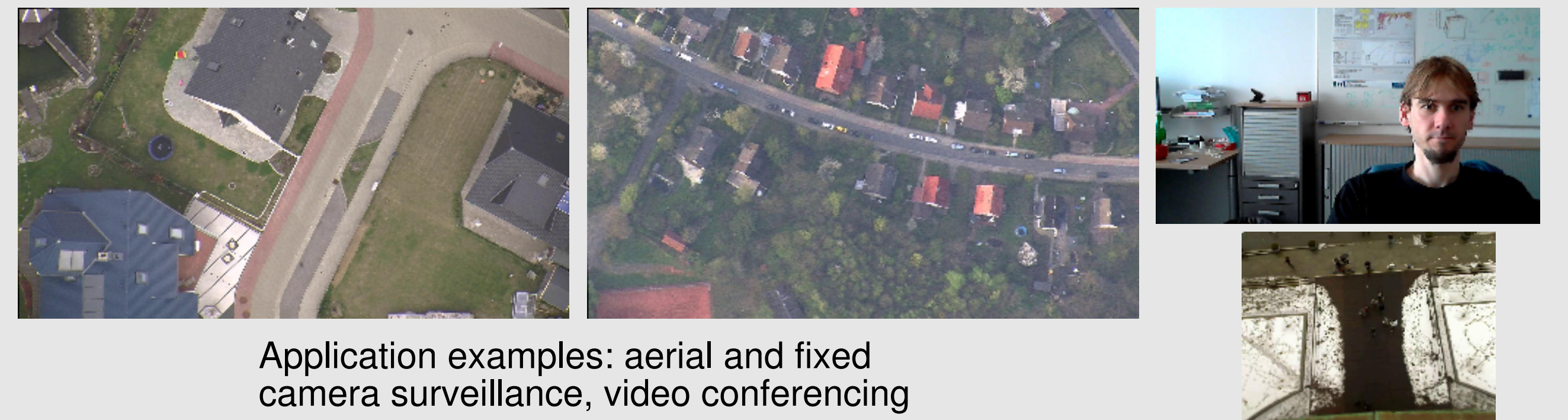


Problem and Goal

- ▶ ROI coding for bit rate reduction
- ▶ Challenge: encoder control
- ▶ Typically, encoder modifications necessary

Goal: Encoder control by modifying the video signal



Application examples: aerial and fixed camera surveillance, video conferencing

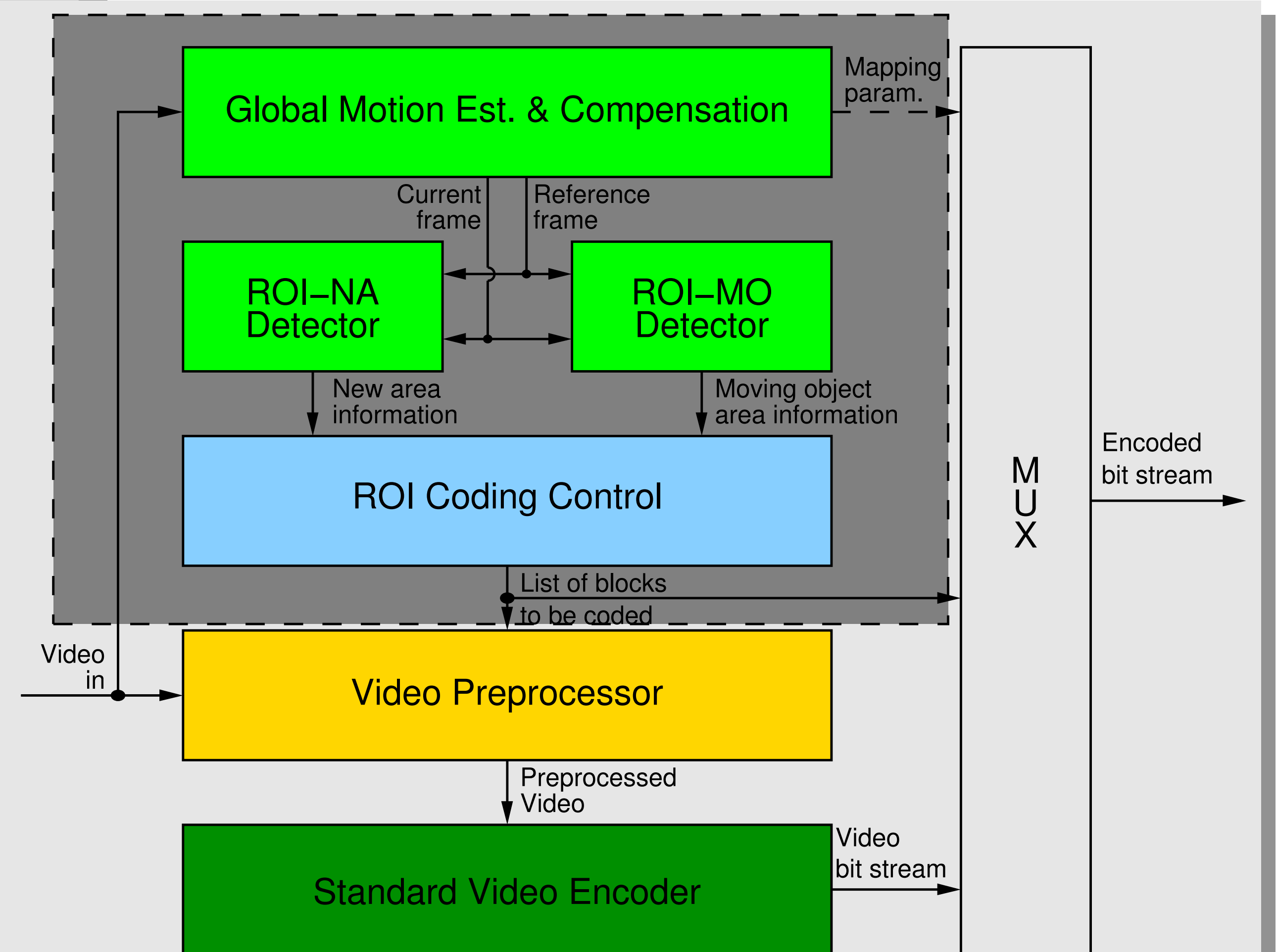
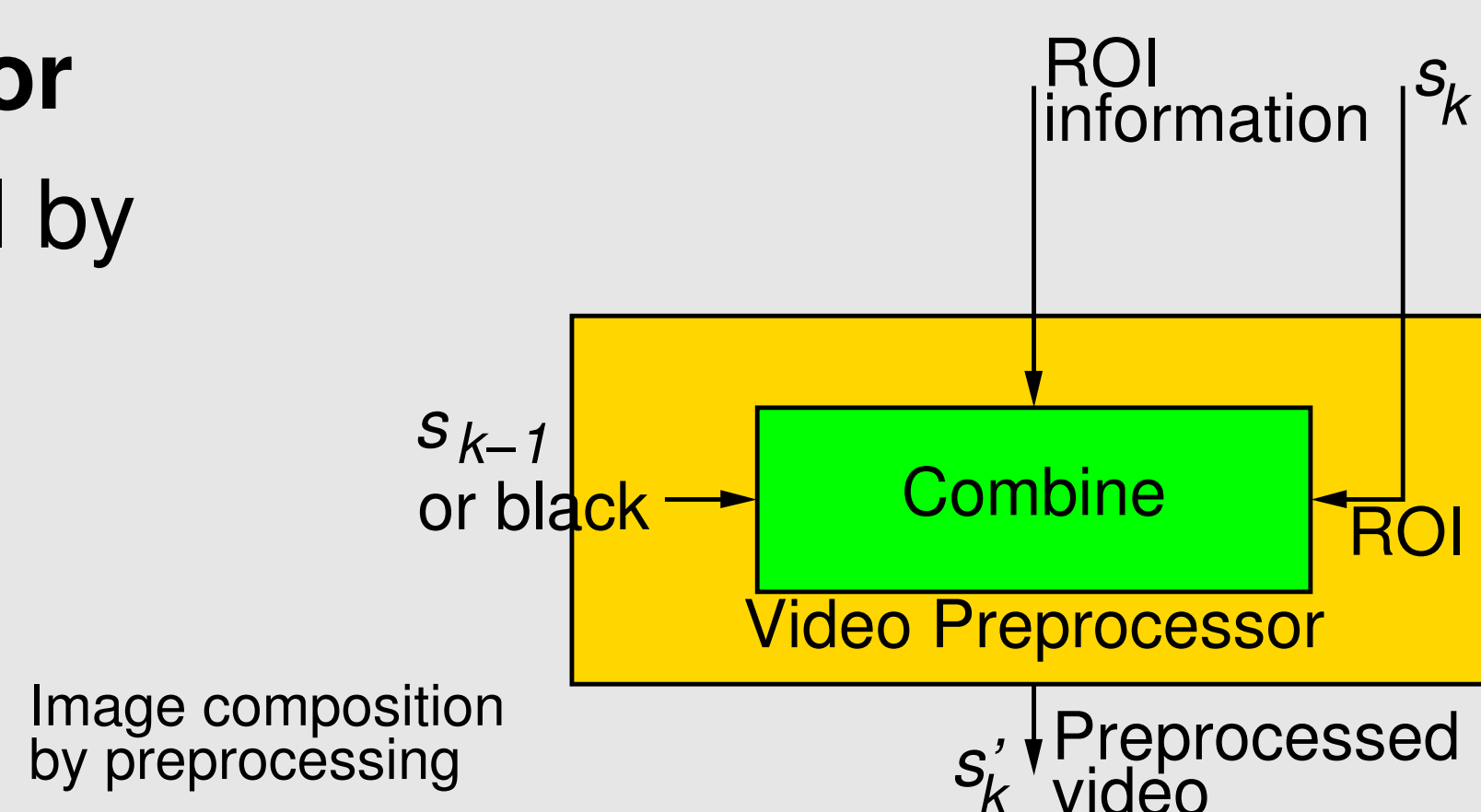
General Region of Interest (ROI)-based ENCODING

Reference ROI detection system [1]

- ▶ Global motion-based ROI-New Area (ROI-NA) detector
- ▶ Difference image-based ROI Moving Object detector (ROI-MO)
- ▶ Block assignment for block-based video coding in ref. system

Proposed video preprocessor

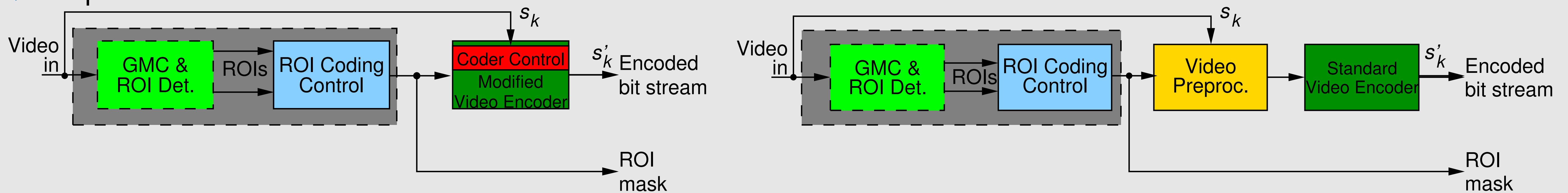
- ▶ 2 modes: Replace non-ROI by
 - 1) the corresponding image block from preceding frame
 - 2) a black block



Block diagram of the general ROI detection and coding system (gray box: ROI detection system from [1])

Common ROI coding system (left) vs. proposed (right)

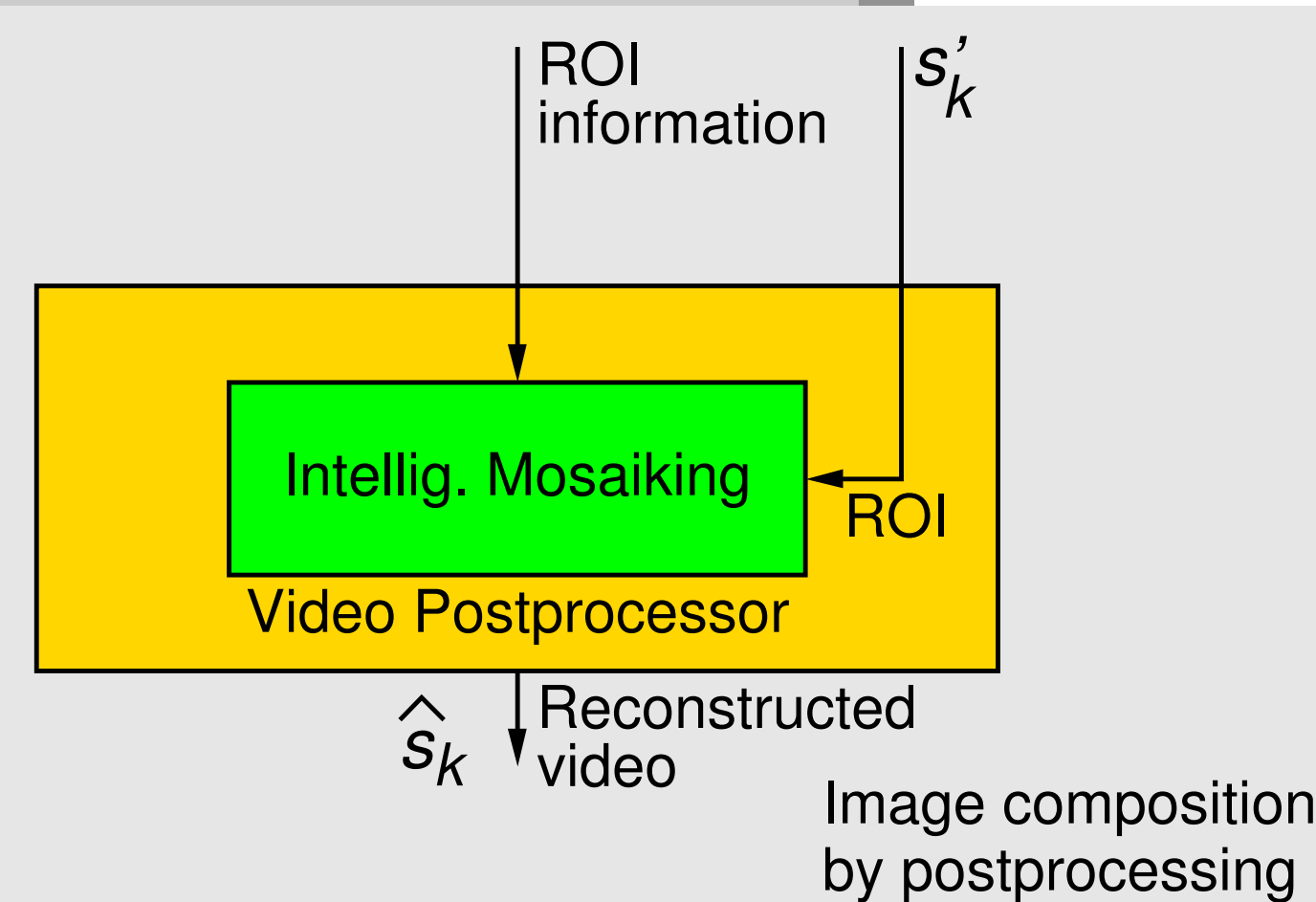
- ▶ Typical: (often extensive) encoder modifications
 - ▶ Coding standard specific adaptations, e.g. external mode control (AVC-/HEVC-skip)
- ▶ Proposed: no encoder modification



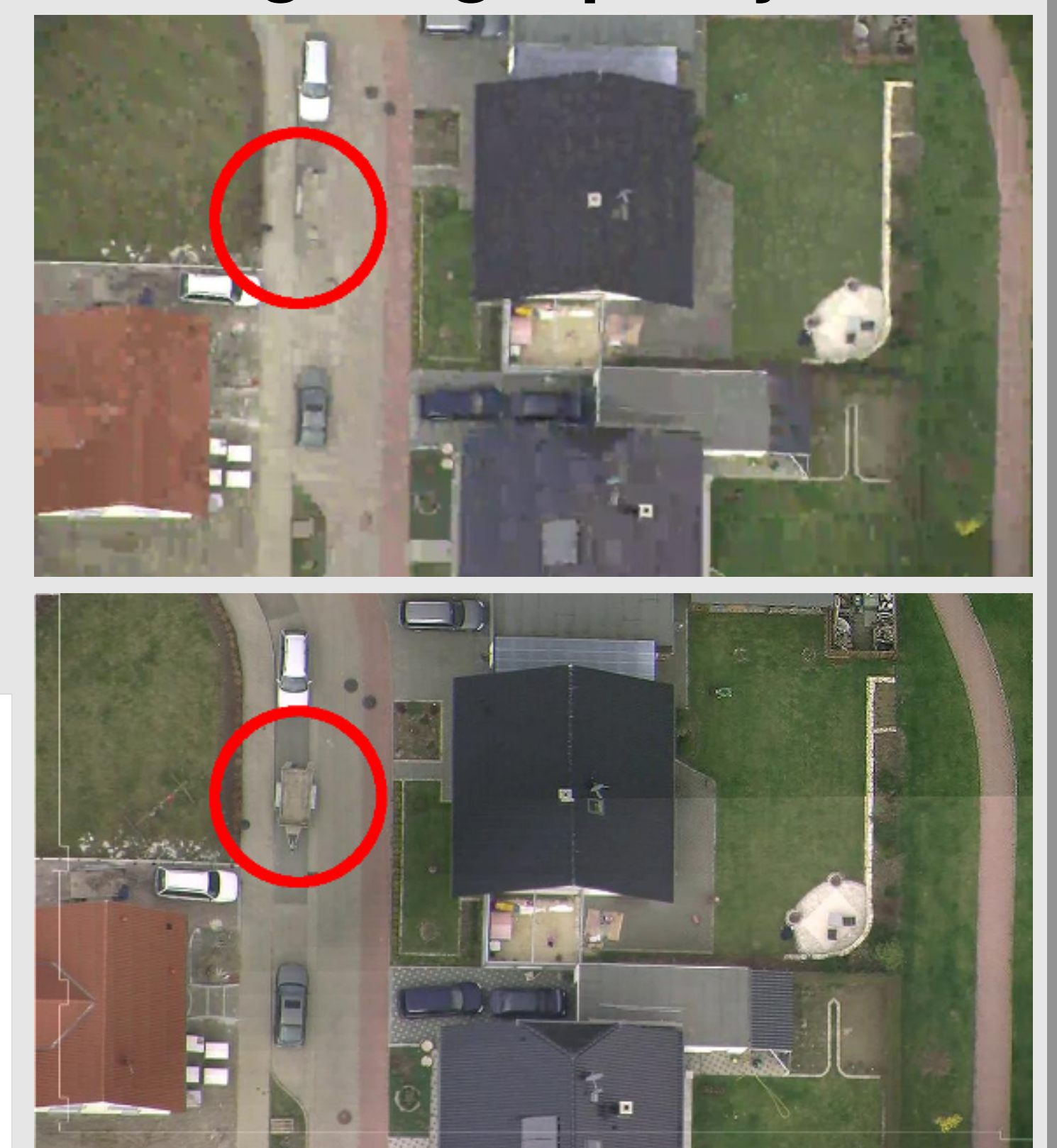
Region of Interest (ROI)-based DECODING

Video reconstruction

- ▶ Generate background panorama
- ▶ Cut background from panorama for each frame
- ▶ Insert ROI
- ▶ Concatenate to video sequence



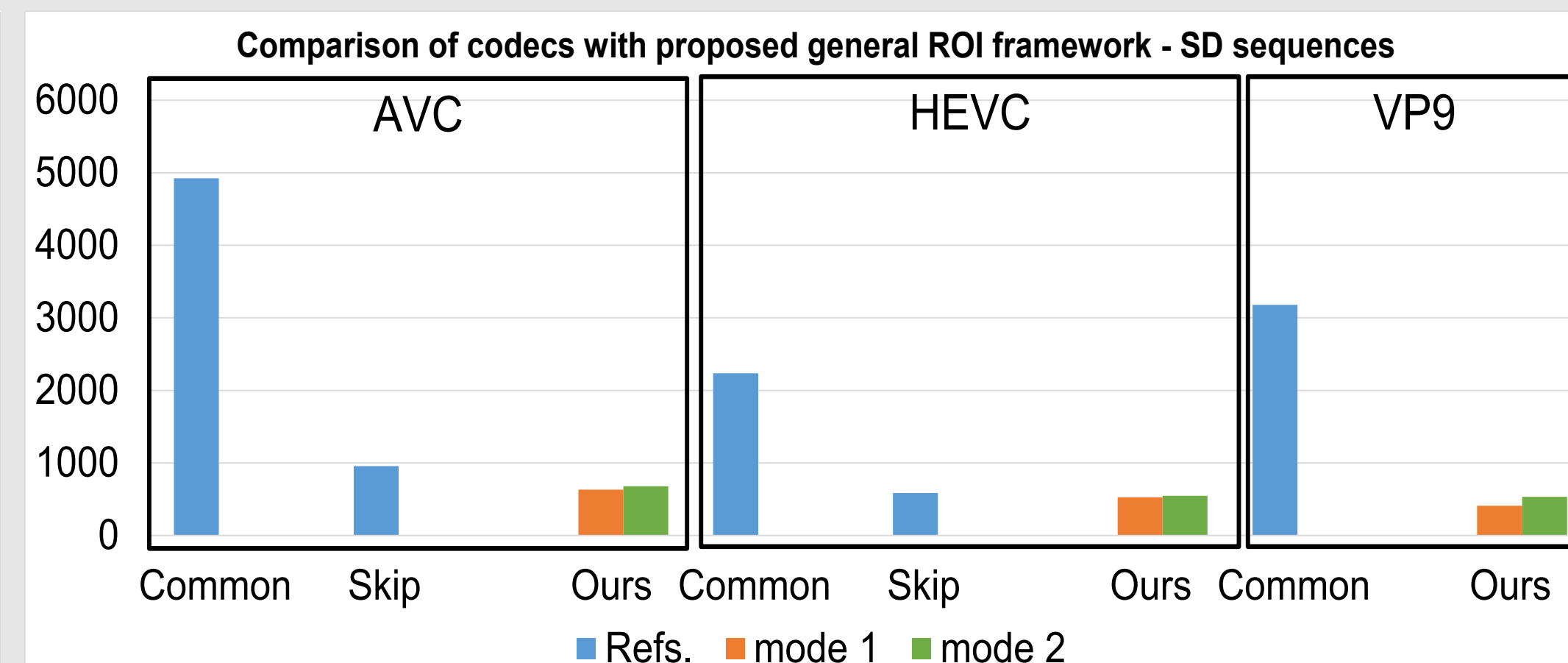
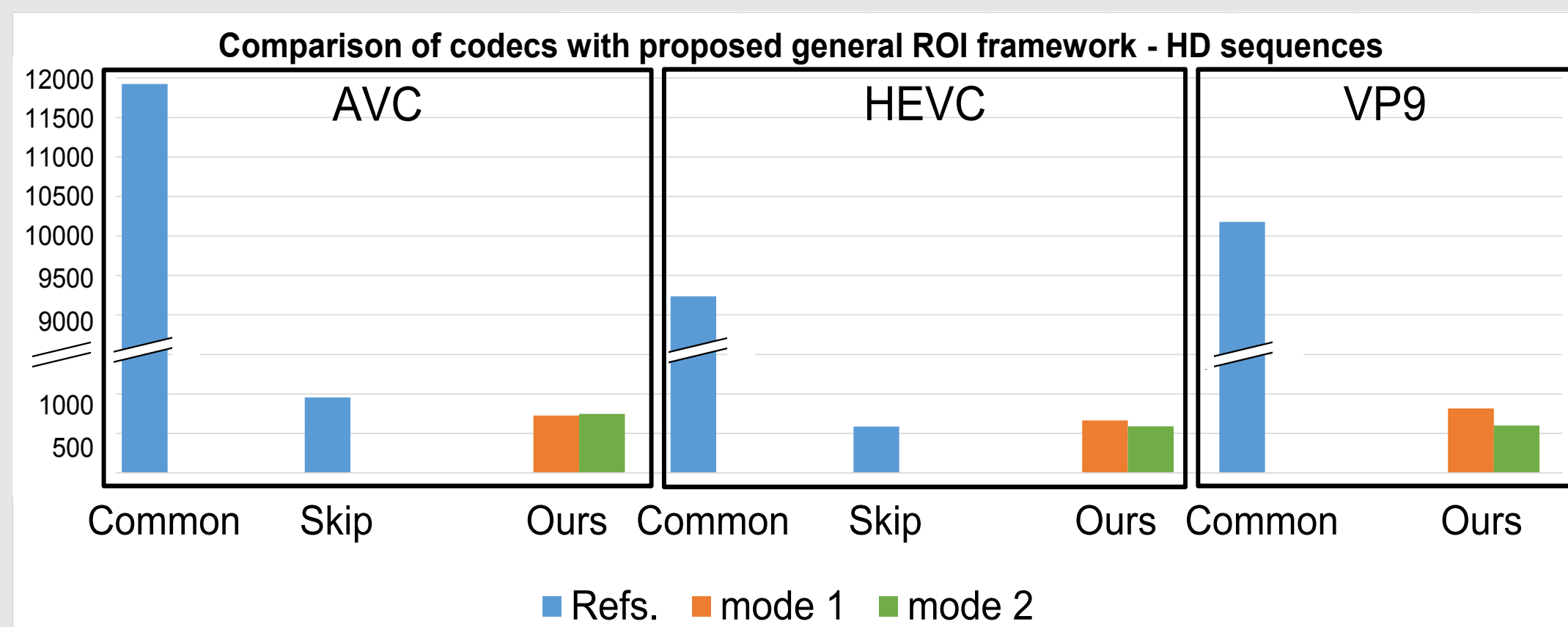
Resulting image quality



Encoded frame with common AVC (top) and with general ROI coding framework (bottom), both using the reference detection system @ 500kbps

General ROI coding results

- ▶ Similar coding results compared to modified video encoders



Conclusions

- ▶ Codec independent ROI-based coding system
- ▶ Easy encoder replacement
- ▶ Coding performance similar to specifically adapted encoders
- ▶ Versatile scenarios like surveillance video, video conferencing etc.

References: [1] H. Meuel, M. Munderloh, J. Ostermann: Low Bit Rate ROI Based Video Coding for HDTV Aerial Surveillance Video Sequences, IEEE CVPRW, 1st Workshop of Aerial Video Processing (WAVP), Colorado Springs, Colorado, USA, 2011