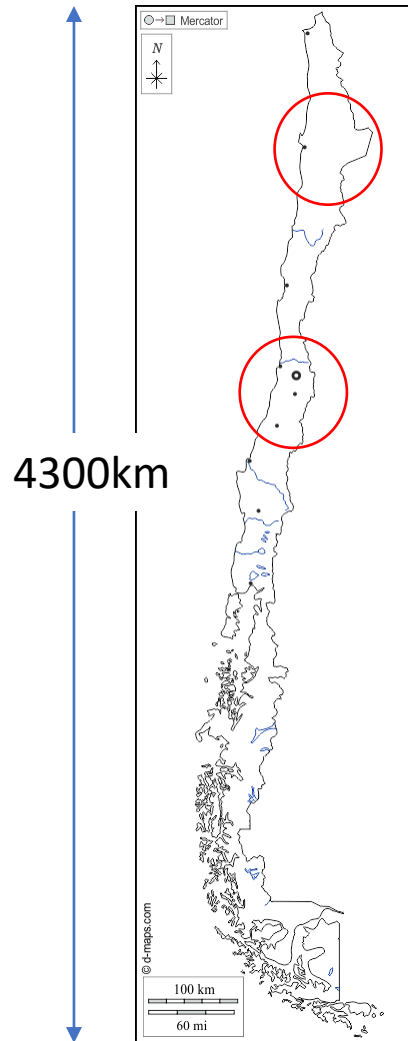


In –situ, near real time and Low Cost Image Velocimetry for Debris Flows and Flash Flood Monitoring in the Chilean Andes

Dussailant, A., Sepúlveda, N., Aguilar, F., Valencia, J., Ancan, J., Cotroneo, J.,
Herrera, R., Leiva, N., Peña, C., Alfaro, A., Fernández, J., and Muñoz, A.

EGU General Assembly 2022, 23-27 May, Vienna, Austria

Motivation



- The June 18 in 1991. The Antofagasta alluvium left 91 people dead, 19 missing and more than 4.000 houses destroyed.
- Between 1970-2019 there have been 40 floods, alluviums or landslides in Chile, mainly last ten years*.
- The lasts alluviums was January 2021 (Farellones, RM), San Alfonso and Melocoton (Cajon del Maipo, RM).



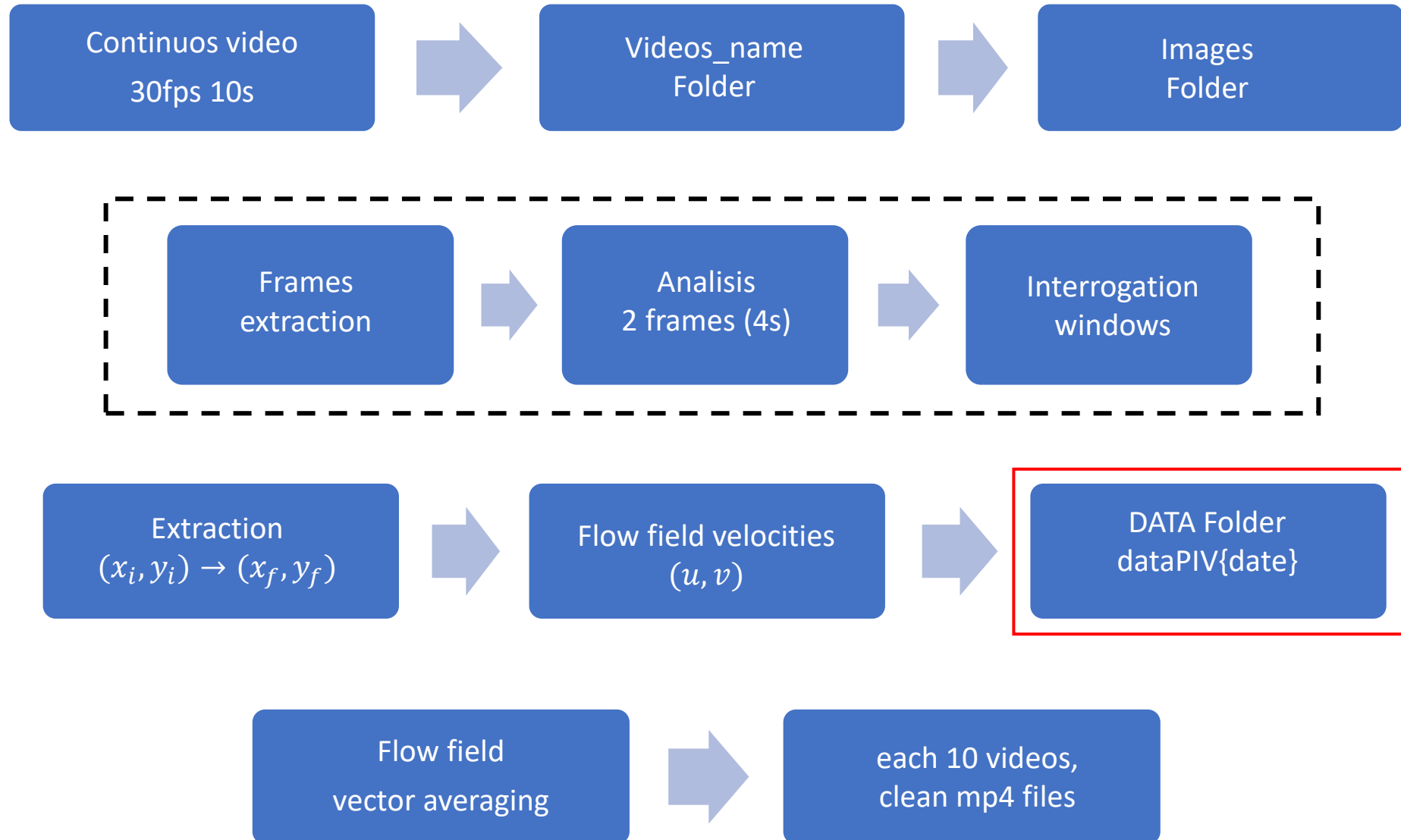
Alluvium Antofagasta June 1991
<http://calamaenlinea.cl>



Alluvium Cajón del Maipo 29-31 January 2021
Informe Técnico SERNAGEOMIN

*Center for Research in the Epidemiology of Disasters (EM-DAT) of the Catholic University of Leuven, Belgium

Workflow (near real time)

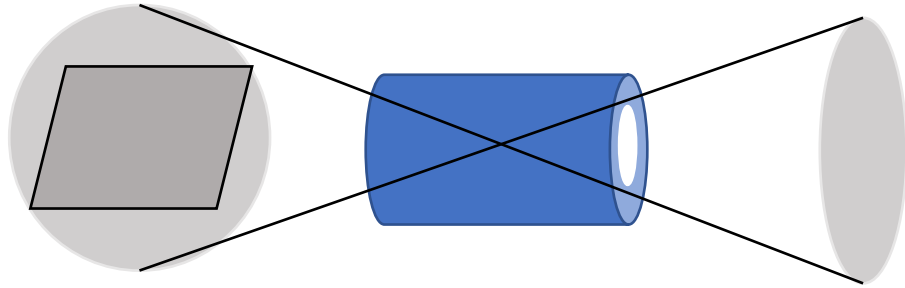


System (In-situ low cost Image Velocimetry)



- Microcomputer Raspberry Pi, camera Hikvision H.265+2.8-12mm, solar panel and LiDar.
- Communication 3G or Iridium
- The program is by OpenCV in Python.
- Low cost < \$1000 USD

Critical aspects:



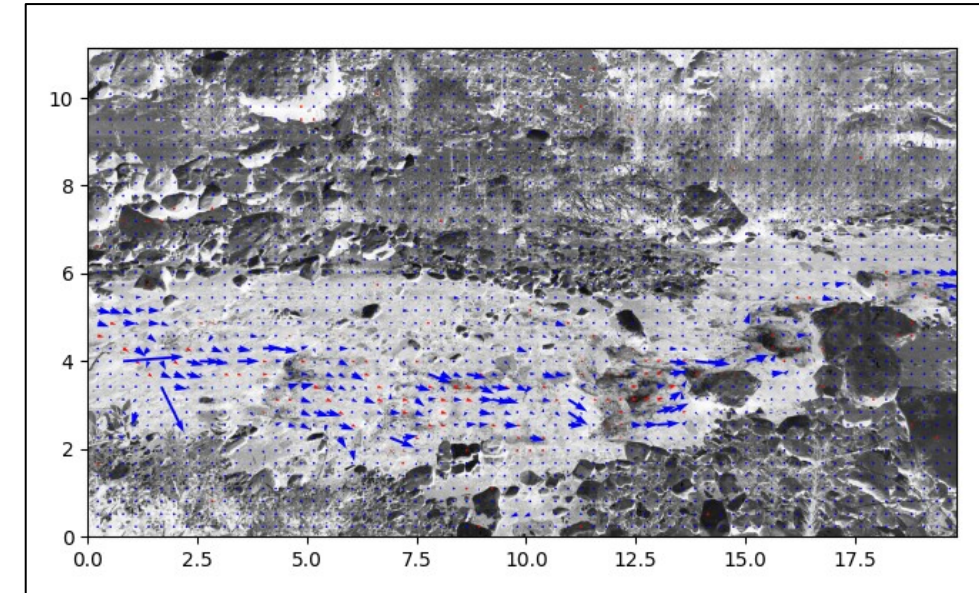
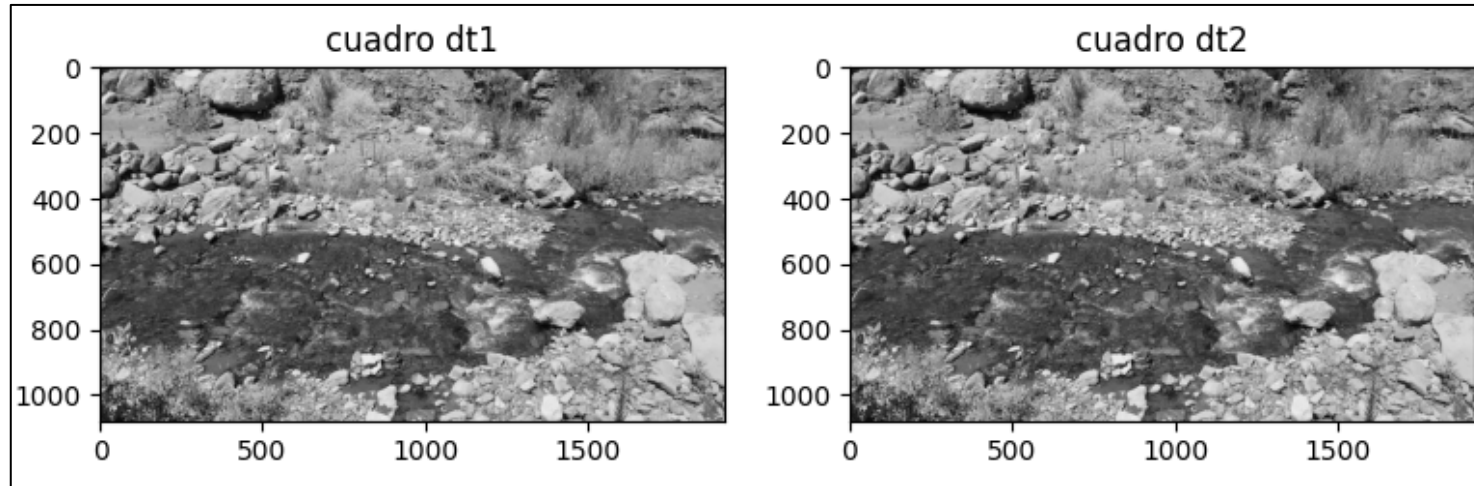
Camera
(photogrammetry)



Local GCP

*Optical Ortho-Rectification for Image-Based Stream Surface Flow Observations Using a Ground Camera, Tsubaky R., Zhu R., Frontiers in water, 2021.

Images test (SJM)



$$velocity = \frac{1}{n} \sum \sqrt{u_i^2 + v_i^2}$$

ongoing Work...

- Major development in the implementation of condition the velocity, for increase frequency of data, and conditions with LiDar for generation of alert.
- Laboratory tests in National Institute of Hydraulics, flash flow and altimetry measurement on water surfaces.
- Validation with other softwares in various field test.

Acknowledgment

This work is supported by National Research and Development Agency (FONDEF ID19I10056).