



Evon Silvia <esilvia@quantumspatial.com>

## Scan Angle Rank

5 messages

Evon Silvia <esilvia@quantumspatial.com>

Mon, Aug 31, 2015 at 11:05 AM

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Hello LWG folks,

I have recently received a few requests related to the scan angle embedded in the LAS file. When I read through the LAS 1.4 specification, it seems to pretty clearly convey that the angle stored is intended to be the angle of the pulse relative to vertical as defined in the data's coordinate system. For example, a single pass of the laser collected with a 30° FOV at +3° sustained roll will have an angle range of -12° to +18°, not including any forward/backward look angles.

By contrast, I have also seen values stored in this field as strictly using the scanner-offset angles – that is, the angle of the scanner mirror at the time of collection. For example, a swath collected with a 30° FOV would have an angle range of -15° to +15°, regardless of the roll value and forward/backward look angles.

What was the motivation for adopting the former convention rather than the latter, and is this a strict requirement of the specification? Would there be any value in adding a flag to indicate the convention used?

I see the latter convention being much more useful when doing any procedures based on scanner geometry (edge clips, overlap classification for multi-channel sensors, etc). The only scenarios I can see the former convention being more useful are when using scan angle as a proxy for angle of incidence when assuming a flat world, and for conveying how far "off-center" the points are from the planned trajectory, either of which can be easily computed if one has the SBETs.

Thanks,  
Evon

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Heidemann, Hans <kheidemann@usgs.gov>

Mon, Aug 31, 2015 at 1:02 PM

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My 2:

I believe that, although the intent was for the measure to be the flat target incidence angle (not simple mirror angle), computing and recording it was a bridge too far in the early days -- there were too many more pressing problems to solve. Subsequently, many just recorded the mirror position, and that became one "standard".

Lotta vendors seem reluctant to deliver SBET files, and most end users do not have the software (or programming skills) necessary to perform the calculations (in either direction). So from an end user perspective, calculating whichever measure is not reported is not usually possible.

Plus, until LAS1.4, there was no good place to store - and access - the other measure.

Karl

 **H. Karl Heidemann, GISP**

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*"Nothing matters very much, and very few things ... matter at all."*

*- Arthur James Balfour*

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**Lewis Graham** <lgraham@geocue.com>

Tue, Sep 8, 2015 at 5:50 AM

To: Evon Silvia <esilvia@quantumspatial.com>, "arttu.soininen@kolumbus.fi" <arttu.soininen@kolumbus.fi>, "david.reid@optech.com" <david.reid@optech.com>, "Gerhard\_Loeffler@trimble.com" <Gerhard\_Loeffler@trimble.com>, Howard Butler <hobu.inc@gmail.com>, "mrosen@lizardtech.com" <mrosen@lizardtech.com>, "paul.galla@leicaus.com" <paul.galla@leicaus.com>, "ramesh.sridharan@virtualgeomatics.com" <ramesh.sridharan@virtualgeomatics.com>, "sdharmapuri@mbakercorp.com" <sdharmapuri@mbakercorp.com>, "wpeng@esri.com" <wpeng@esri.com>, "cparrish@ccom.unh.edu" <cparrish@ccom.unh.edu>, "csevcik@riegl.com" <csevcik@riegl.com>, Derek Morris <dorris@geocue.com>, "kheidemann@usgs.gov" <kheidemann@usgs.gov>, "martin.isenburg@gmail.com" <martin.isenburg@gmail.com>, "mumansky@appliedimagery.com" <mumansky@appliedimagery.com>

Hello Evon,

Scan Angle Rank was originally being used by a vendor to do radiometric normalization and hence needed to be WRT the coordinate system. Obviously one gets slope from the data themselves and with scan angle rank, can compute angle of incidence. I am not sure many folks ever did this, though. It is very useful when used in this manner. The other big use for this value was to determine the edge of flight line. I have generally found the encoding to be suspect.

I have heard talk of using the scan angle rank as in the second mode you mention but have not seen a lot of use for this since other scanner parameters are not conveyed in LAS (e.g. is it a rotating system versus oscillating system and so forth).

There has been discussion about this field every time we revise the LAS specification but very little passion – does not seem to be used very much in reality.

Best Regards,

Lewis

Lewis Graham

AirGon LLC, small UAS Solutions

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**Sent:** Monday, August 31, 2015 13:06

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**Subject:** Scan Angle Rank

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**Evon Silvia** <[esilvia@quantumspatial.com](mailto:esilvia@quantumspatial.com)>

Tue, Sep 8, 2015 at 8:40 AM

To: Lewis Graham <[lgraham@geocue.com](mailto:lgraham@geocue.com)>

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Karl & Lewis,

Thank you for the information! In reality if properly encoded I can always use the roll values from the SBET to back-compute the second convention, so it isn't the end of the world for me either way. I'll let this stew awhile.

Evon

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**Martin Isenburg** <[martin.isenburg@gmail.com](mailto:martin.isenburg@gmail.com)>

Wed, Sep 9, 2015 at 12:43 AM

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Hello,

11/8/2017

Quantum Spatial Mail - Scan Angle Rank

I like to reiterate - yet one more time - my request to make the discussions of the LAS Working Group publically available so that message threads that provide insights about the LAS specification - in this case about the intended meaning and practical use of the "scan angle rank" attribute - are available to all users of the LAS format. The current practice that all LAS Working Group discussion are solely "archived" in the 17 private email folders of its members is not acceptable.

Regards,

Martin

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