



06-11 MAY 2018
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*Presented at the FIG Congress 2018,
May 6-11, 2018 in Istanbul, Turkey*

A STUDY ON THE USABILITY OF DIGITAL ELEVATION MODELS OBTAINED FROM OPEN SOURCES IN THE PRODUCTION OF CONTOURS: COMPARISON OF ALOS AND SRTM DEM DATA

S.Çabuk, **A.C. Kiracı**, M.Kaya, M.Erdoğan, O.Eker, A.Okul

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INTRODUCTION



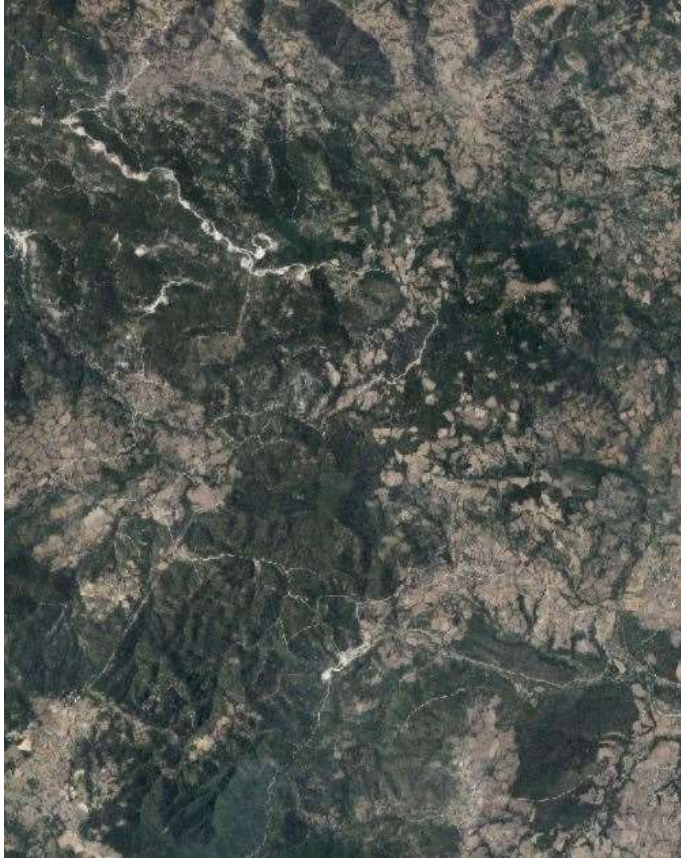
ALOS (Advanced Land Observing Satellite) 30m,

SRTM (Shuttle Radar Topography Mission) 30m

SRTM (90m)

1:50k scale topographic map production

STUDY AREA



Çanakkale - H17c1



Konya - J28c3

DATA

High resolution aerial photographs taken in 2015 for the Canakkale area and 2011 for the Konya area were used in the application areas.

100 point feature coordinates are captured from stereo models for each study area.

□ The points in the Canakkale area are captured from different places where the elevation differences are increasing and decreasing rapidly.

□ For Konya area, the point features are captured from different and vast plain areas.

DATA



ALOS 30m

released in 2015 by the Japan Aerospace Exploration Agency (JAXA), and can be downloaded free of charge.

The AW3D-30 is actually a resampling of the 5-meter mesh version of the World 3D Topographic Data, which is considered to be the most precise global-scale elevation data at this time. It was generated using the traditional **optical stereo matching technique.**

SRTM

- *The SRTM 90m* is digital elevation data with an approximate 90m sampling distance, which is available as open source in 2003.
- *The SRTM 30m* data was developed by improving the SRTM 90m digital elevation data. This new data was improved by interpolating gaps in the SRTM 90m digital elevation data and filling in the data from different sources, resampling the data.

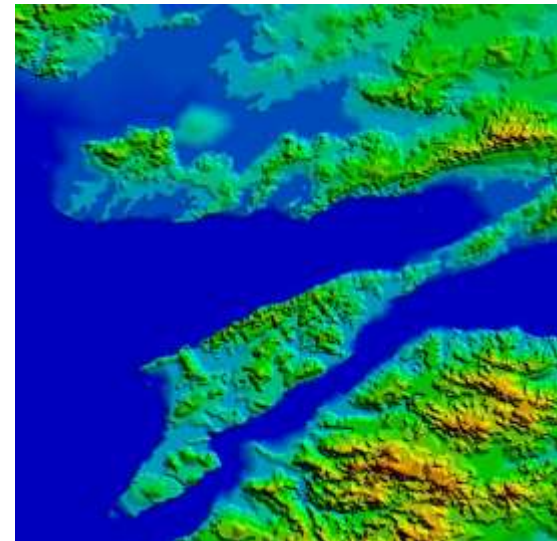
DATA



ALOS 30m



SRTM 30m



SRTM 90m

TEST



Totally **200 points** are derived;.

- **100 of these are located in the Canakkale area, 80 point features are on the ground and 20 point features are captured from top of the construction in the build-up areas.**
- **The remaining 100 points are captured from Konya area with the same properties.**

COMPARISON

- ✓ **Differences between DEM DATA**
- ✓ **Visual Control – Topographic representation, 3D stereo check**

TEST

Differences Between Elevation Data - SRTM 90m

| | SRTM 90m |
|--------------------|----------|
| Number of Feature | 100 |
| Total Difference | 211,61 m |
| Minimum Difference | 0,15 m |
| Maximum Difference | 11,33 m |
| Mean Difference | 4,12 m |
| Median | 2,65 m |
| Standard Deviation | 4,39 m |
| RMS | 4,85 m |

Çanakkale

| | SRTM 90m |
|--------------------|----------|
| Number of Feature | 100 |
| Total Difference | 236,11 m |
| Minimum Difference | 0,1 m |
| Maximum Difference | 12,91 m |
| Mean Difference | 2,36 m |
| Median | -1,13 m |
| Standard Deviation | 3,21 m |
| RMS | 3,20 m |

Konya

TEST

Differences Between Elevation Data - SRTM 30m

| | SRTM 30m |
|---------------------------|---------------|
| Number of Feature | 100 |
| Total Difference | 312,2 m |
| Minimum Difference | 0,08 m |
| Maximum Difference | 10,09 m |
| Mean Difference | 3,12 m |
| Median | 0,24 m |
| Standard Deviation | 3,97 m |
| RMS | 3,95 m |

Çanakkale

| | SRTM 30m |
|---------------------------|---------------|
| Number of Feature | 100 |
| Total Difference | 208,03 m |
| Minimum Difference | 0,12 m |
| Maximum Difference | 13,91 m |
| Mean Difference | 2,08 m |
| Median | -0,88 m |
| Standard Deviation | 2,82 m |
| RMS | 2,82 m |

Konya

TEST

Differences Between Elevation Data - ALOS 30m

| | ALOS 30m |
|---------------------------|---------------|
| Number of Feature | 100 |
| Total Difference | 124,22 m |
| Minimum Difference | 0,07 m |
| Maximum Difference | 7,92 m |
| Mean Difference | 1,7608 m |
| Median | 0,855 m |
| Standard Deviation | 2,23 m |
| RMS | 2,54 m |

Çanakkale

| | ALOS 30m |
|---------------------------|---------------|
| Number of Feature | 100 |
| Total Difference | 201,13 m |
| Minimum Difference | 0,14 m |
| Maximum Difference | 9,46 m |
| Mean Difference | 2,01 m |
| Median | -1,465 m |
| Standard Deviation | 2,27 m |
| RMS | 2,35 m |

Konya

TEST

| ÇANAKKALE | SRTM 90m | SRTM 30m | ALOS 30m |
|---------------------|----------|----------|----------|
| Minimum Difference | 0,15 m | 0,08 m | 0,07 m |
| Maksimum Difference | 11,33 m | 10,09 m | 7,92 m |
| Mean Difference | 4,12 m | 3,12 m | 1,76 m |
| Median | 2,65 m | 0,25 m | 0,86 m |
| Standart Deviation | 4,39 m | 3,97 m | 2,23 m |
| RMS | 4,85 m | 3,95 m | 2,54 m |

Statistics of Datasets

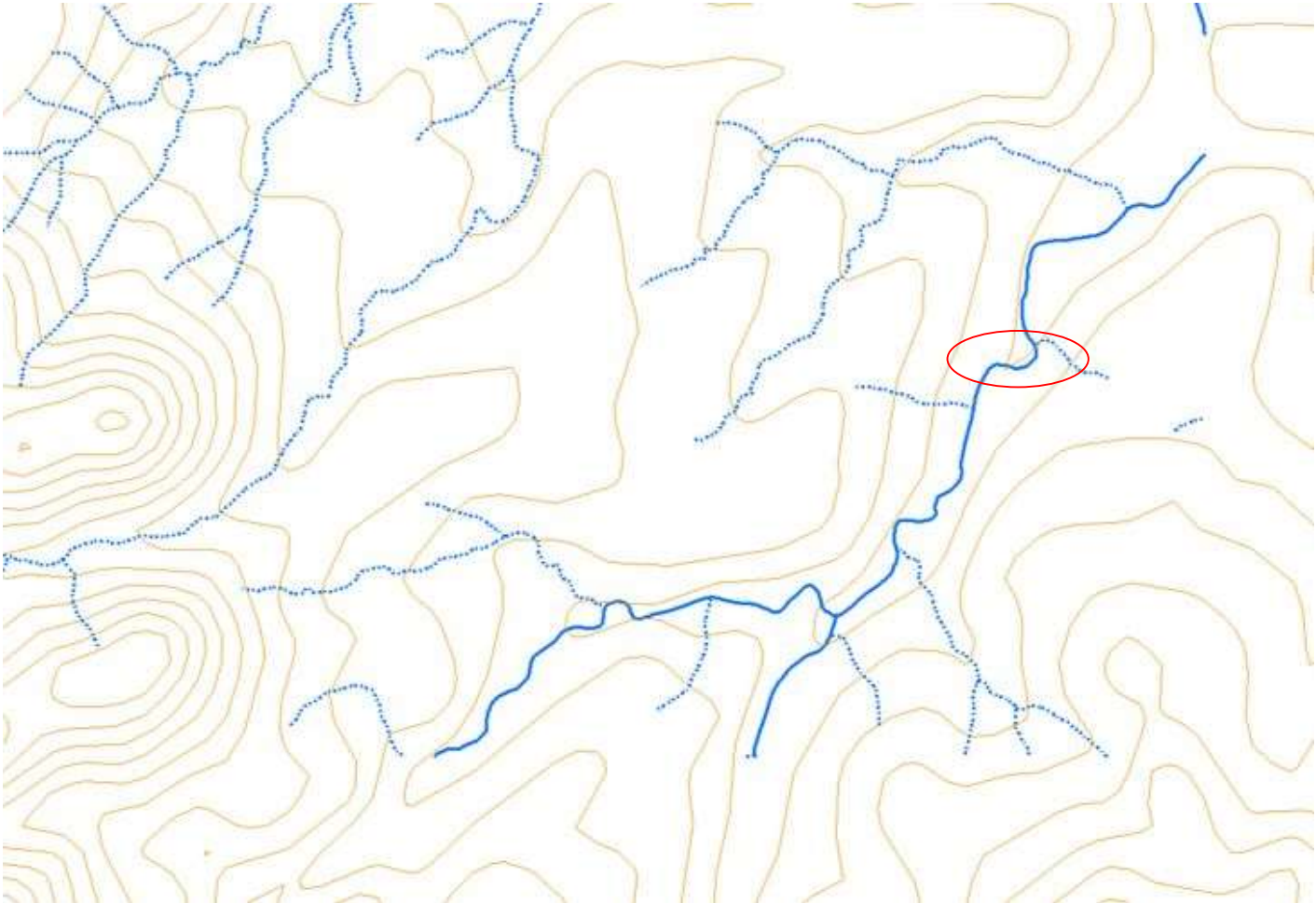
TEST

| KONYA | SRTM 90 | SRTM 30 | ALOS 30 |
|---------------------|-------------|-------------|-------------|
| Minimum Difference | 0,10 | 0,12 | 0,14 |
| Maksimum Difference | 12,91 | 13,91 | 9,46 |
| Mean Difference | 2,36 | 2,08 | 2,01 |
| Median | -1,14 | -0,88 | -1,47 |
| Standart Deviation | 3,21 | 2,82 | 2,27 |
| RMS | 3,20 | 2,82 | 2,35 |

Statistics of Datasets

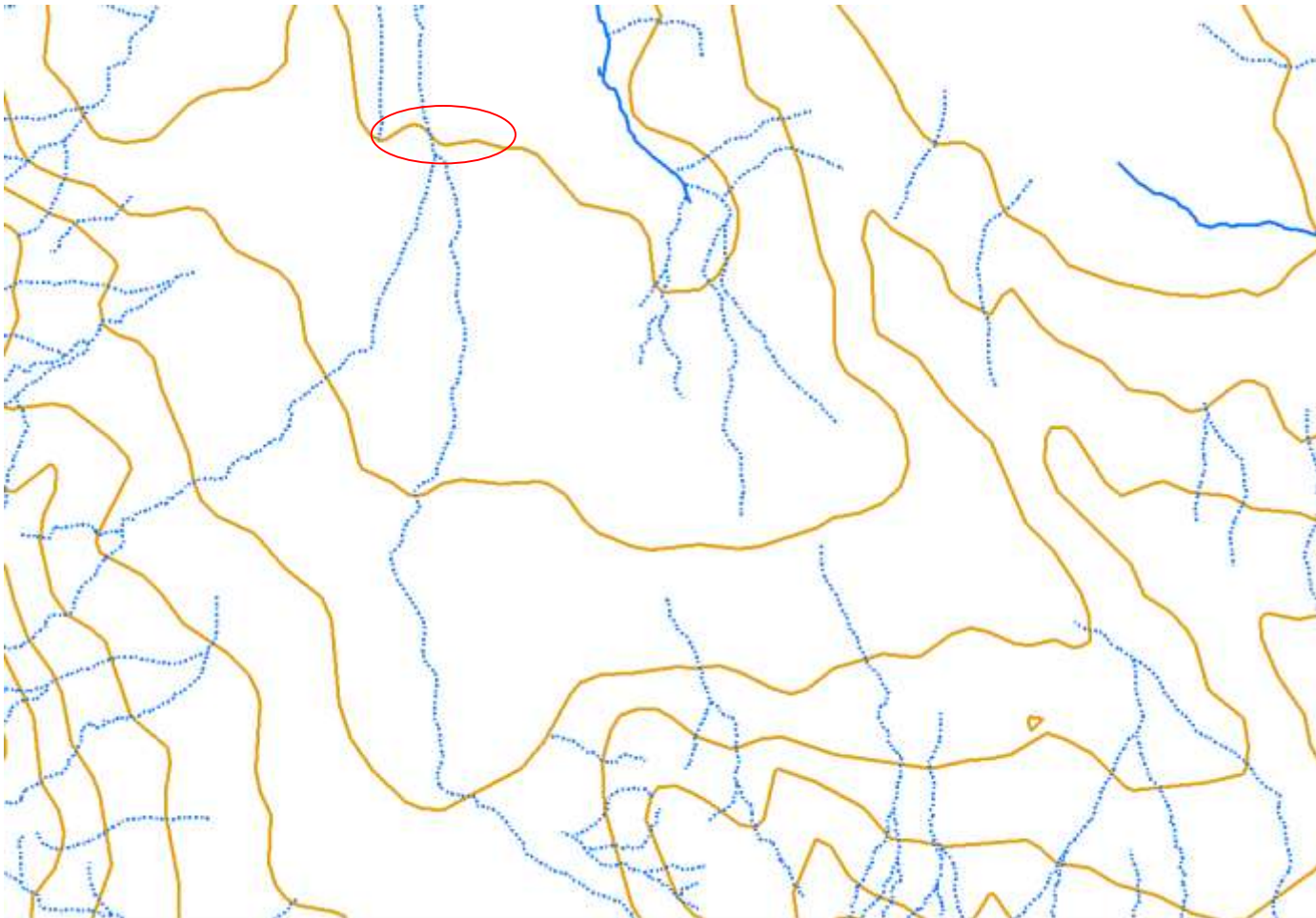
TEST

Contours Produced From SRTM 90m Data



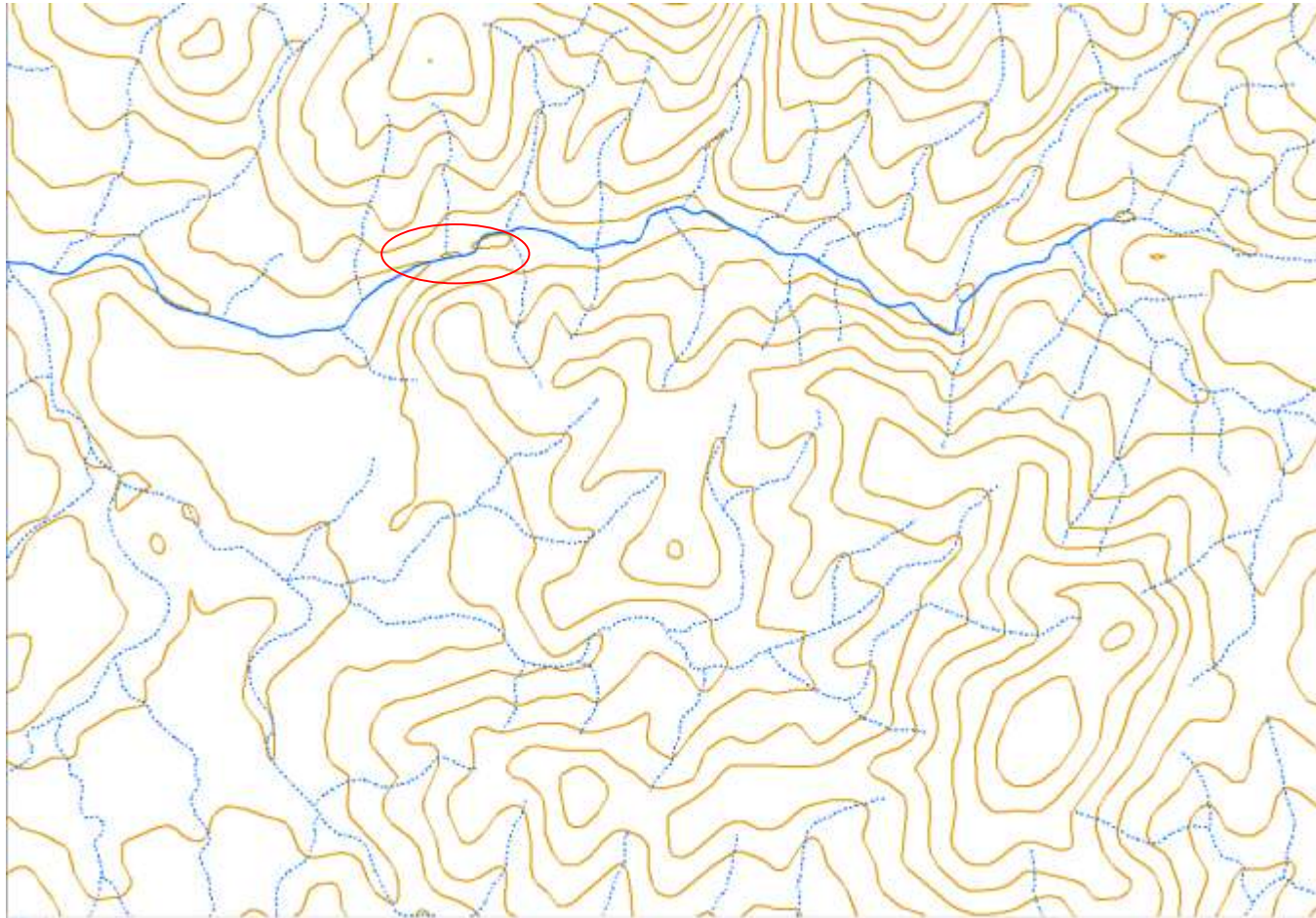
TEST

Contours Produced From SRTM 90m Data



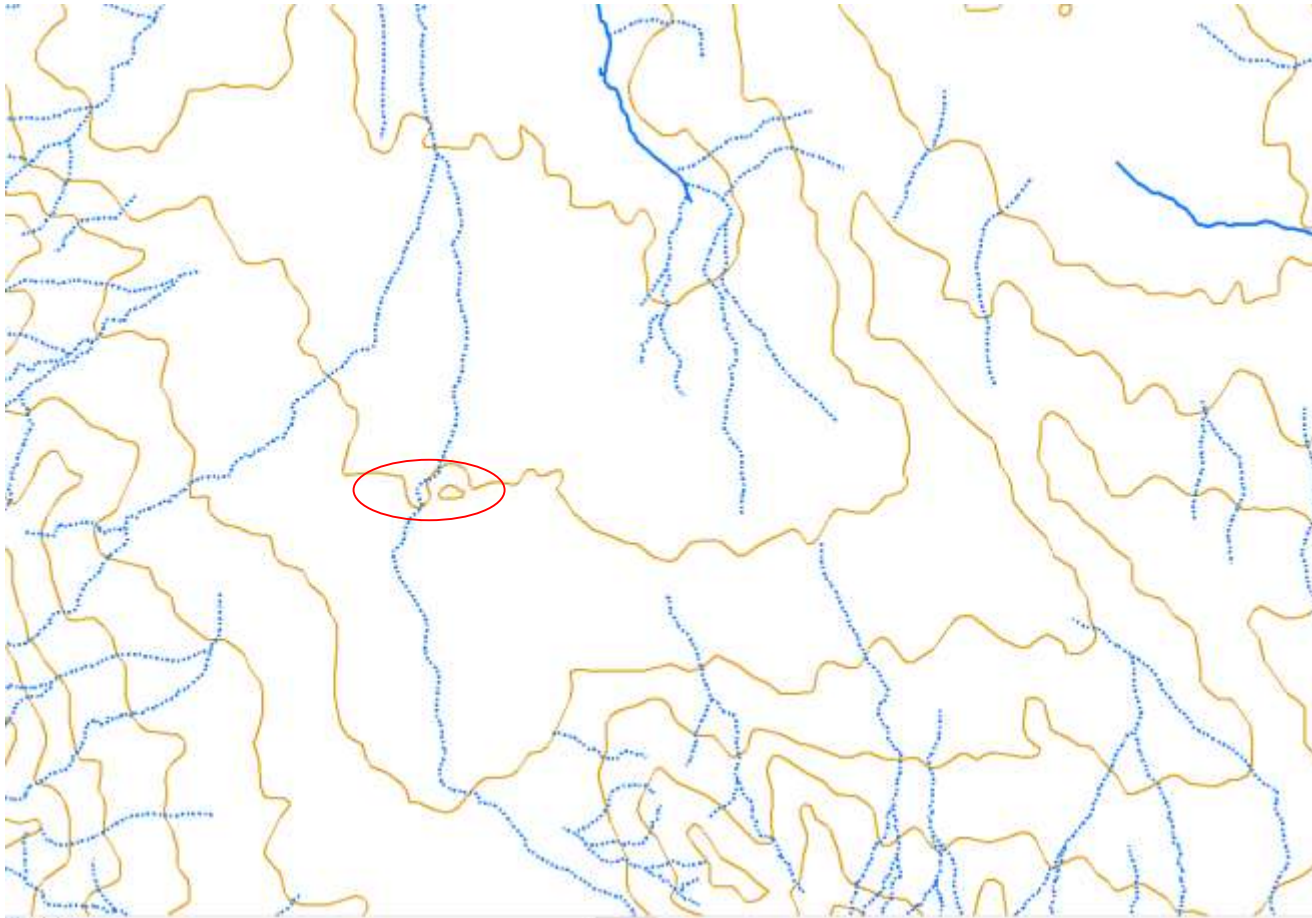
TEST

Contours Produced From SRTM 30m Data



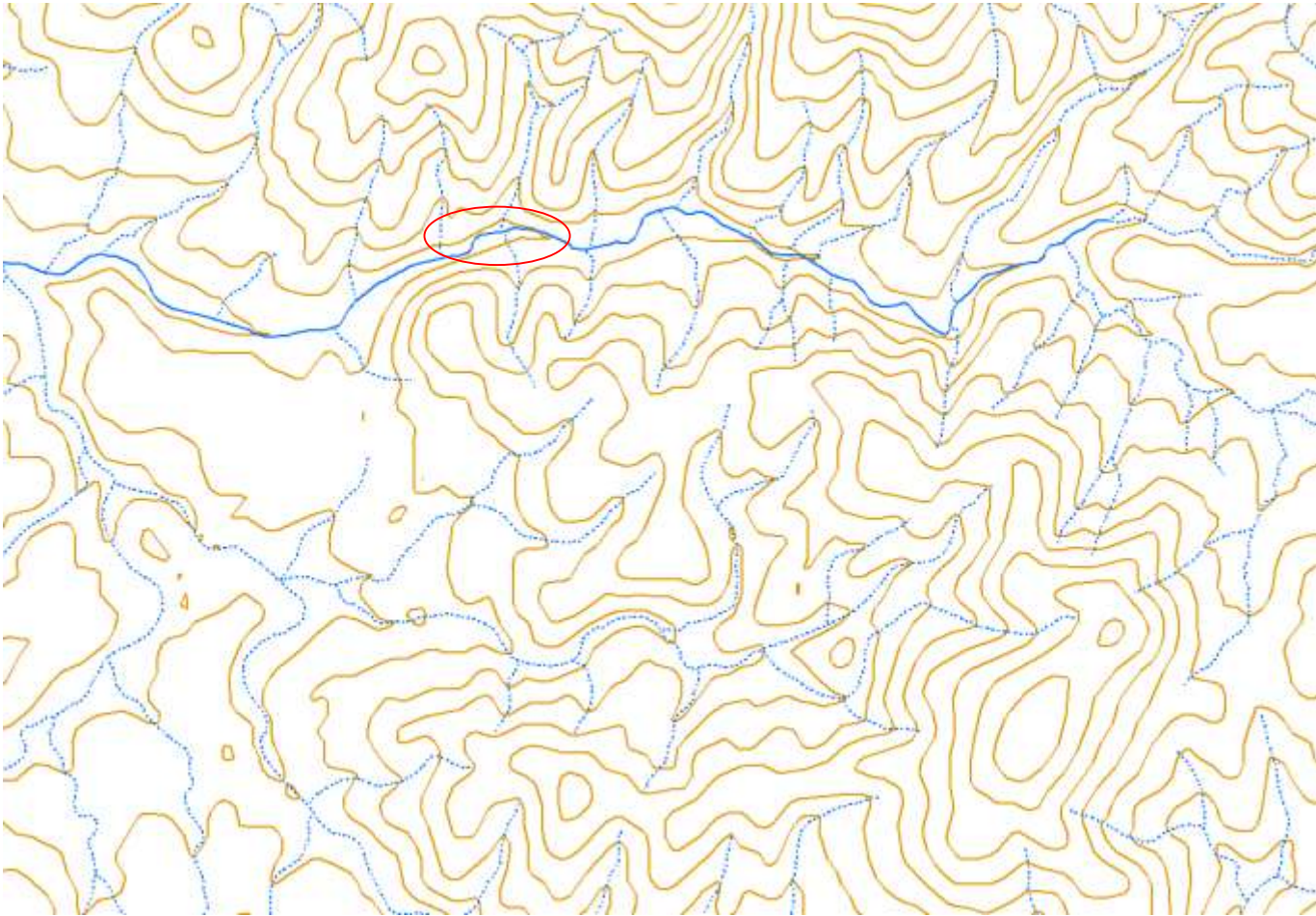
TEST

Contours Produced From SRTM 30m Data



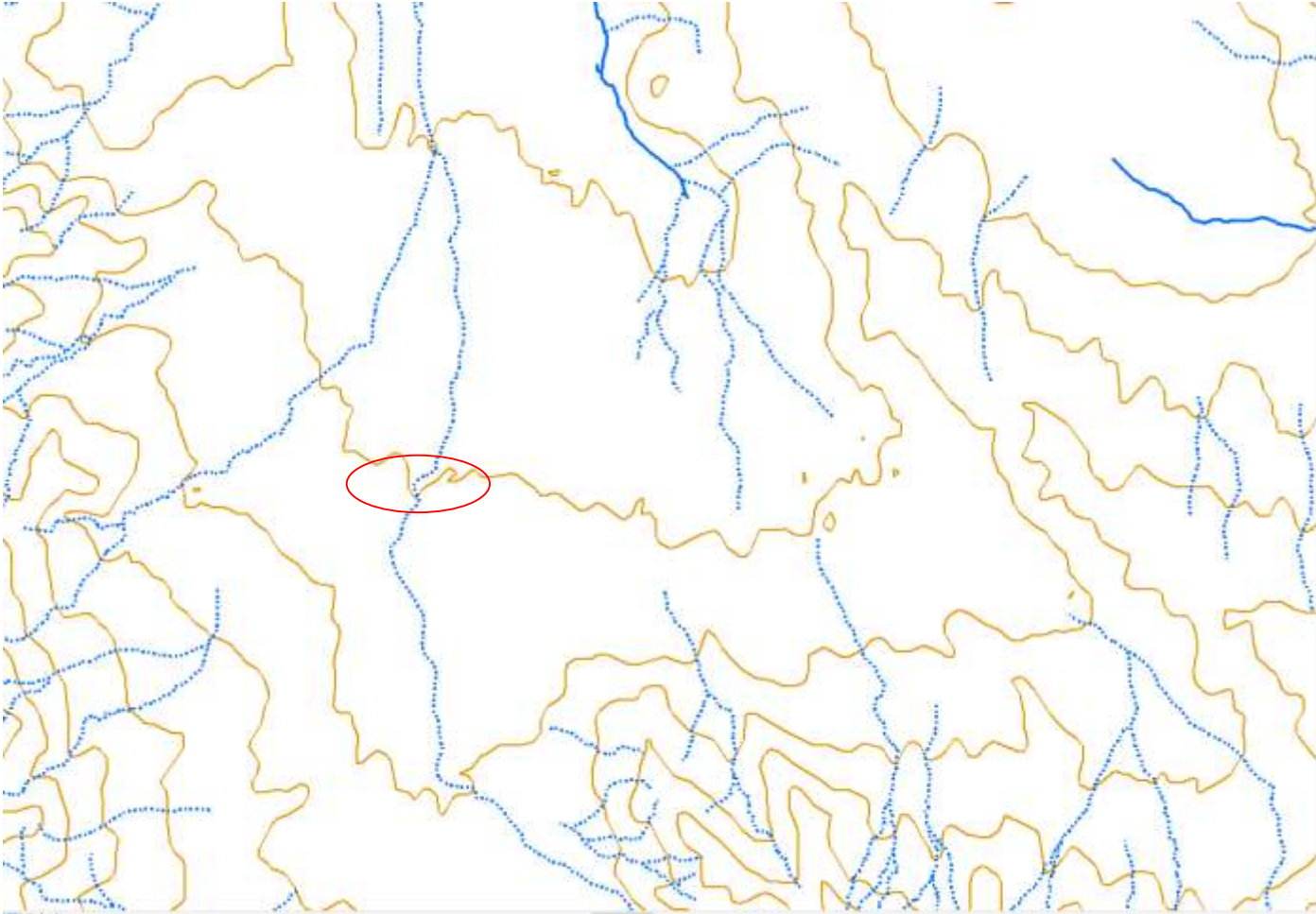
TEST

Contours Produced From ALOS 30m Data

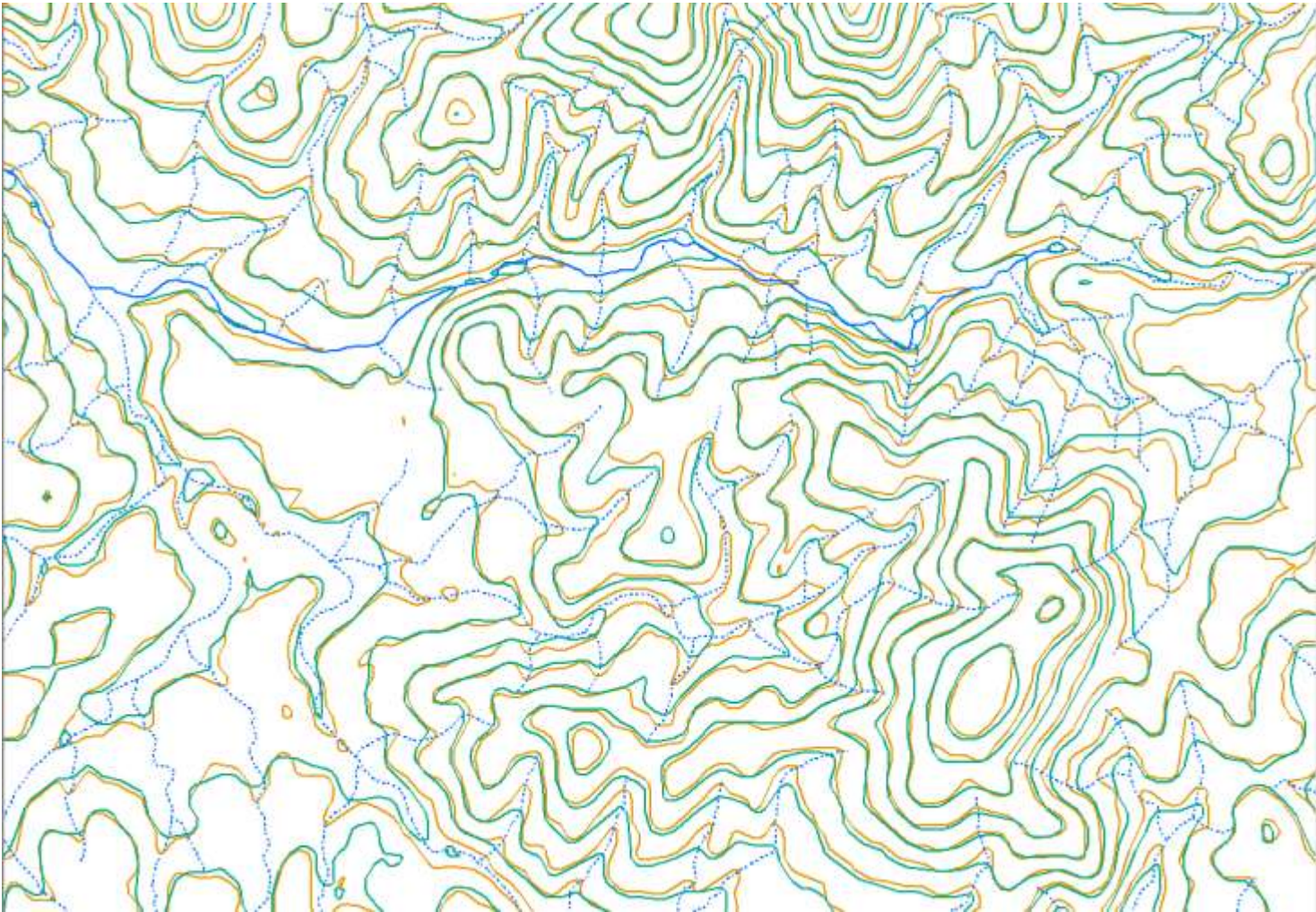


TEST

Contours Produced From ALOS 30m Data



TEST



CONTROLS ON STEREO MODEL

the contours obtained from each DEM data were checked with stereo models. As a result of these checks, the best and most accurate representations of land in topographical sense were ALOS 30m, SRTM 30m and SRTM 90m respectively. During these checks, it was observed that the areas with higher elevation differences were represented more accurately than those with flat areas.

Deciding with the results gathered, it is evaluated that **open source data can be used in the production of contours** if no data is available as elevation data. As a result of the study, it was determined that **ALOS 30m data from open source data gives more accurate results than other SRTM 90m and SRTM 30m data.**

THANK YOU...