

**Implementing Temperature Vegetation Dryness Index (TVDI) Technique on Landsat images  
to monitor flash flood: A case study in Calgary on June 20<sup>th</sup>, 2013**

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**ABSTRACT**

On June 20<sup>th</sup>, 2013, the city of Calgary, Alberta, Canada, suffered from one of the highest rainfall events (greater than 100 mm), resulting in catastrophic flooding and \$5 billion in damage to the city infrastructure. One of the key arguments raised for the occurrence of the disaster was that the accumulation of precipitation during early-mid June on already saturated ground surface caused rivers to overflow. This study examines the validity of this argument by assessing the Temperature Vegetation Dryness Index (TVDI) derived from four Landsat 7 and 8 satellite images collected for the dates of June 5<sup>th</sup>, 13<sup>th</sup>, 29<sup>th</sup>, and July 7<sup>th</sup> 2013. The TVDI was created using the Land Surface Temperature (LST) - Normalized Difference Vegetation Index (NDVI) triangle space method. The results indicated that the average TVDI was prominently wet at the west of Calgary before the flood. In addition, the TVDI also dropped from 0.49 (on June 5<sup>th</sup>) to 0.37 (on June 13<sup>th</sup>) within the city. The low TVDI value (< 0.4) coupled with heavy rain and snowmelt, indicate that there could be an oversaturation in the ground moisture during early-mid June.

**KEY WORDS:** Remote Sensing, Flood, Soil Moisture, Temperature Vegetation Dryness Index