

Fire VASE Validation Report

Independent, rerunnable QA for the CubeDynamics grammar, complete HTML cube serialization, GridMET streaming and attribution, FIRED polygon-to-hull construction and 3-D averaging sensitivity, and upstream source consistency.

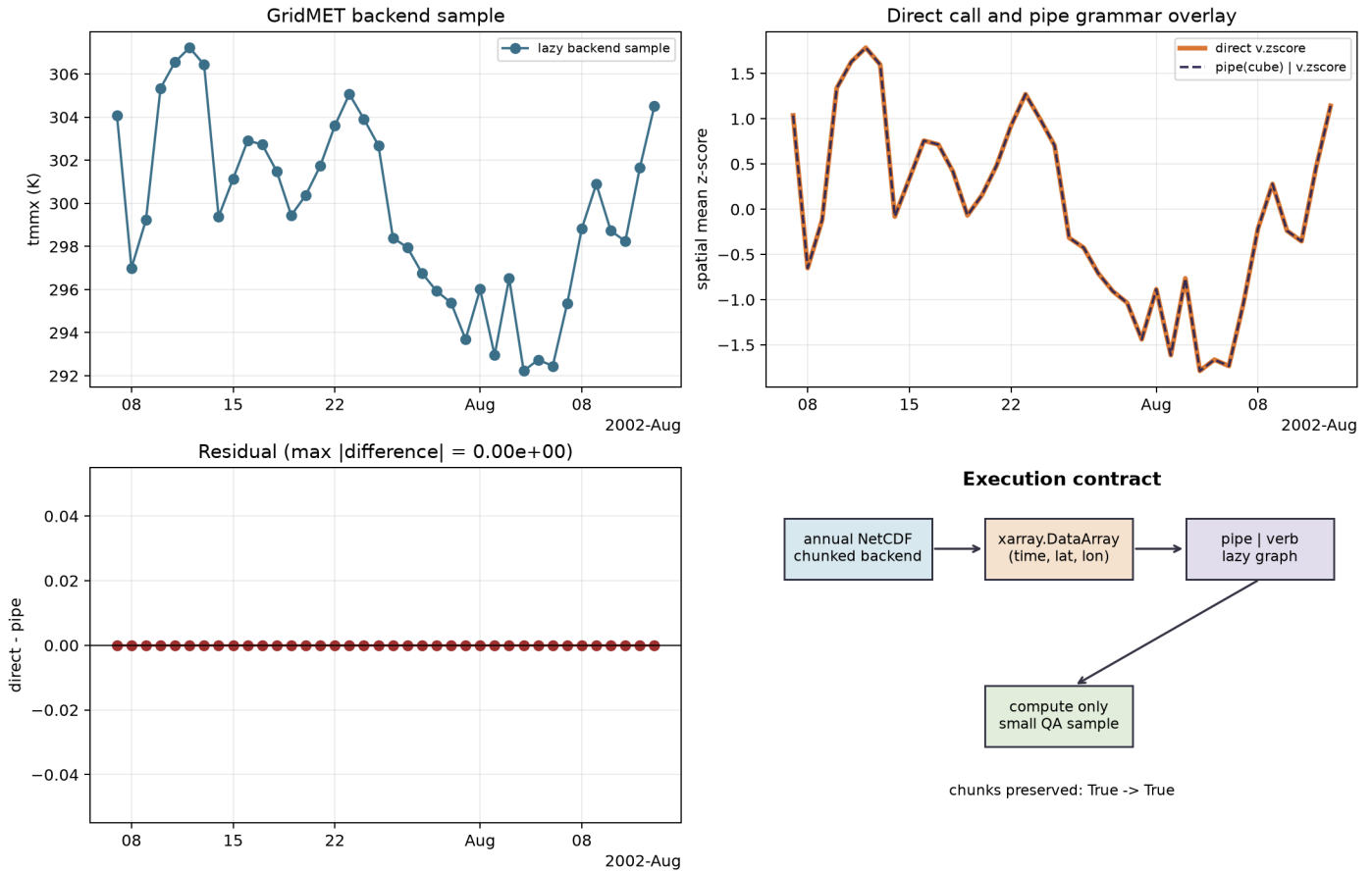
module	status	purpose
pipeline	PASS	Pipe grammar and direct verb calls produce identical values while preserving lazy chunks.
cube	PASS	The real GridMET cube retains ordered coordinates and contiguous dates; every source time plane and every decoded HTML raster matches the declared source indexing exactly.
geometry	PASS	FIRED polygons remain valid through the configured simplification range and yield stable, positive time-hull metrics.
hull3d	PASS	The plotted construction exactly reproduces the production directional-support hull and exposes alternative temporal averaging decisions in 3-D.
climate	PASS	Lake-table dates and centroid values match FIRED/GridMET inputs; fractional overlap attribution is computed and exposed as a deliberate alternative.
external	PASS	Packaged GridMET raw values exactly match the NCAR mirror and FIRED event geometry matches the union of daily polygons.

Generated 2026-08-25T16:36:33+00:00. Each module also writes CSV/JSON evidence beside its plot; this PDF is a collation, not the only QA record.

1. Pipeline validation

PASS - Pipe grammar and direct verb calls produce identical values while preserving lazy chunks.

QA 1 - CubeDynamics grammar and GridMET streaming contract

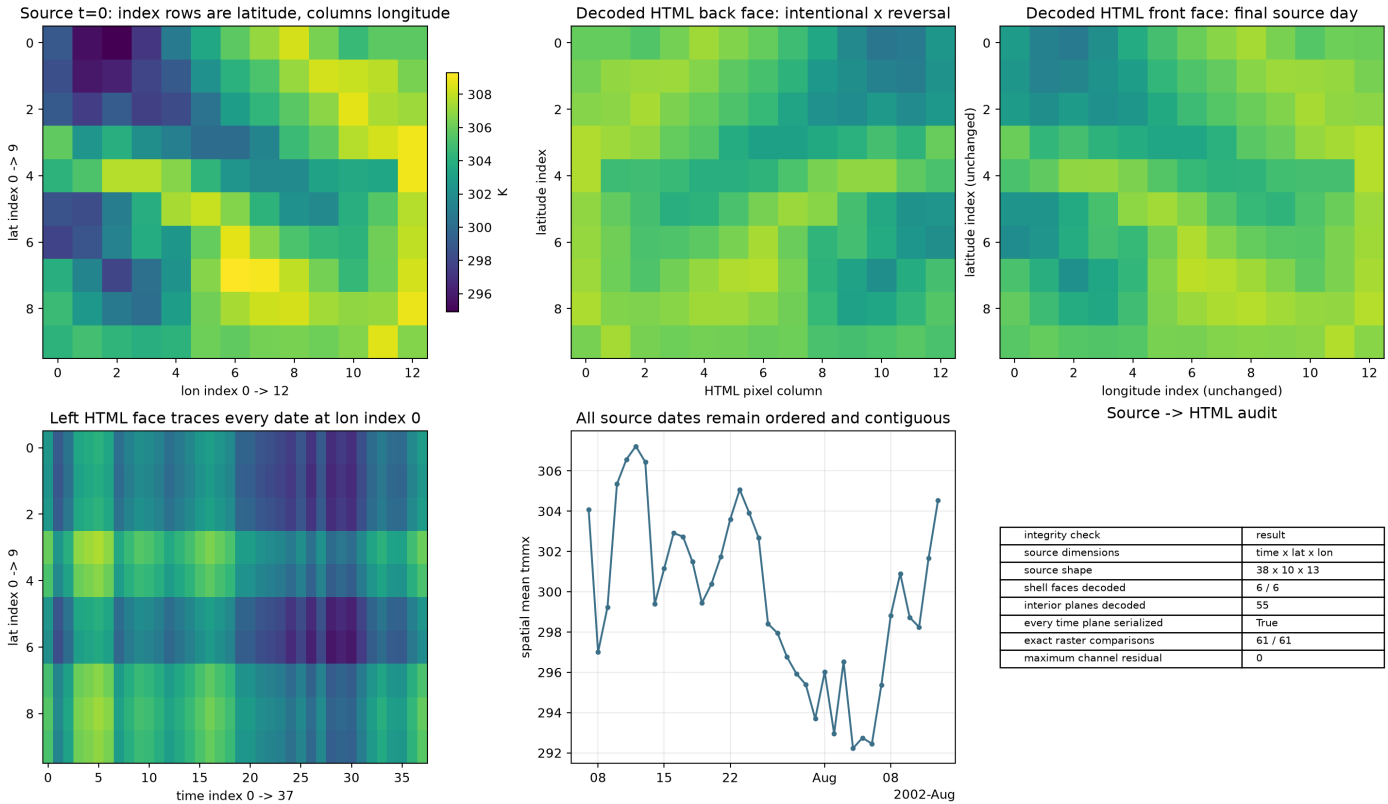


metric	value
fire id	20657
variable	tmmx
shape	time=38, lat=10, lon=13
chunks	((38,), (10,), (13,))
max abs residual	0.0
lazy before	True
lazy after	True
same object on noop unwrap	True

2. Cube validation

PASS - The real GridMET cube retains ordered coordinates and contiguous dates; every source time plane and every decoded HTML raster matches the declared source indexing exactly.

QA 4 - Real GridMET cube axis, continuity, and HTML serialization integrity

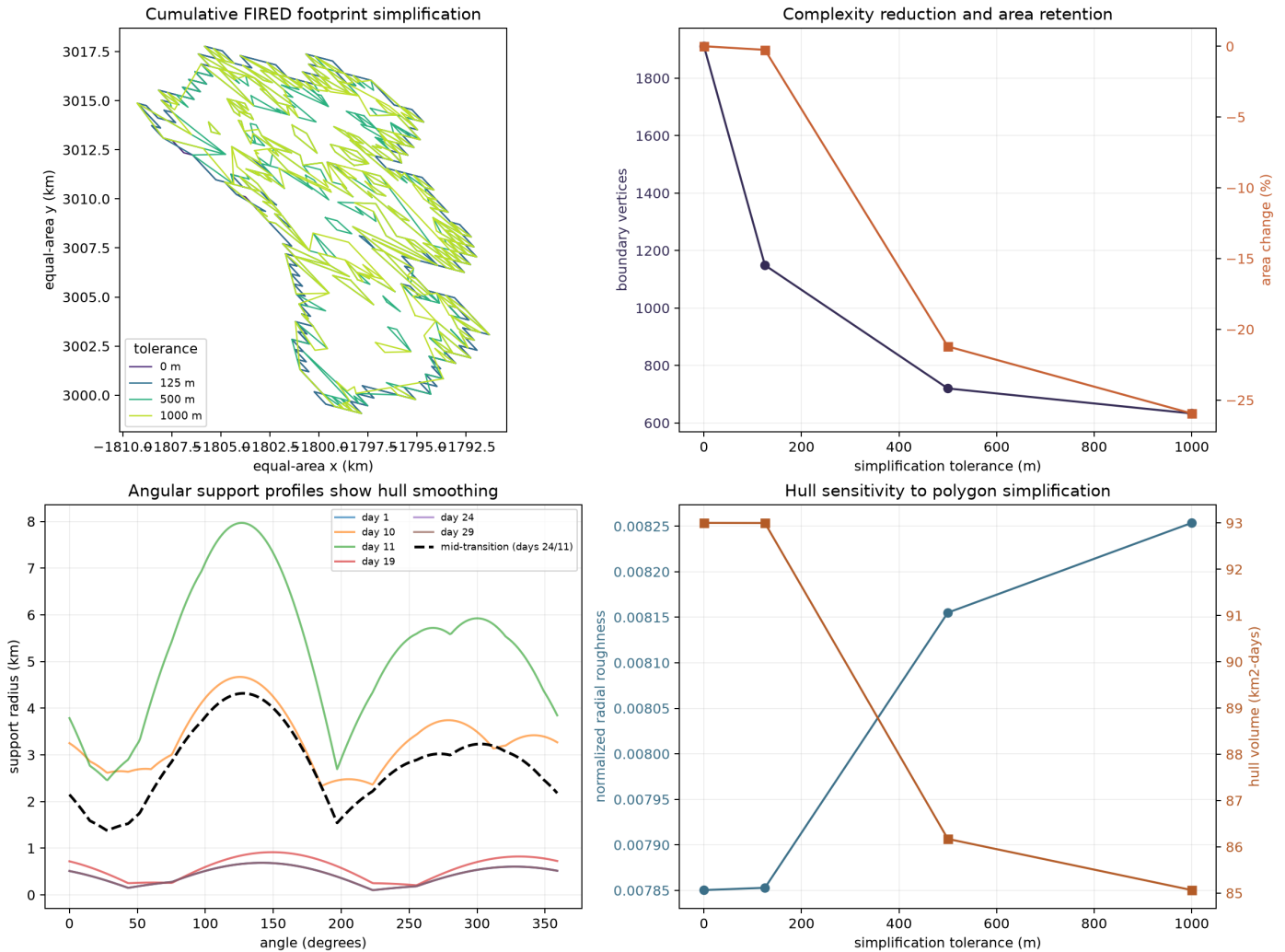


metric	value
fire id	20657
variable	tmmx
dims	time, lat, lon
shape	time=38, lat=10, lon=13
source cells	4940
finite cells	4940
missing cells	0
time contiguous daily	True
coordinate integrity	True
all html planes present	True
all html pixels exact	True
all time slices serialized once	True
decoded shell faces	6
decoded interior planes	55
maximum rgba channel residual	0
corner landmarks exact	True
source value sha256	cdbb88d825c589fc276f013555f80d205b7dcb05cd2b73bc6d7f364c4f04352f
embedded manifest matches source	True

3. Geometry validation

PASS - FIRED polygons remain valid through the configured simplification range and yield stable, positive time-hull metrics.

QA 2 - FIRED polygon to time-hull construction



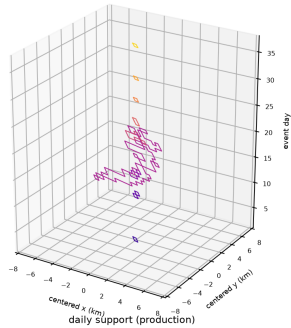
metric	value
fire id	20657
daily polygon rows	29
tolerances m	0.0, 125.0, 500.0, 1000.0
n theta	96
operational max tolerance m	125.0
all simplified geometries valid	True
operational max absolute area change pct	0.2538943308263701
max absolute area change pct	25.944624780202286
base daily polygon vertices	1911
most simplified daily polygon vertices	633

4. Hull3D validation

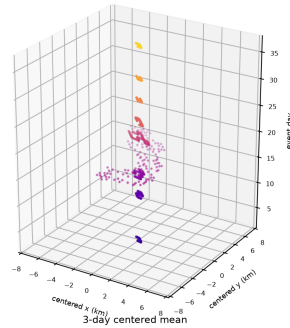
PASS - The plotted construction exactly reproduces the production directional-support hull and exposes alternative temporal averaging decisions in 3-D.

QA 3 - How FIRED polygons become a 3-D time hull, and how averaging changes the shape

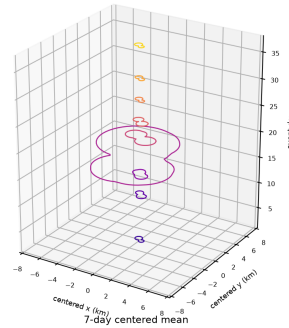
1. Raw FIRED polygons, stacked by day



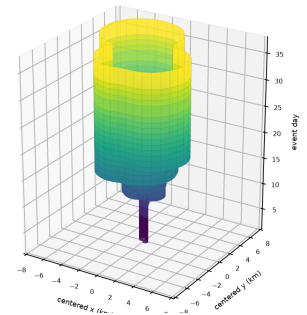
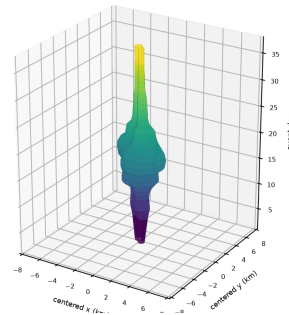
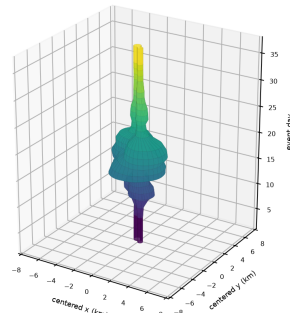
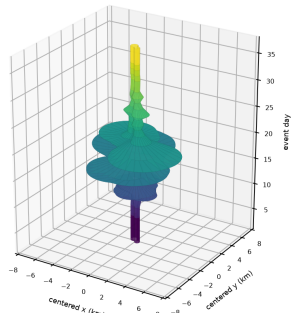
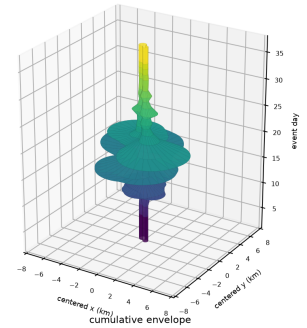
2. Equal-step boundary samples, day-centered



3. Directional maxima form support rings



4. Adjacent rings triangulated linearly

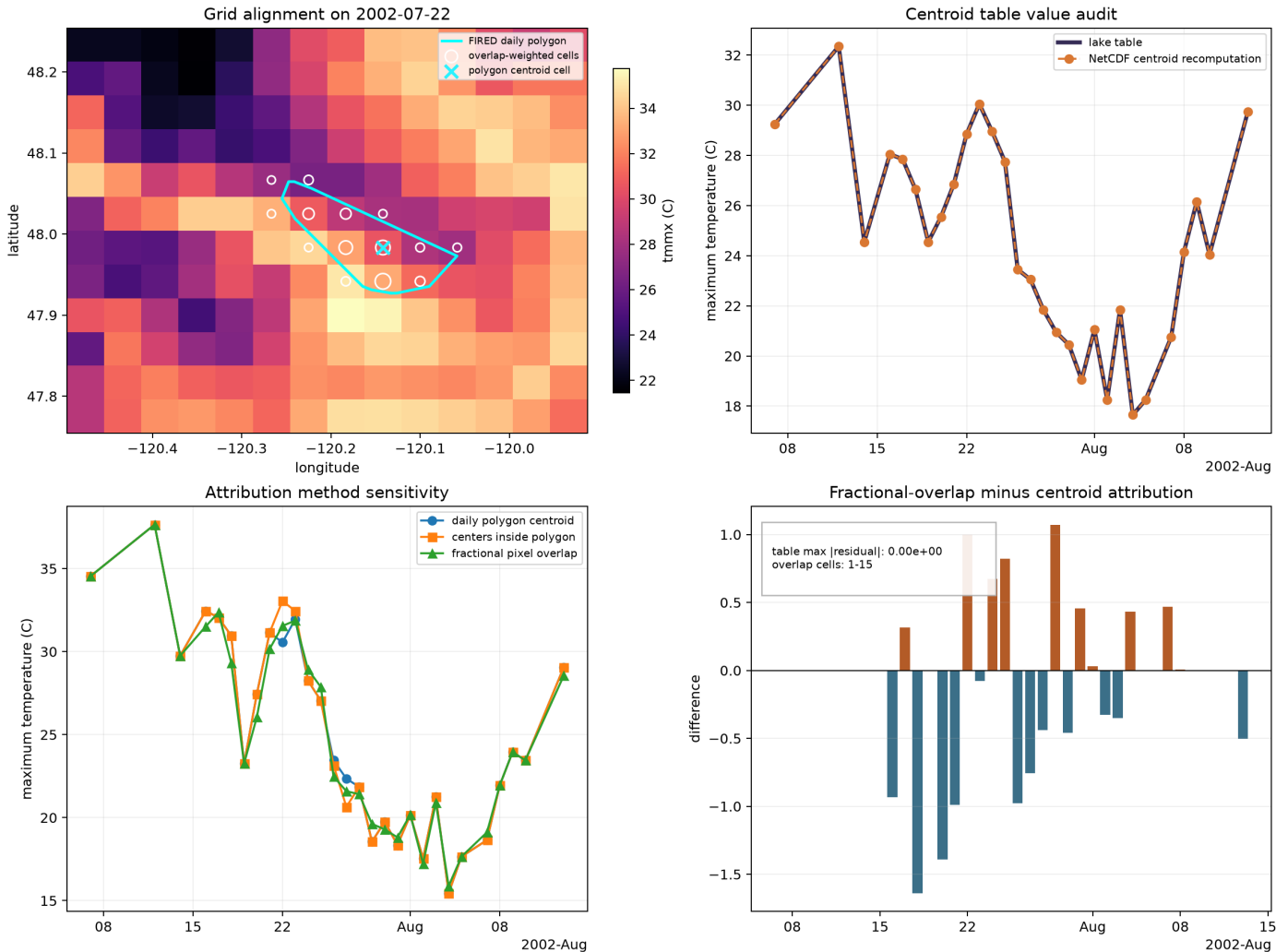


metric	value
fire id	20657
daily layers	29
ring samples	128
directional angles	96
averaging decisions	daily support (production), 3-day centered mean, 7-day centered mean, cumulative envelope
production max abs radial residual km	1.7763568394002505e-15
largest alternative mean radial change km	2.9010788132667864
largest alternative max radial change km	6.989561112223742

5. Climate validation

PASS - Lake-table dates and centroid values match FIRED/GridMET inputs; fractional overlap attribution is computed and exposed as a deliberate alternative.

QA 3 - GridMET time and polygon attribution

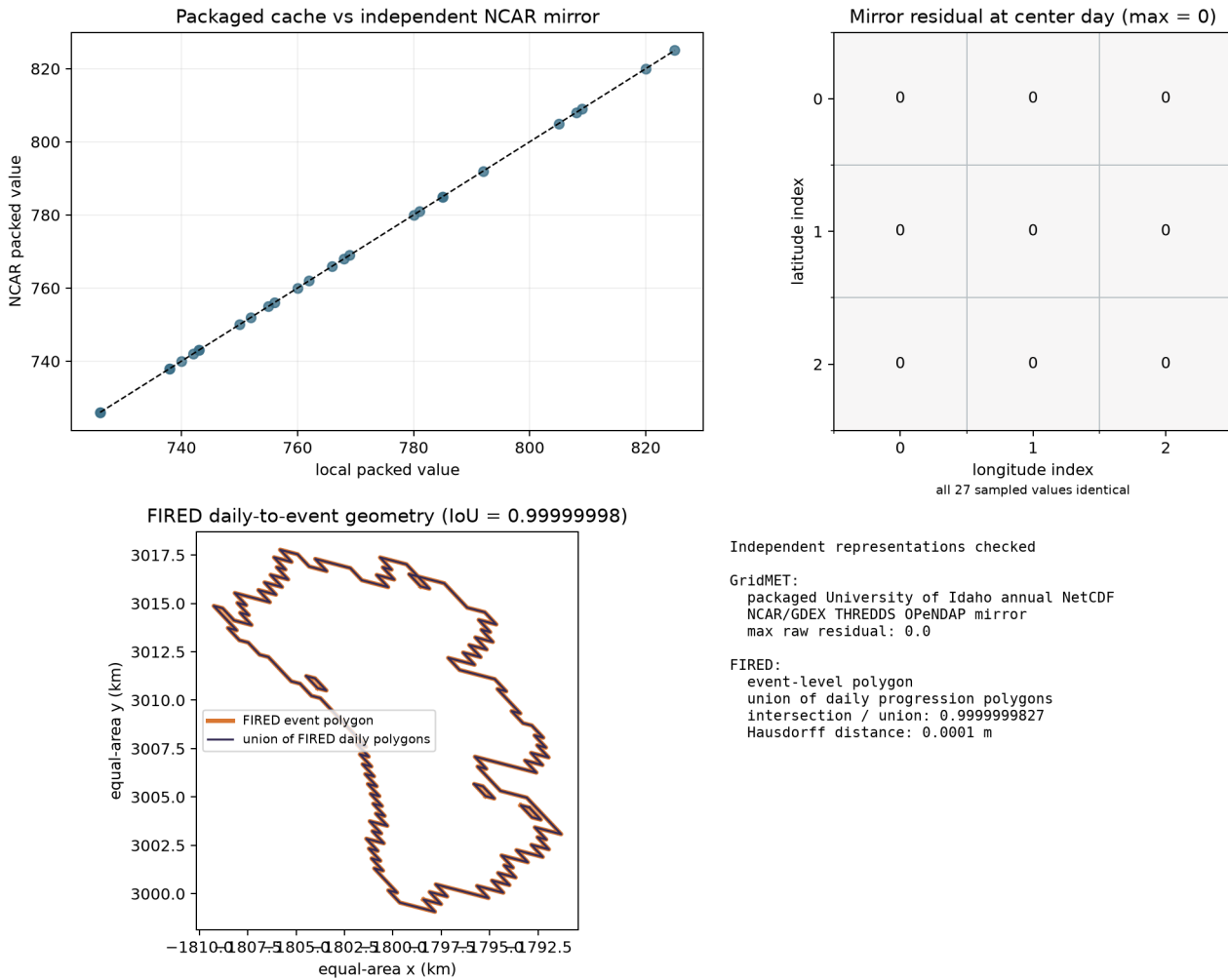


metric	value
fire id	20657
variable	tmmx
centroid lat	48.00781087513061
centroid lon	-120.17427984812414
max abs table residual	0.0
table dates equal fired dates	True
table dates present in gridmet	True
table rows	29
daily polygon rows compared	29
min overlap cells	1
max overlap cells	15
max abs area weighted minus centroid	1.6390664673533024

6. External validation

PASS - Packaged GridMET raw values exactly match the NCAR mirror and FIRED event geometry matches the union of daily polygons.

QA 4 - External and upstream-source validation



metric	value
fire id	20657
gridmet variable	tmmx
external network requested	True
gridmet max abs raw residual	0.0
gridmet external url	https://tds.gdex.ucar.edu/thredds/dodsC/files/d761426/tmmx_2002.nc.ascii?air_temperature[206:1:208][32:1:34][109:1:111]
fired intersection over union	0.9999999826761925
fired hausdorff distance m	0.0001247120738568293