AIRBORNE SFM MODELLING FOR AVALANCHE AND DEBRIS FLOW PATHS IN STEEP TERRAIN WITH LIMITED GROUND CONTROL

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Årnes debris flow path
Jølstravatnet, Sunnfjord Municipality, Norway
[Top] Precipitation map indicating torrential rainfall in the Jølstravatnet lake area on July 30, 2019 (map: Norwegian Meteorological Institute);

[Right] False colour satellite image from August 2, 2019 (imagery: Copernicus Sentinel).

Vassenden (credit: Hallstein Dvergsdal)

Årnes (credit: HRS Sør-Norge)
High-resolution digital surface model created during SfM-MVS workflow; shown with numbered ground control points used for adjustments and accuracy assessment.
Sætreskarsfjellet avalanche path
Strynefjellet, Stryn Municipality, Norway
[Top] Orthoview and [Right] Map view of East facing avalanche path on Sætreskarsfjellet above National Road 15, in Strynefjellet area, western Norway (imagery: Geodata AS, Kartverket)

(Maps: Geodata AS, Kartverket, Esri)
**Top** Flight lines displayed on top of SfM-derived orthophoto product, draped over a terrain model; ground control points displayed in red (background imagery: Geodata AS, Kartverket); **Right** Example of survey image at the foot of the avalanche path; area encircled in red is enlarged (inset) to illustrate ground control placement in the scene.
[Left] Ground control point error assessed within Agisoft Metashape software; [Right] Comparison of RPAS-SfM-derived and LiDAR-derived surface models (ground control points shown in red).

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<th>GCP</th>
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<th>Surveyed elevation (meters)</th>
<th>Difference</th>
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[Top] Satellite image of Sætreskarsfjellet in late spring (credit: Maxar Technologies, Google).

[Right] Joint report published in collaboration with the Norwegian Public Road Administration and University of Washington researchers.
#påsikkergrunn