Weekly Update – July 26th 2013
David Caratelli

Big picture: make sensitivity plots using reconstructed energy

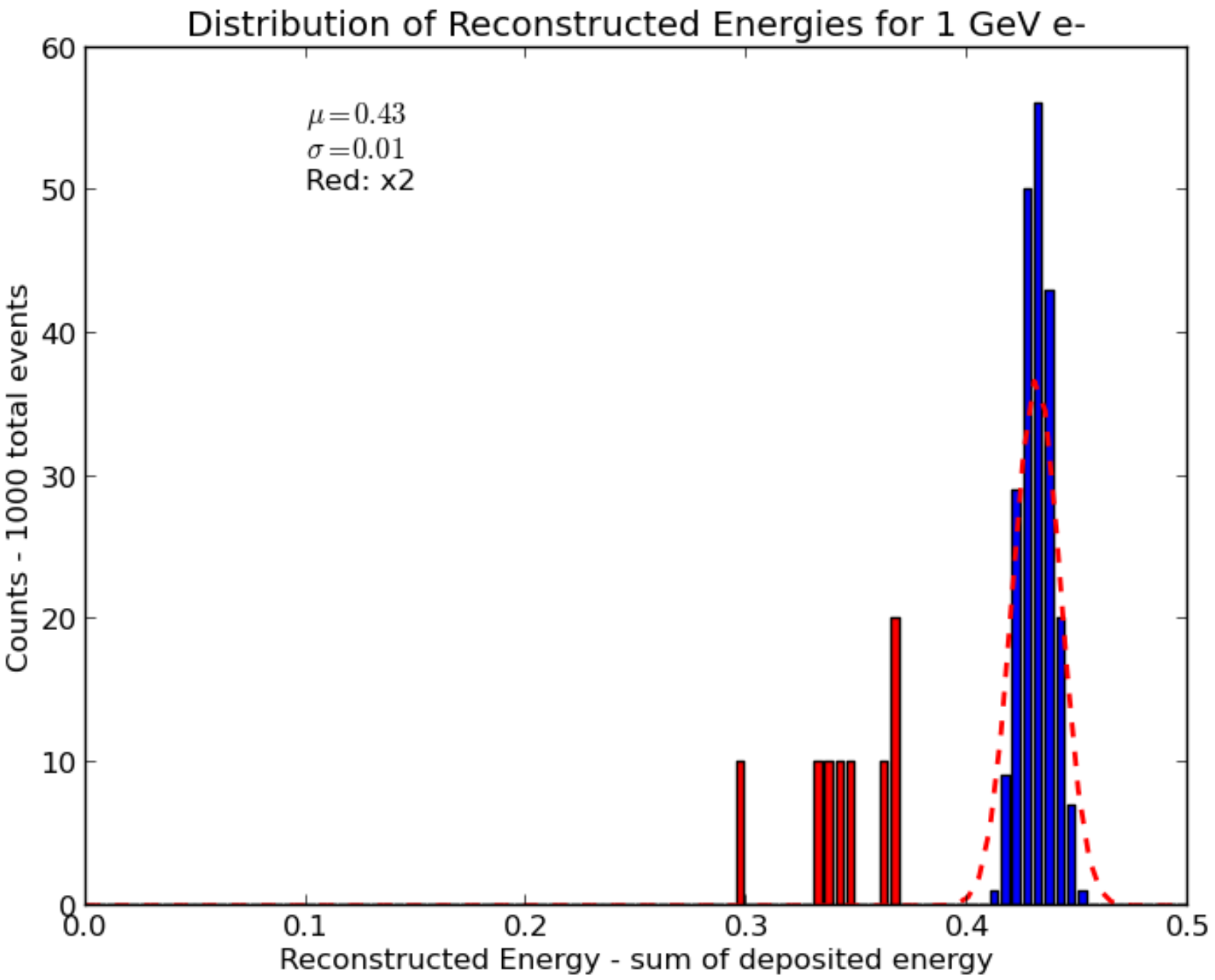
Today: Energy reconstruction for electron showers

QECC

Quasi-Elastic charged current interactions: find the nu energy

$$E_{\nu}^{\mathrm{QE}} = \frac{2(M'_n)E_{\mu} - ((M'_n)^2 + m_{\mu}^2 - M_p^2)}{2 \cdot [(M'_n) - E_{\mu} + \sqrt{E_{\mu}^2 - m_{\mu}^2}\cos\theta_{\mu}]}$$

M'_n: binding energy (separation energy) for carbon. From miniBooNE. Argon?


Distribution of Reconstructed Energies for 1 GeV e-
$\mu = 0.43$
$\sigma = 0.01$
Red: x2
Counts - 1000 total events
Reconstructed Energy - sum of deposited energy
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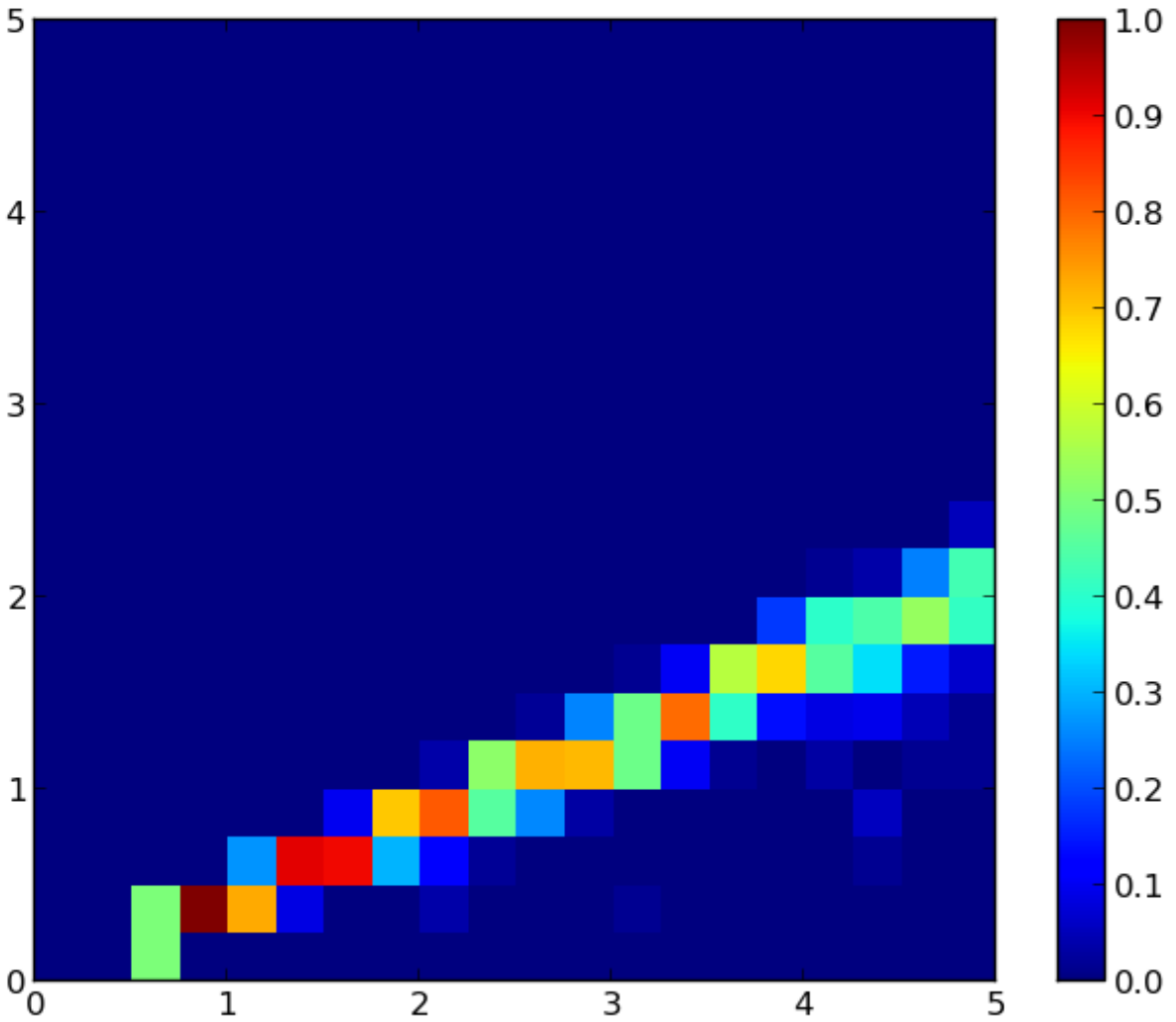


Reconstructed Energy vs. Input Energy.

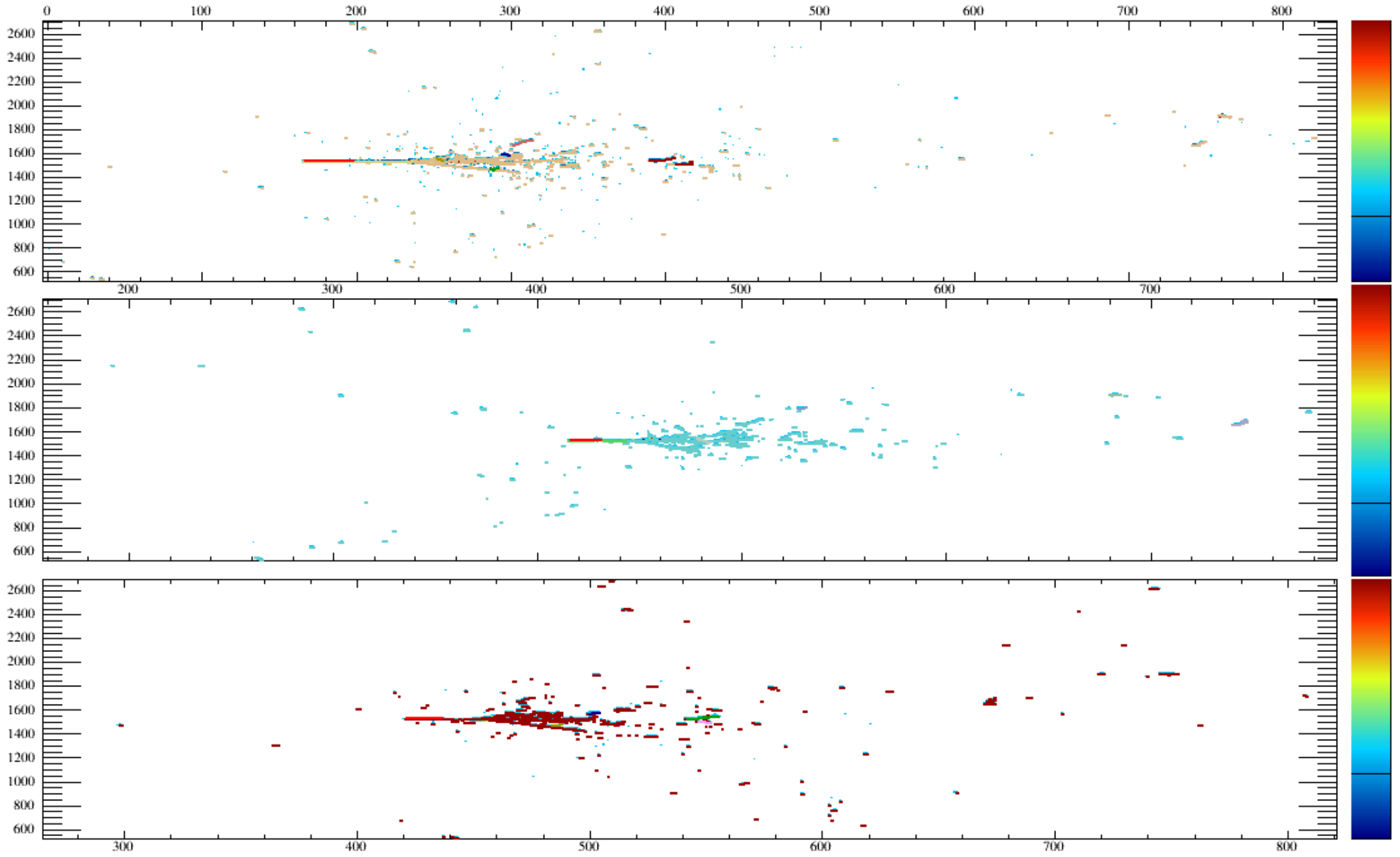
Fractional “correlation” matrix. What fraction of electrons with an original Energy between 2 and 2.25 GeV are reconstructed with an Energy between 0.75 and 1 GeV?

Need more points to make this nicer! Use MC Challenge?
Actual correlation matrix? - Something like this useful to assign reco_E randomly
Maybe a fit with some sigma to use as smear? Would remove granularity of binning

EXTRA:

Look at “low efficiency” and “high efficiency” reconstruction events!

BAD: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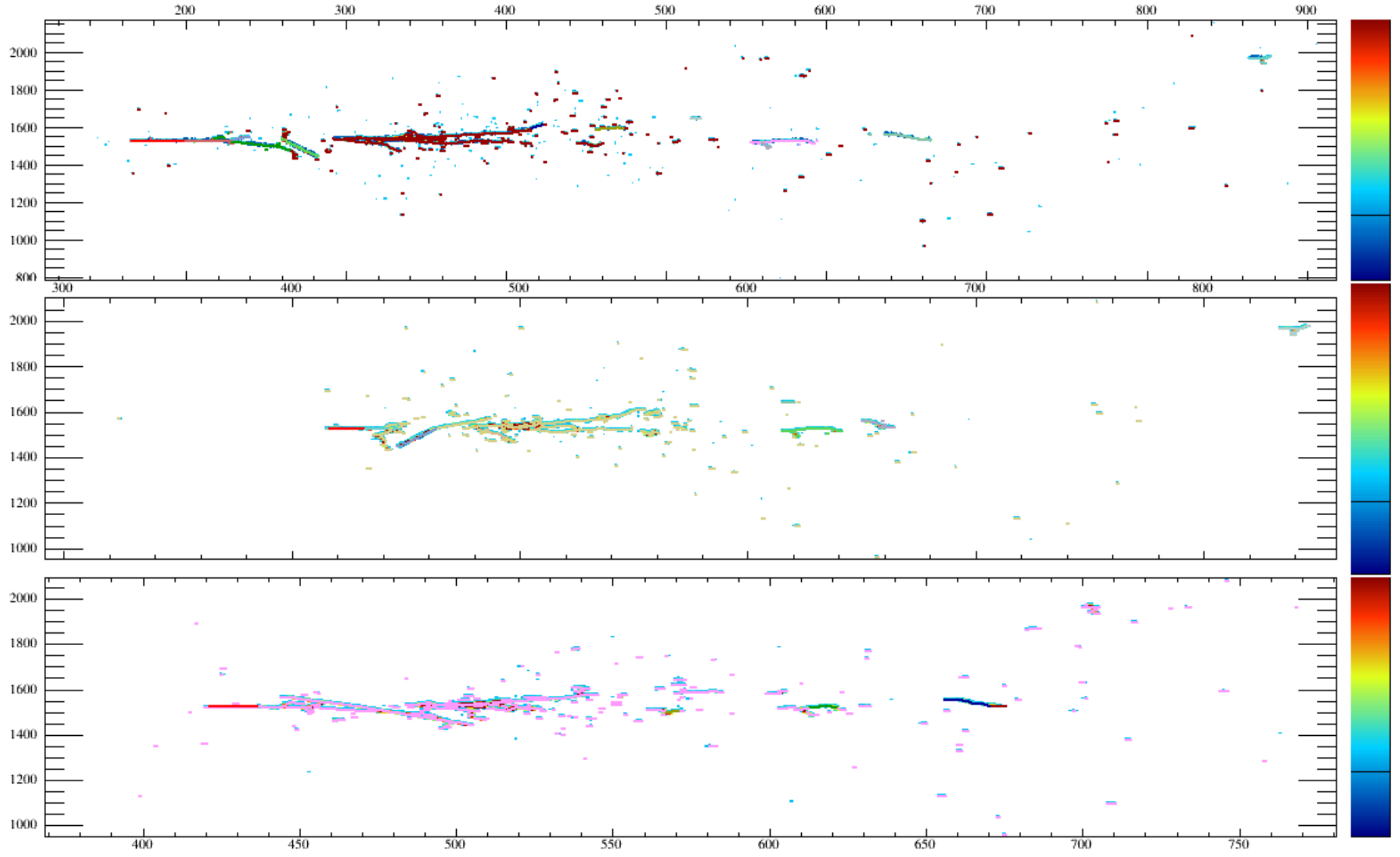
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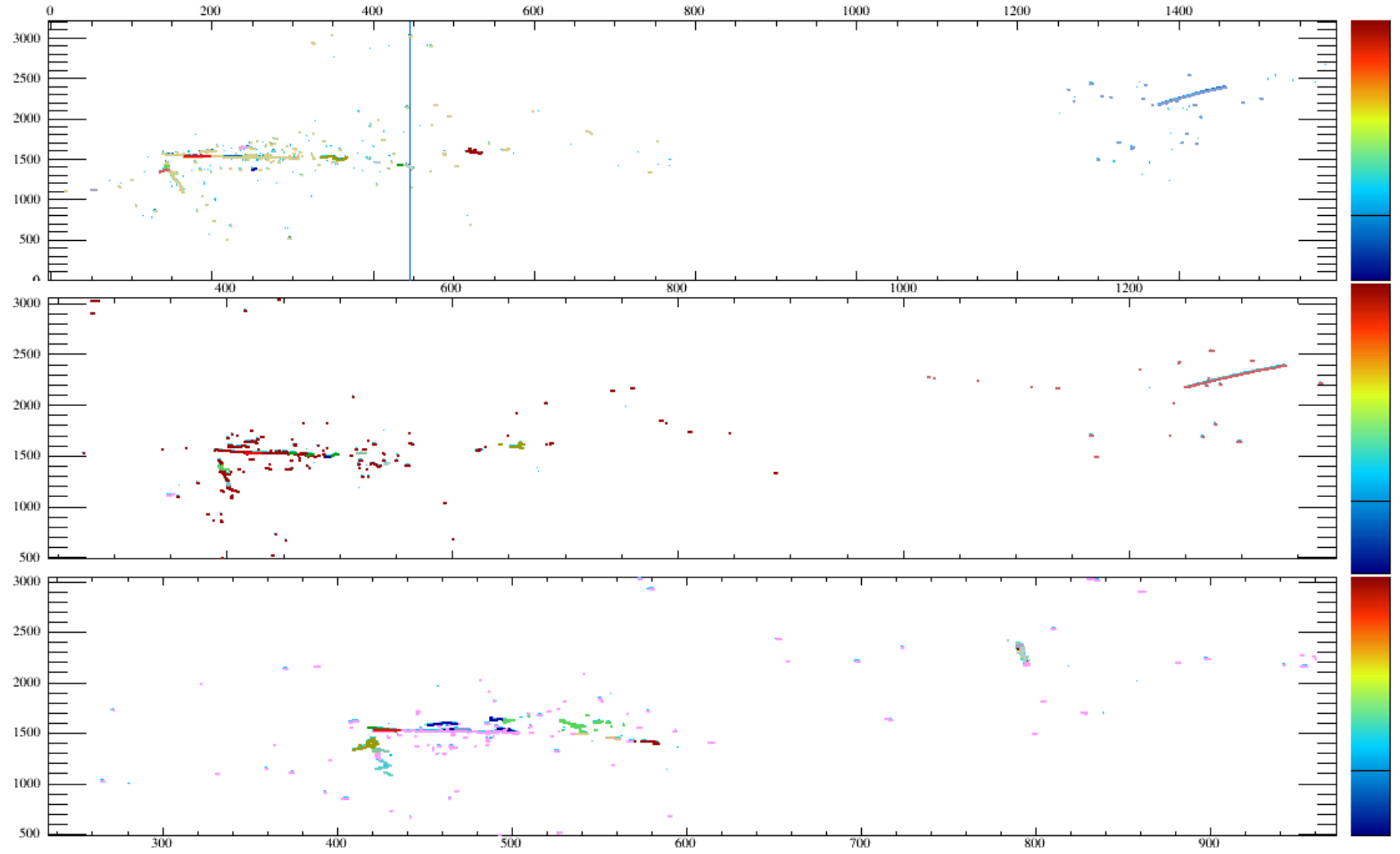
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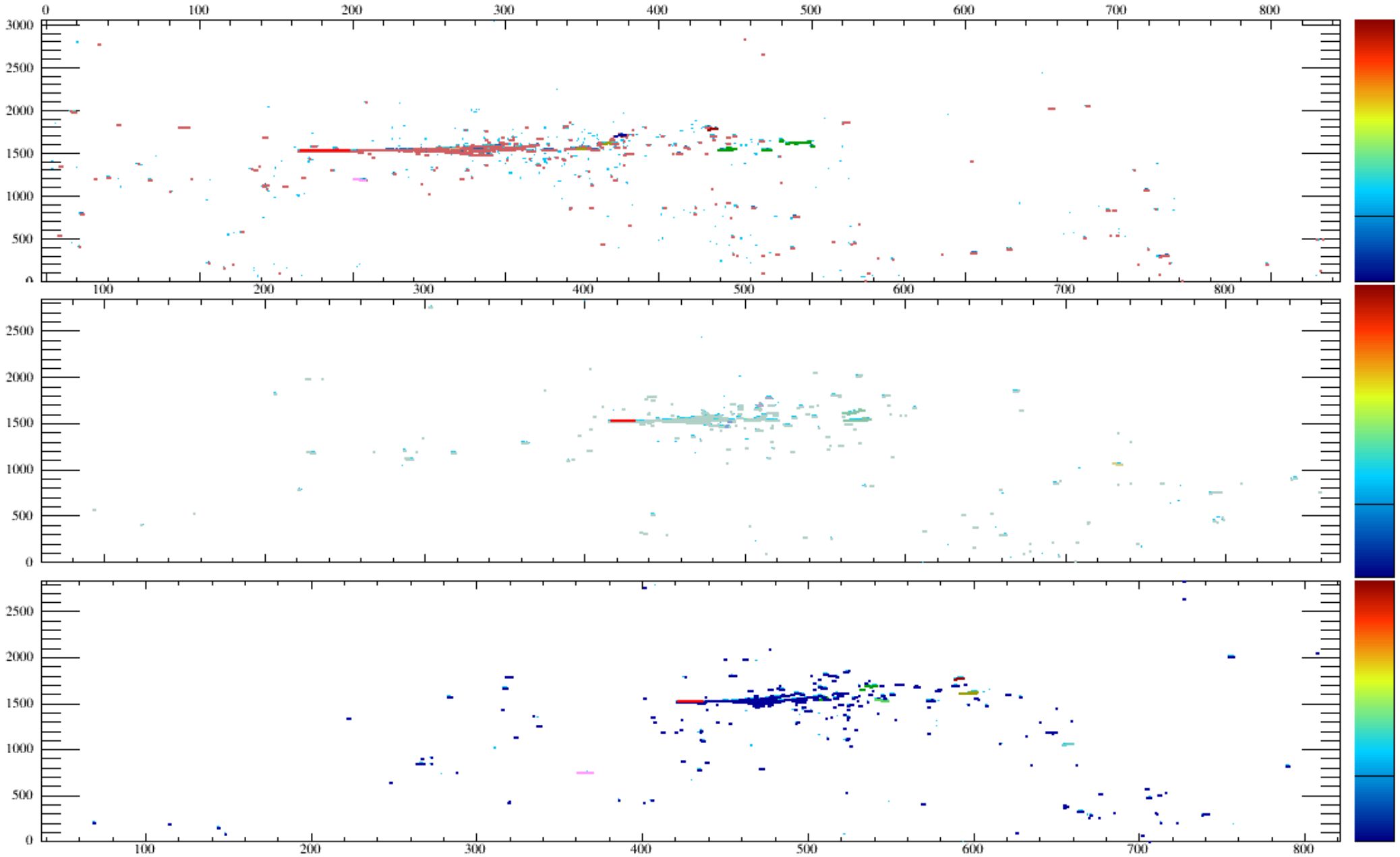
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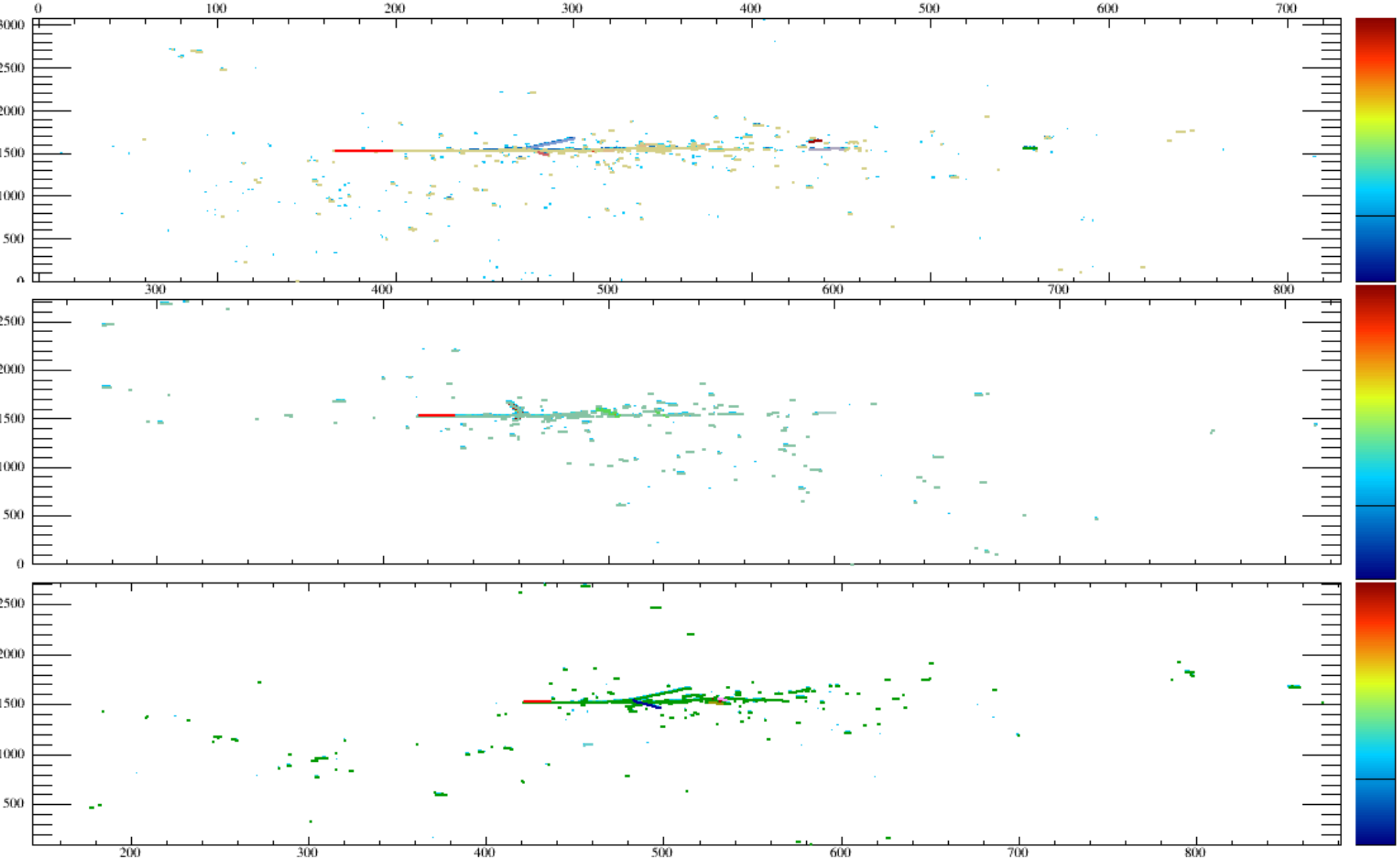
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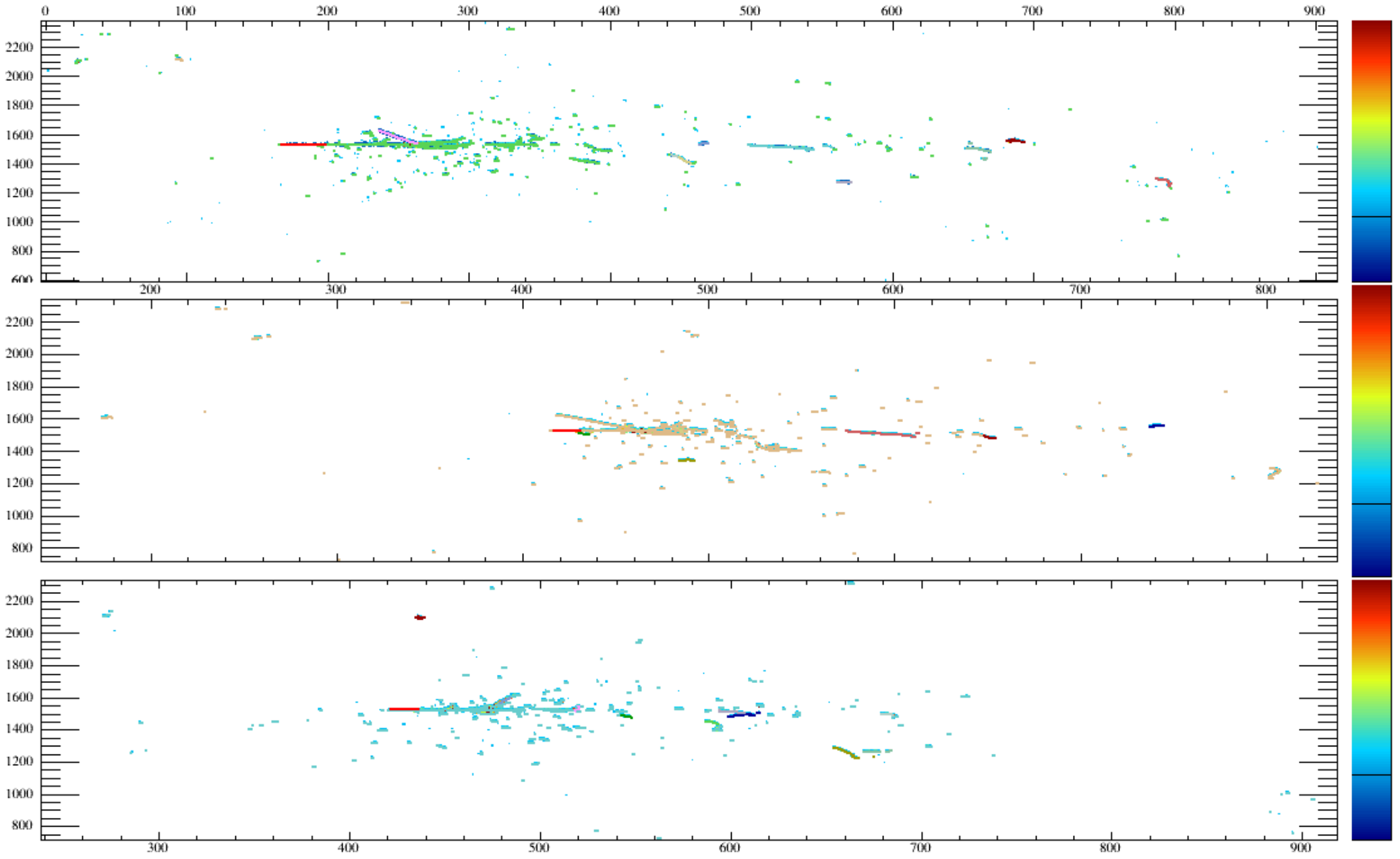
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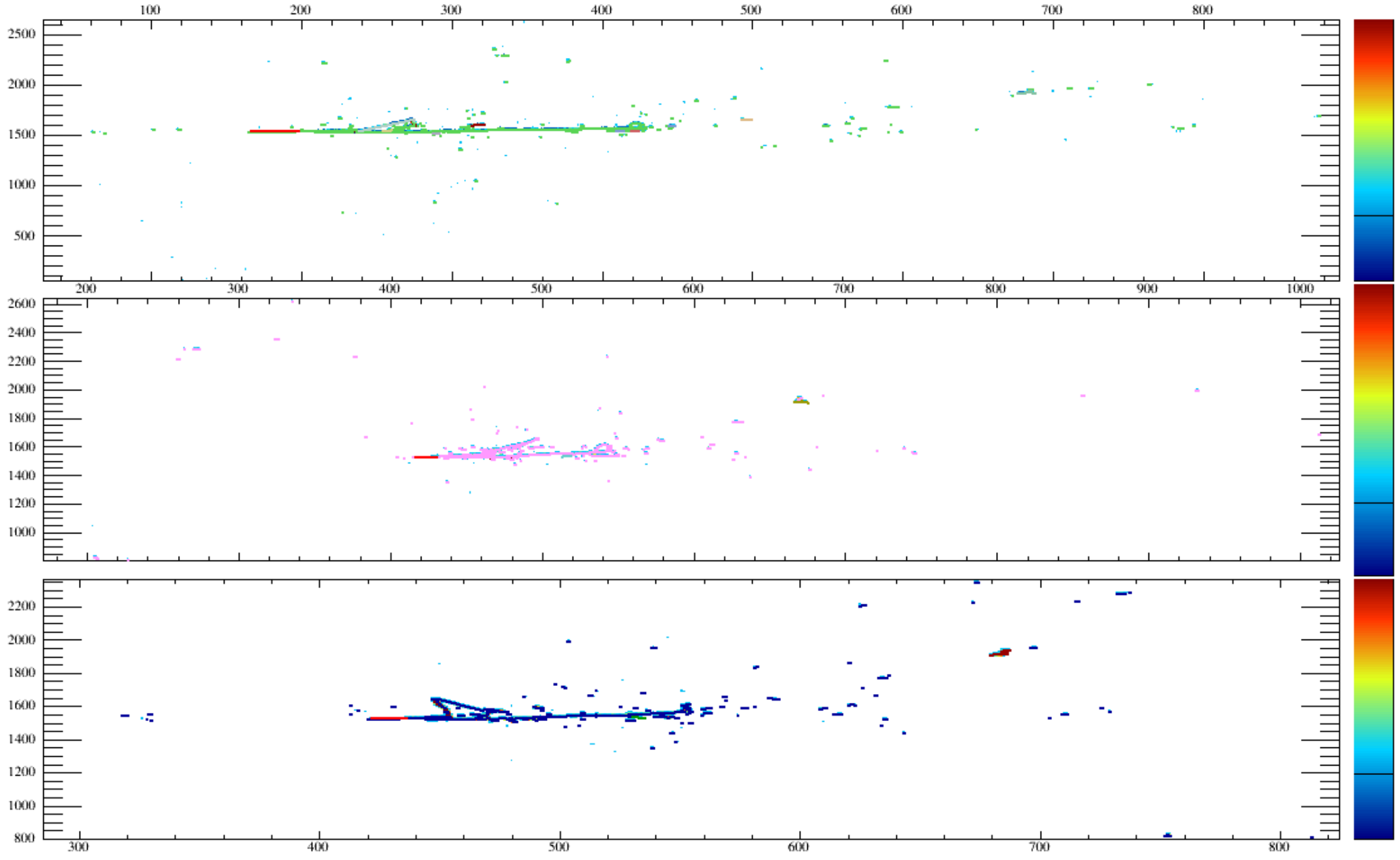
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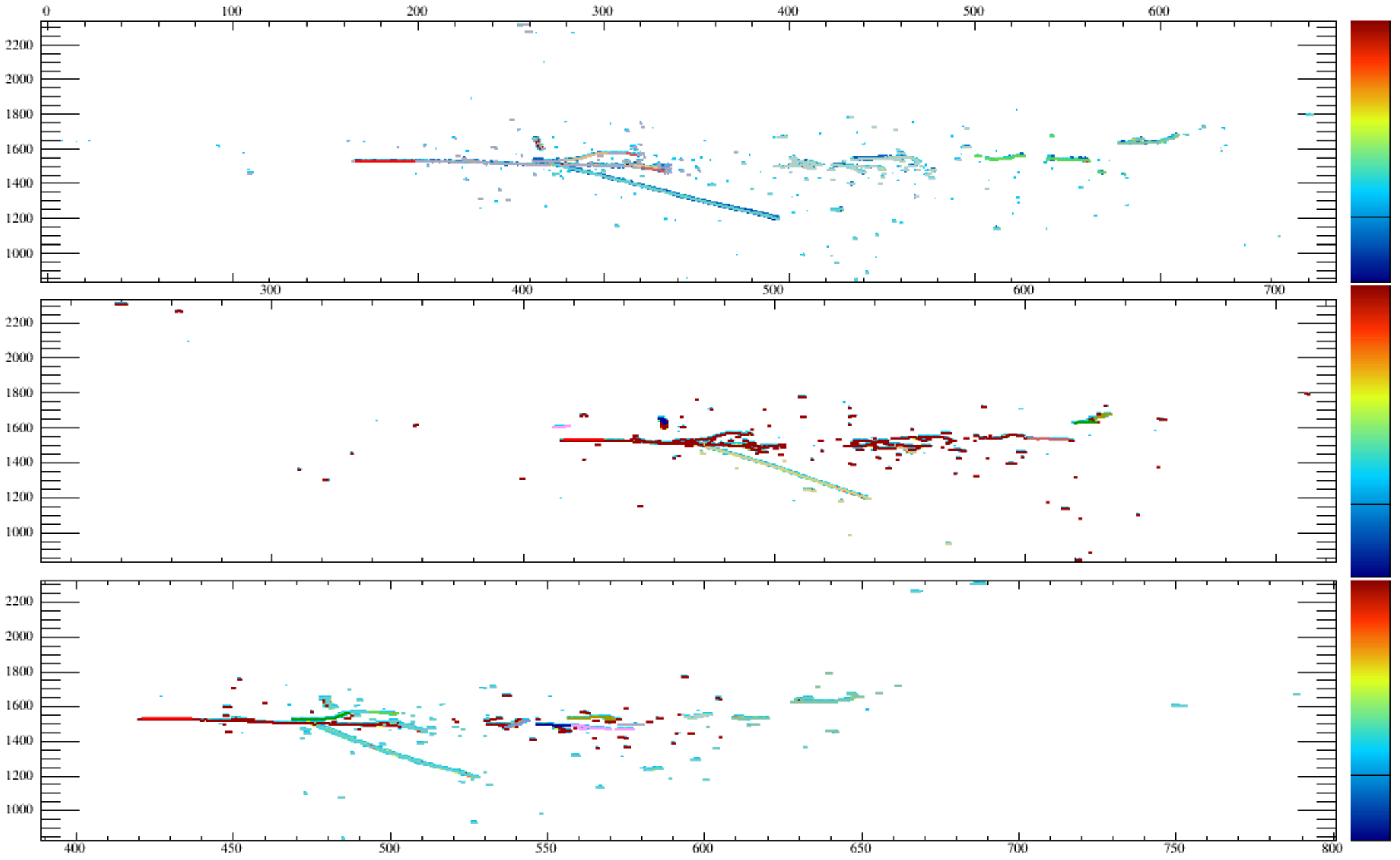
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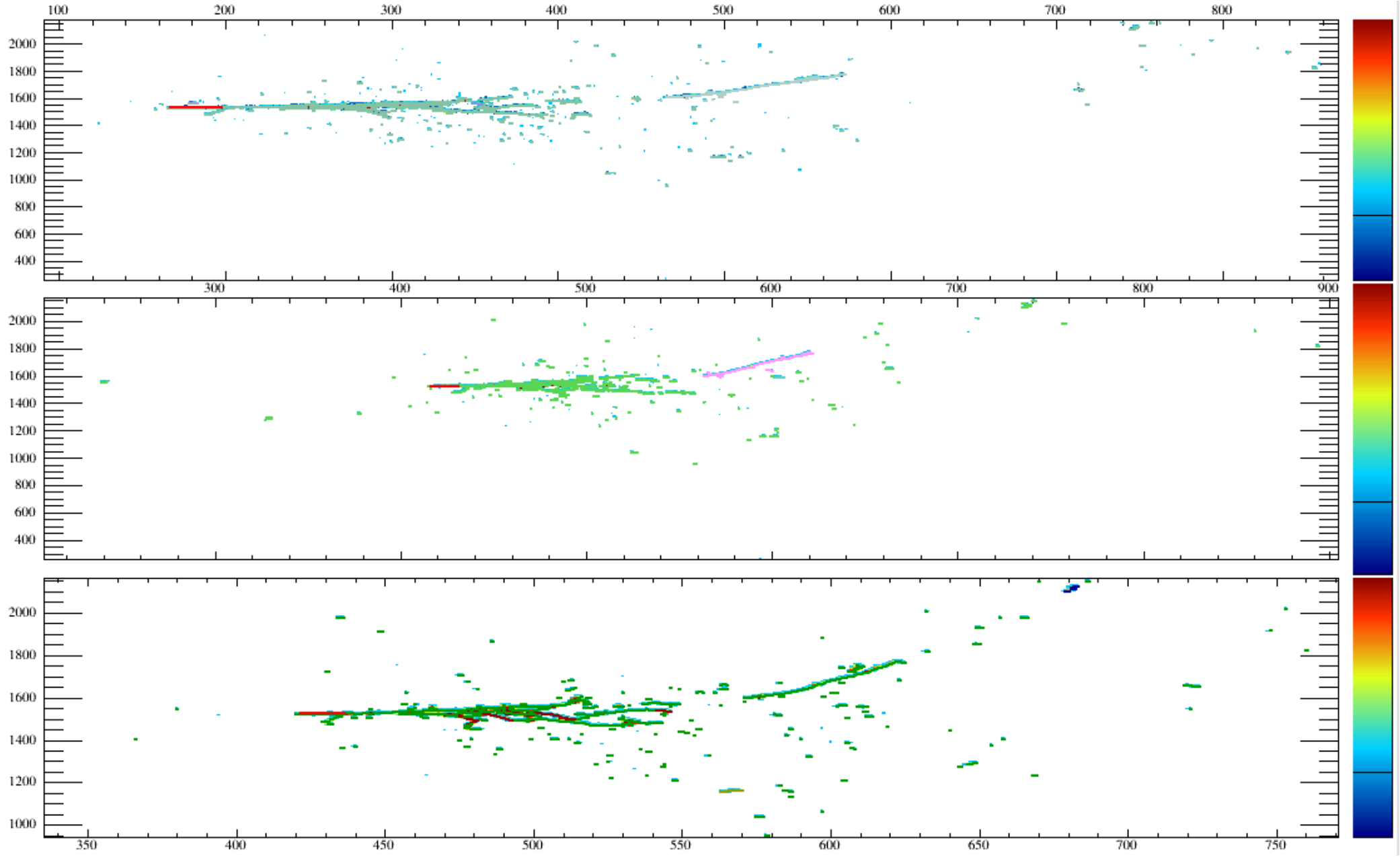
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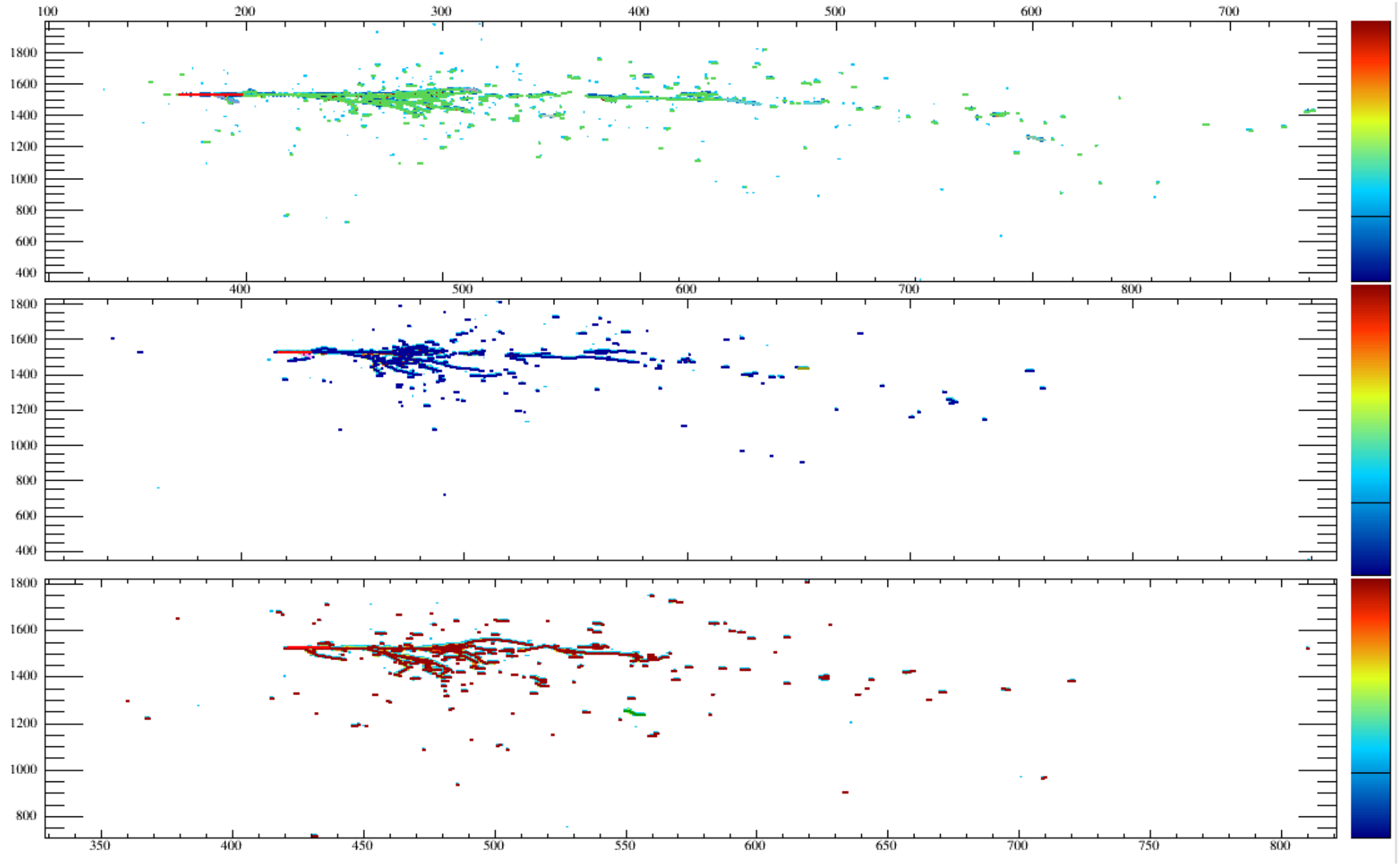
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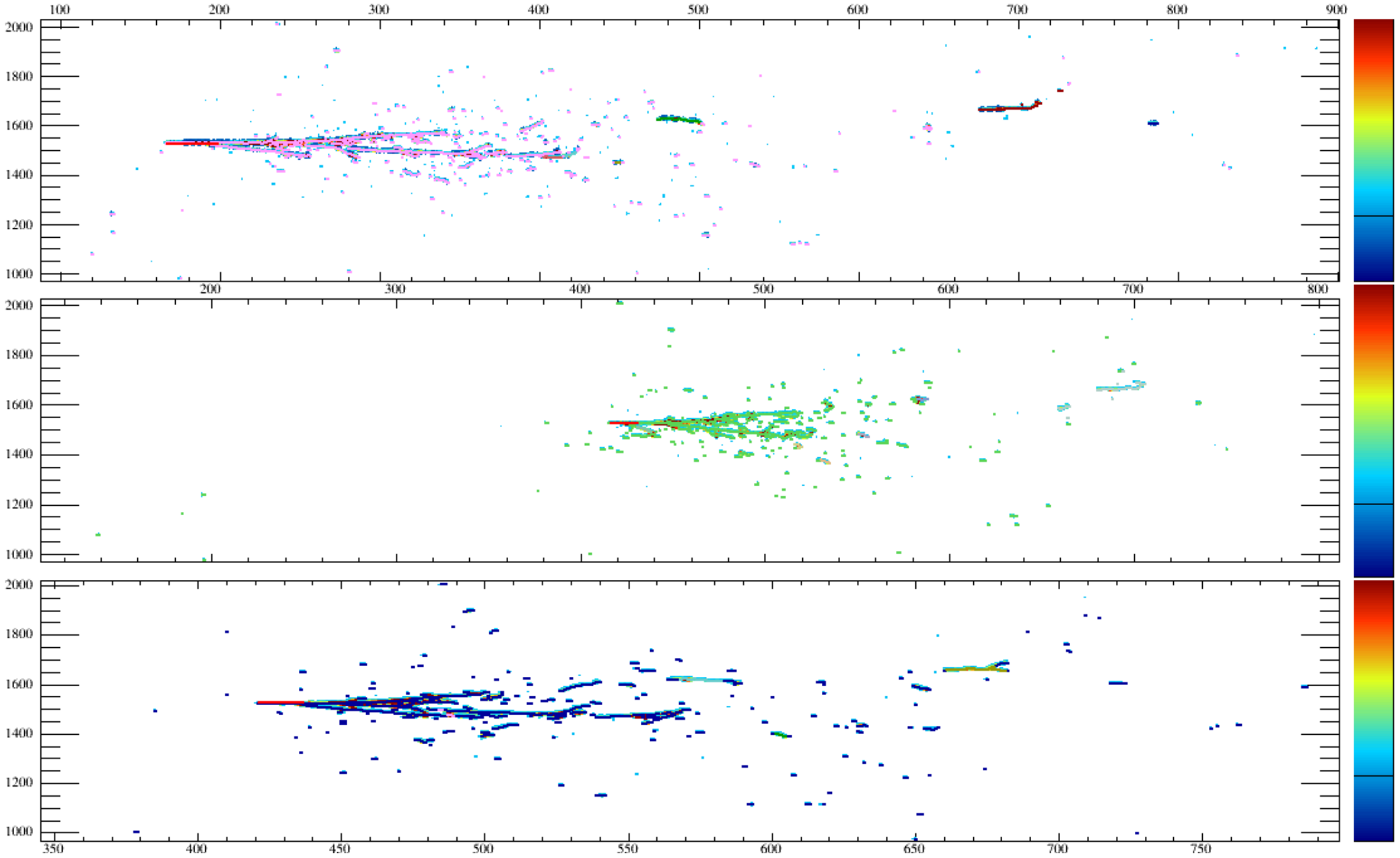
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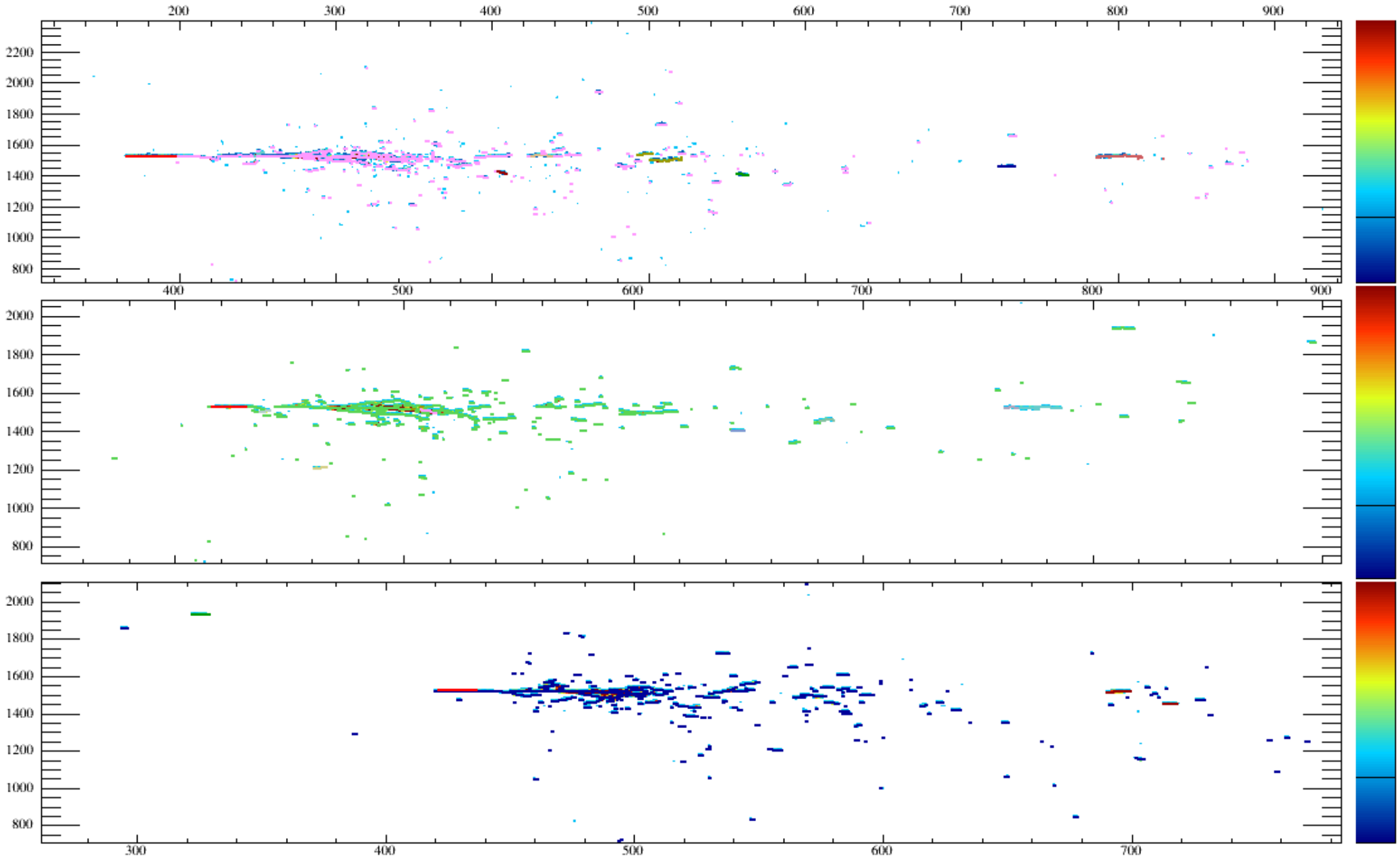
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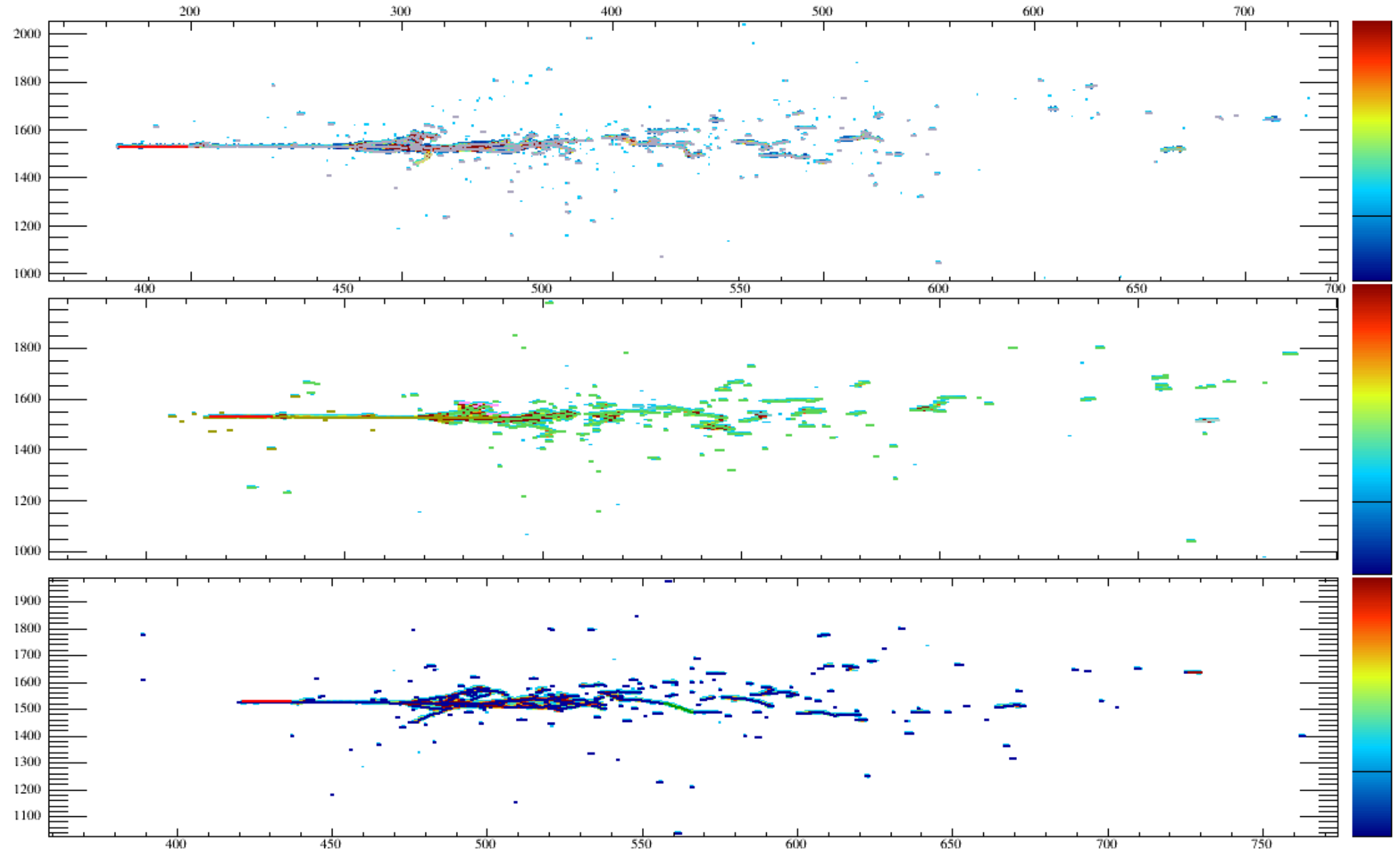
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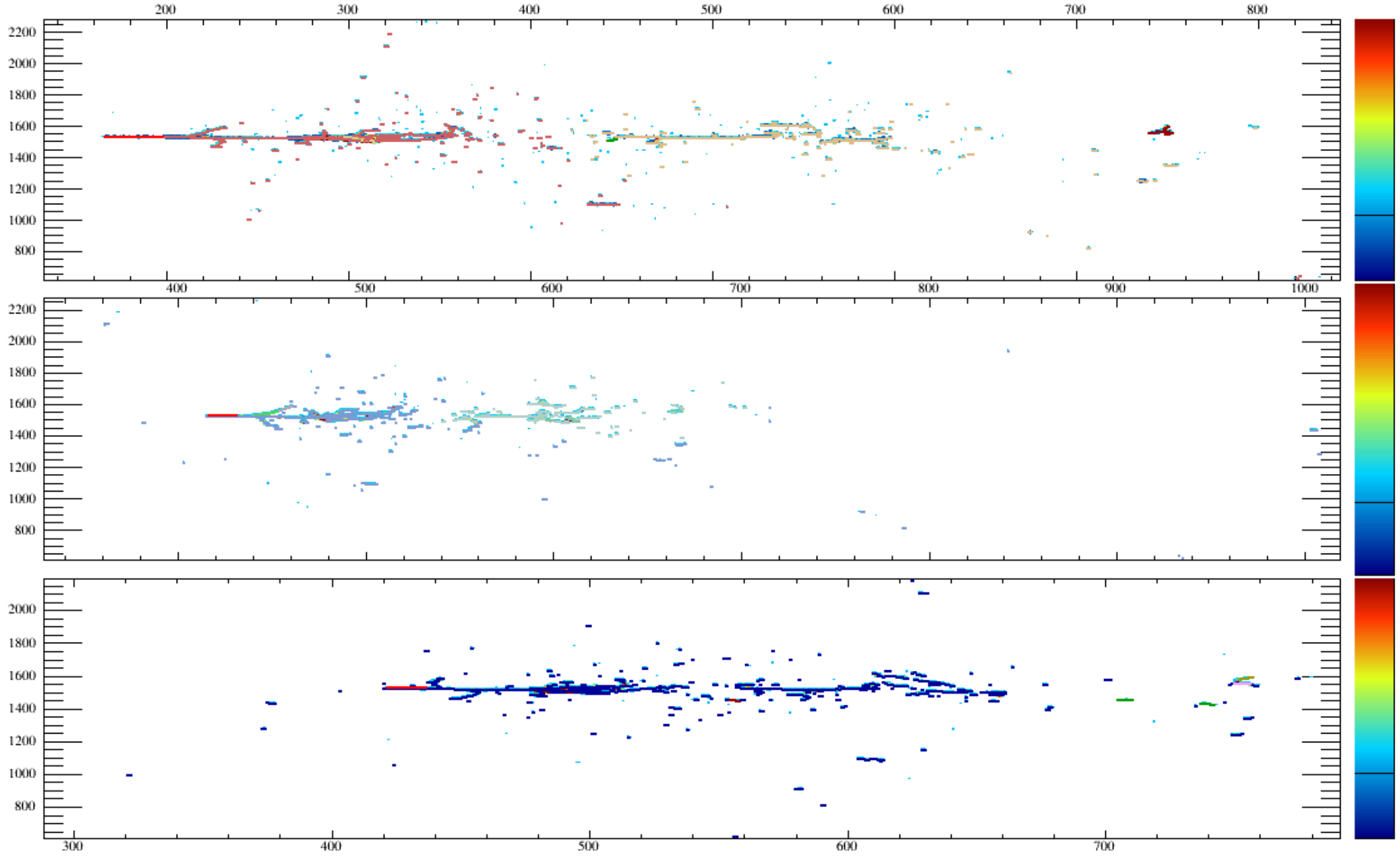
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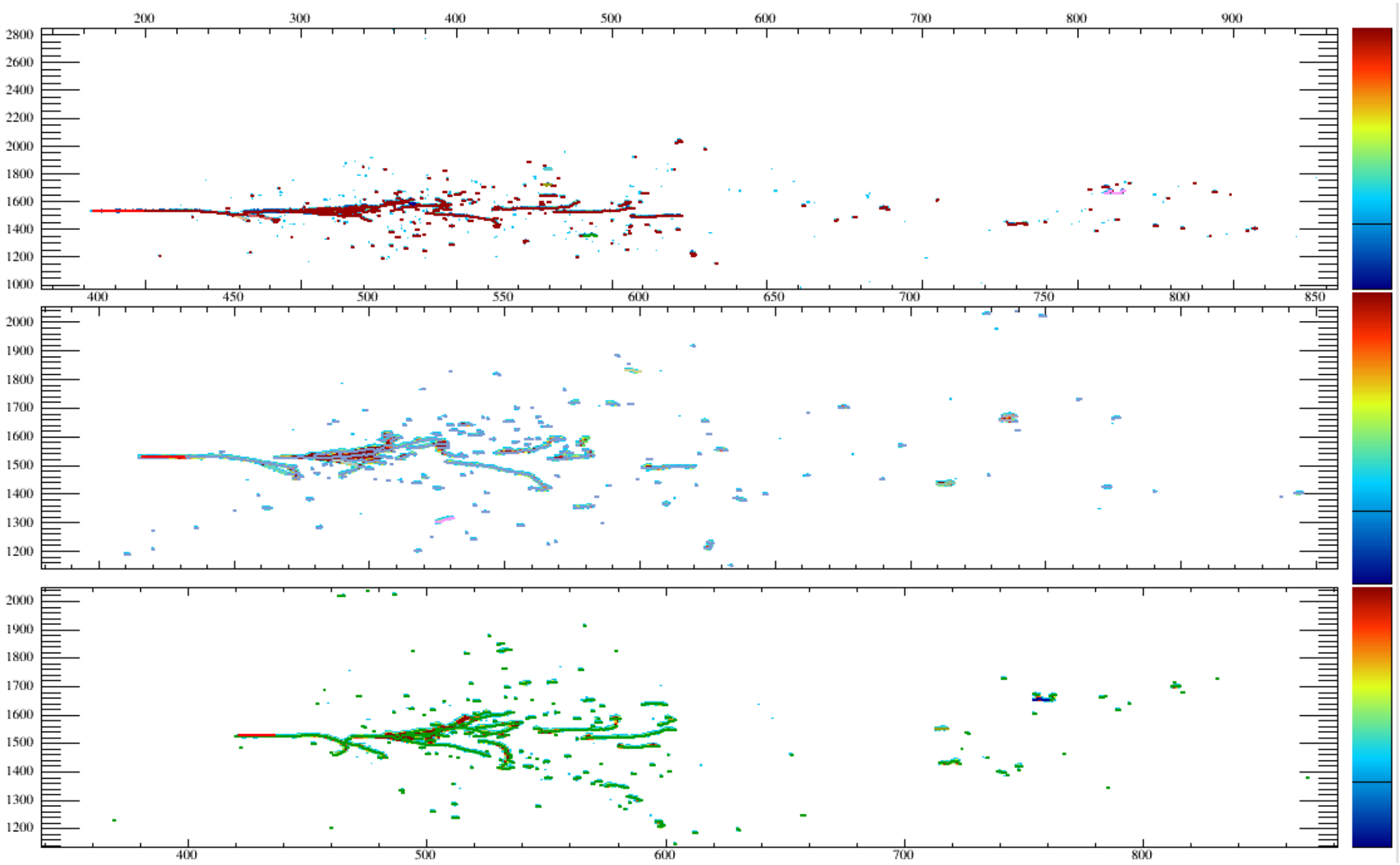
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