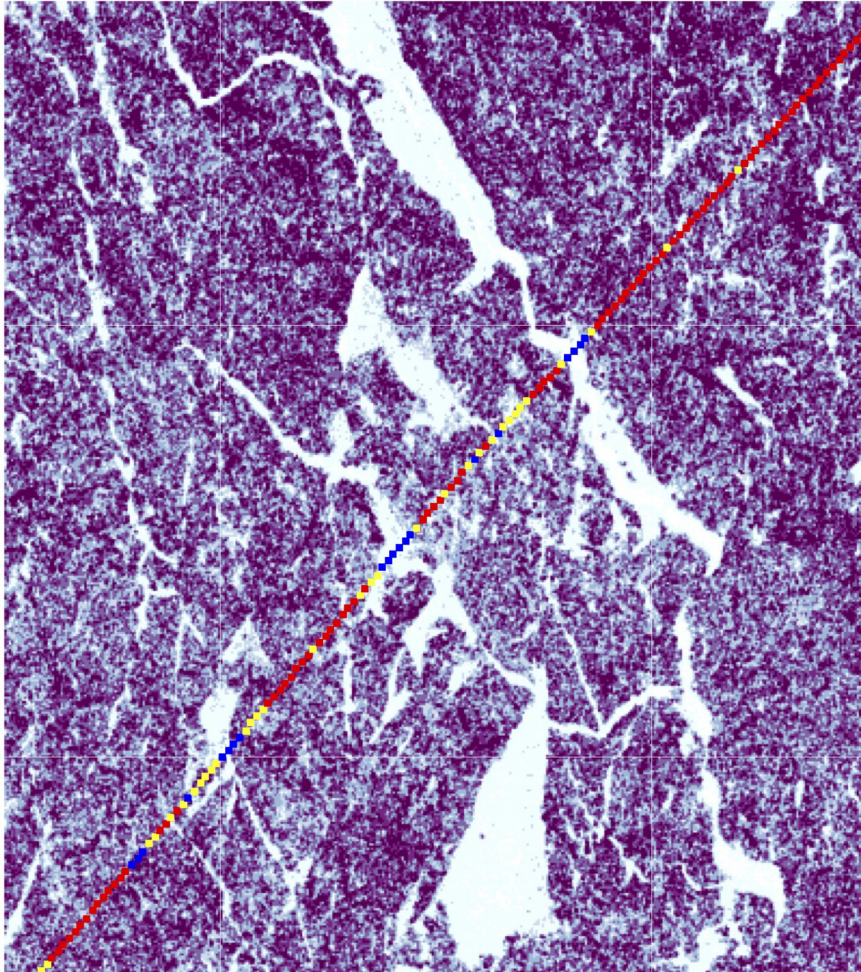
# SEA-ICE CASE STUDY: WP6300

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- This case study shows how to use DeDop to investigate the impact of windowing on surface type discrimination over sea-ice
- We are going to compare the discrimination results for some CryoSat2 data, compared with the result of processing that data (converted to S3 L1A format) through DeDop with it's default configuration, and with Hamming windowing selected with a width of 32 and 64.
- We also alter the zero padding factor from x1 to x2 and consider the impact of that.

CS\_OFFL\_SIR\_SARI2A\_20120329T112952\_20120329T113436\_C001



- Sea Ice
- Lead
- Unknown

These are reference discrimination results taken from the operational Cryosat2 processing.



- The file CNF.json controls the processing performed by Dedop.
- To change the windowing, we modify the following elements.
  - "flag\_azimuth\_windowing\_method\_cnf": {  
    "value": "hamming",  
    "units": "flag",  
    "description": "Flag the sets the azimuth windowing method: Disabled ('none'); Boxcar ('boxcar'); Hamming ('hamming'); Hanning ('hanning')" },
  - "azimuth\_window\_width\_cnf": {  
    "value": 64,  
    "units": "count",  
    "description": "Width of Azimuth window (minimum value: 32, maximum value: 64)" },

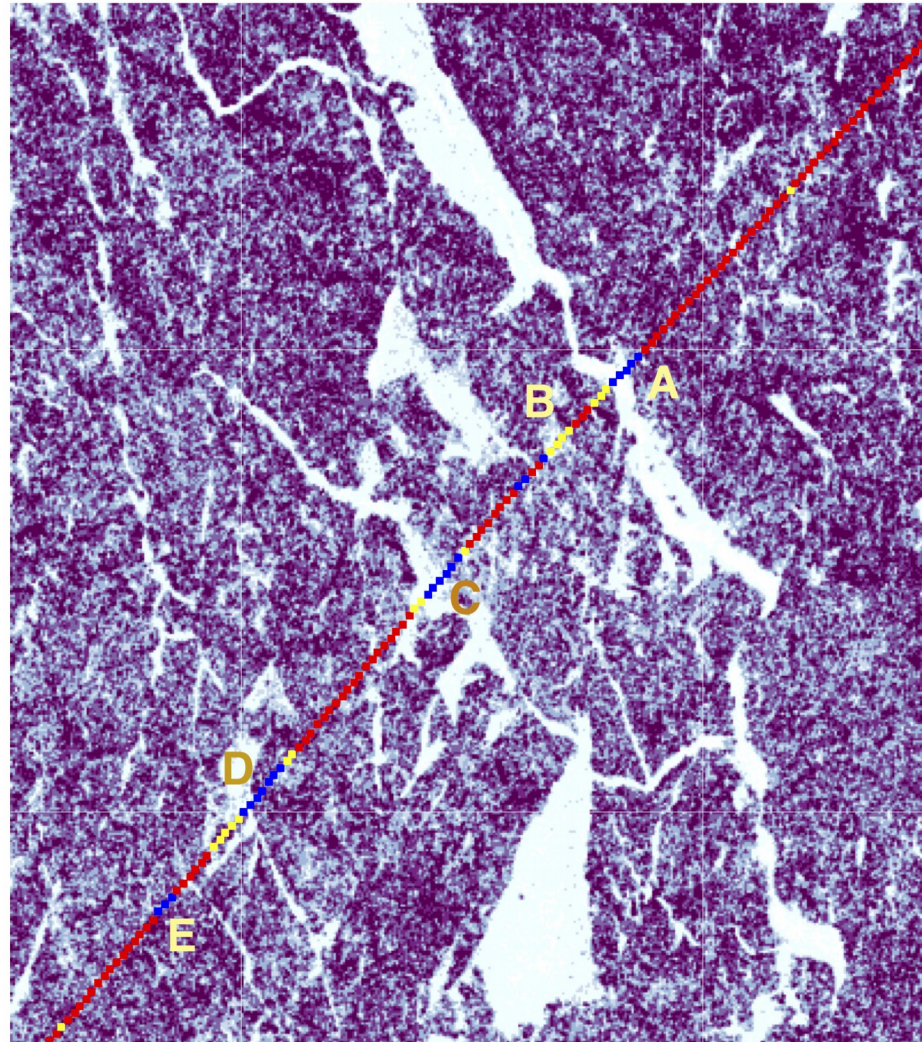


- To alter the zero padding, we modify this part of the configuration file
  - "zp\_fact\_range\_cnf": {  
    "value": 2,  
    "units": null,  
    "description": "Zero padding factor used during range compression"  
  },
- To perform a discrimination, we use pulse peakiness, computed as
$$pp = 0.5 * \text{number\_of\_bins} * \frac{\text{waveform\_max}}{\text{waveform\_mean}}$$
  - If  $pp < 16.0$  then classify as sea-ice
  - If  $pp > 31.0$  then classify as lead
  - Otherwise, classify as unknown



# RESULTS OF DEDOP PROCESSING

No Weighting

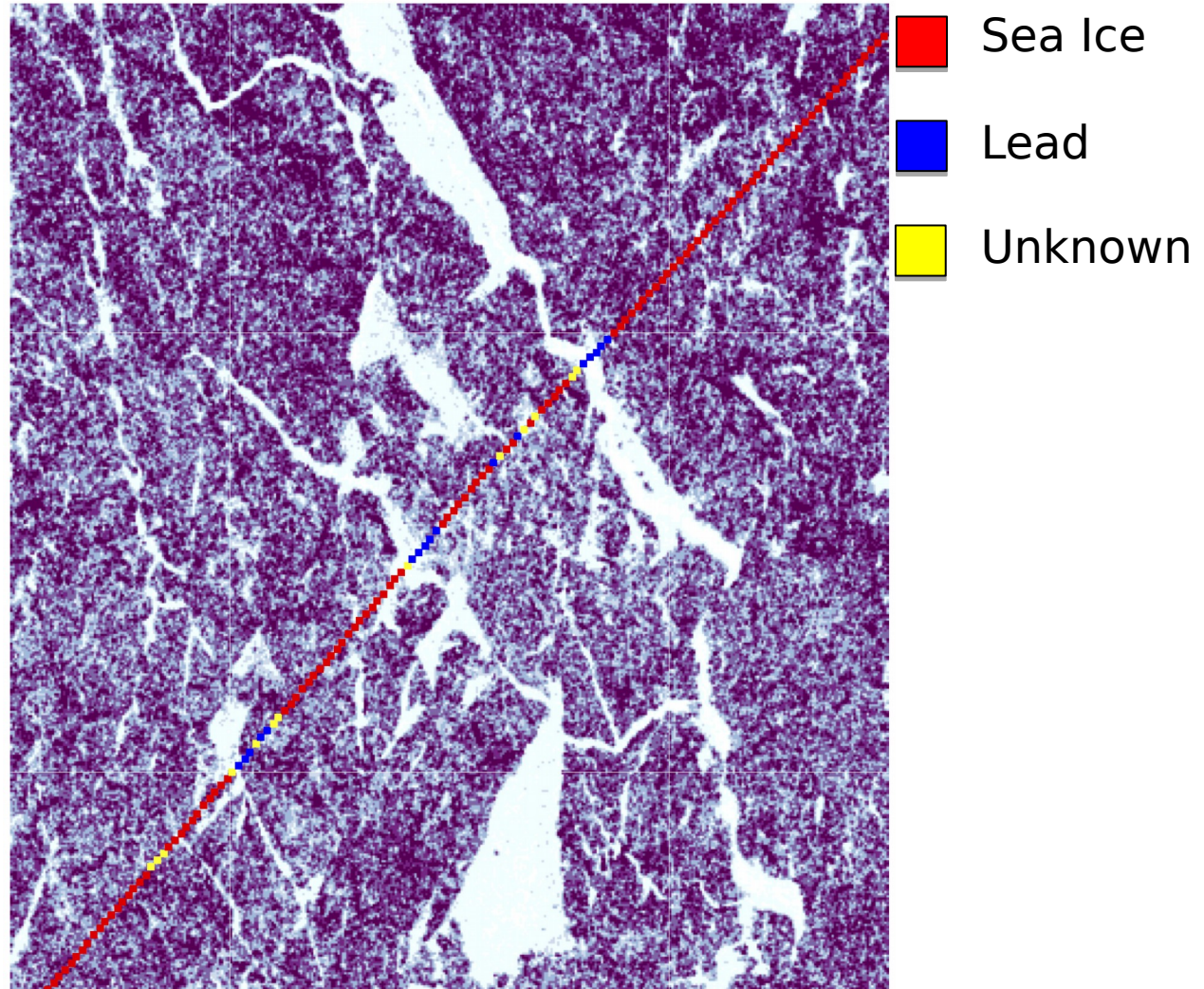


-  Sea Ice
-  Lead
-  Unknown



# RESULTS OF DEDOP PROCESSING

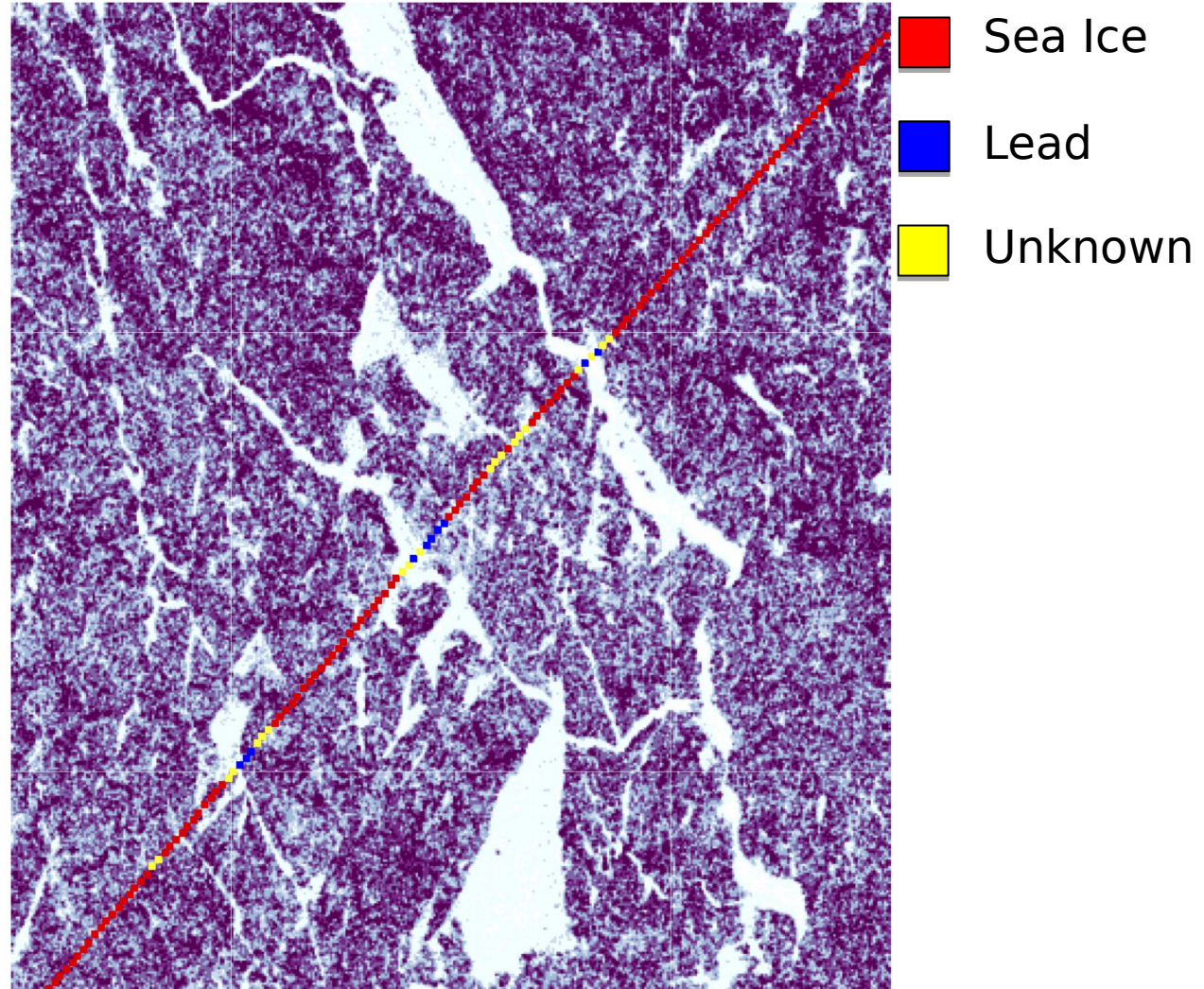
No Weighting and x2 zero-padding





# RESULTS OF DEDOP PROCESSING

Hamming weighting with 32 bin width



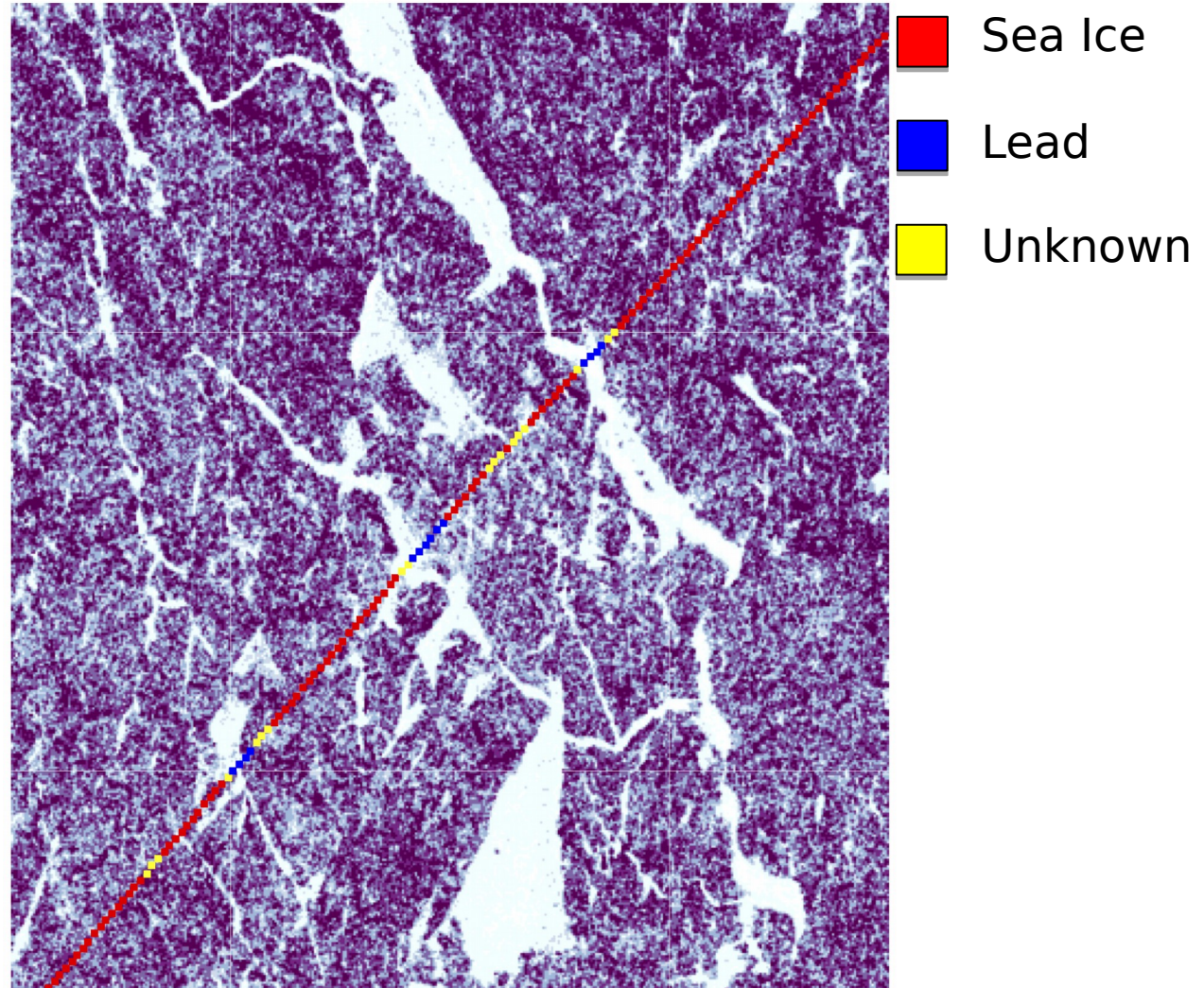




# RESULTS OF DEDOP PROCESSING

Hamming weighting with 32 bin width and x2

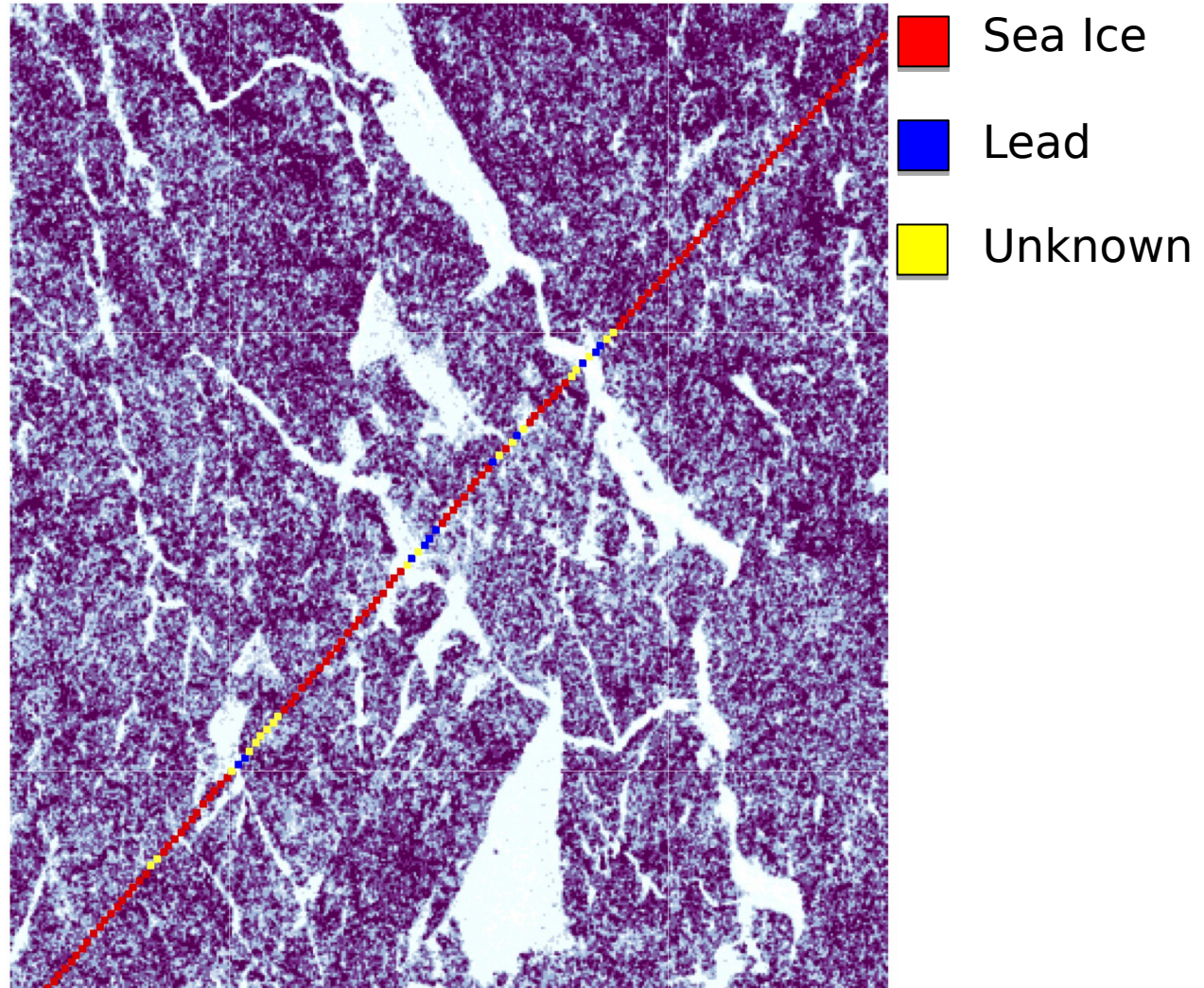
zero padding





# RESULTS OF DEDOP PROCESSING

Hamming weighting with 64 bin width

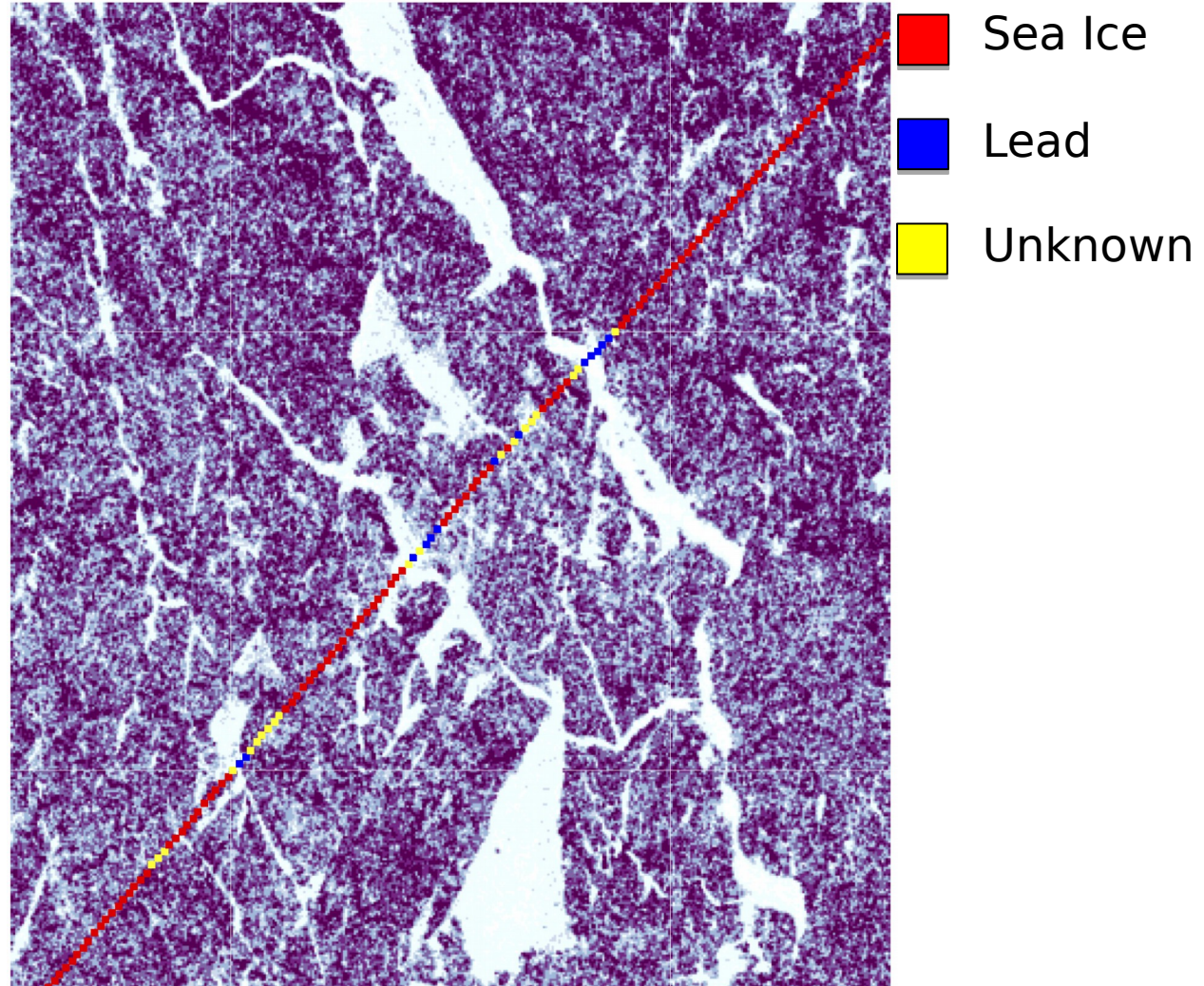




# RESULTS OF DEDOP PROCESSING

Hamming weighting with 64 bin width and x2

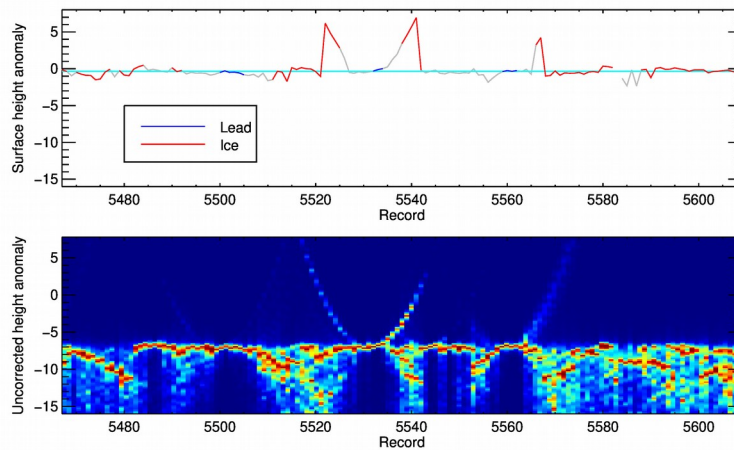
zero padding



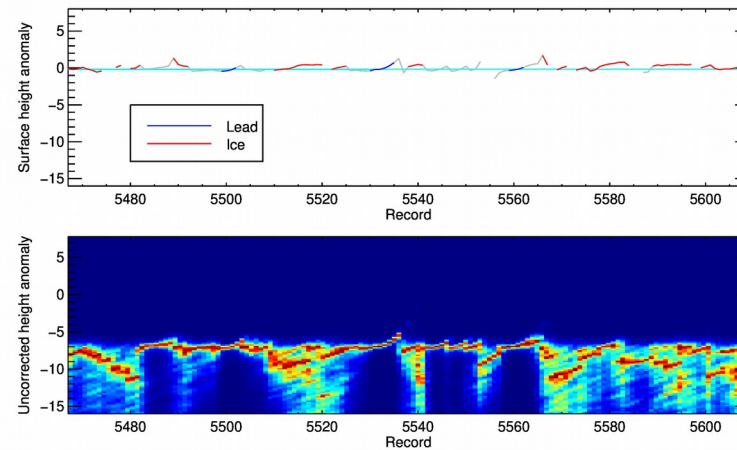


- Investigate the changes in discrimination result, and determine which seems to be best discriminating between sea-ice and lead, without creating false positives
  - It is better to have fewer lead and sea-ice detections if false positives or classifications of mixed regions are removed
  - For example, region 'B' on the first plot of results is complex, and region 'E' is a sea-ice region with a small lead that is best classified as 'unknown' or 'sea-ice'
- It may be helpful to plot the waveform power to show the effect of the filtering

### No weighting or zero-pad



### 32 bin weighting and x2 zero-pad



Note the removal of the power from before the leading edge.



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