

July 28 & 29, 2011 Flight Information

David K Lynch (USGS)

Ground Tracks

Each flight had two legs.

1. Lone Pine Canyon west of I-15 to Curtis Palms in the Indio Hills, just east of the Granite Construction Company quarry. This covered the SAF down to Burrow Flats then transitioned onto the Banning fault.
2. San Bernardino Mts just west of CA-62 on the Mission Creek strand of the SAF down to Curtis Palms then continuing along the SAF to Bombay Beach on the Salton Sea.

The same ground tracks were flown on both days, southeast bound on the 28th, northwest bound on the 29th. Actual ground tracks are shown in the **Flight Path (.kmz)** link. (obtained using a Garmin 60CSx receiver), and can be retrieved in more detail (with some effort) from the EXIFs.

Altitude

On 28 July, the nominal altitude AGL was 700 ft (213 m) and on the 29th the nominal altitude AGL was 1400 ft (427 m). Planned deviations from these altitudes were between Burro Flats and White Water Canyon near Bonnie Bell where we flew higher to include the irregular range front along the Banning fault.

Aircraft

Partenavia Observer (N6602L) owned by Aspen Helicopters of Oxnard, CA. The plane had a large “bombay” door in the floor over which was fitted a mounting plate with a vibration-reducing foam camera holder.

Camera and Imaging

All photographs were taken looking straight down relative to the aircraft. In most cases these were nadir photographs. When the plane was climbing or descending (pitching), slight deviations from nadir occurred, but always along the intended ground track.

Camera:	Nikon D90, 2848 x 4288 pixels
Lens:	Nikkor AF-S DX VR Zoom-Nikkor 18-105mm f/3.5-5.6G ED fixed at 26 mm focal length
GPS receiver	Nikon GP-1
Shutter Control	Aputure Remote Cord Timer (Intervalometer)
Orientation	The short axis of the image (2848 pixels) was along the flight path.

Flight planning was done with the *FlightSim* software (spreadsheet) developed for our aerial imaging program. In addition to obtaining the highest possible ground resolution, our goals were (1) to obtain 60% overlap between successive images for retrieving stereo images and possible DEMs, (2) limit image blur due to the moving aircraft to less than 1 pixel.

These constraints resulted in the following exposure parameters:

July 28 700 ft AGL nominal 1/2000 s exposure 1 sec picture interval
 Field of View 52° x 34.8°, or 208 m x 134 m on the ground
 GSD (1 pixel) 4.85 cm

July 29 1400 ft AGL nominal 1/1000 s exposure 2 sec picture interval
 Field of View 52° x 34.8°, or 416 m x 268 m on the ground
 GSD (1 pixel) 9.71 cm

True image dimensions must be computed using the actual altitude AGL and the elevation of the terrain for each picture. Altitude of the aircraft MSL can be found in the GPS portion of the EXIF file. Elevation of the ground MSL at that point must be obtained from a DEM. We used the elevations from Google Earth.

The flights were carried out during later afternoon (28th) and early morning (29th) to take advantage of the low sun elevation to enhance visibility of subtle topographic features. The images on Leg 2 late on the 28th are on the dark side, but can be enhanced digitally by increasing the virtual exposure. Clouds on Leg 2 on the 29th resulted in slightly reduced image contrast.

Image Files

All 9022 images are in JPEG Fine format and vary between 6 and 9 Mb each. The images have been grouped in time sequence according to the following table.

July 28 & 29 2011 Flight Picture Summary						
Cajon Pass to Bombay Beach						
Leg 1 Cajon Pass to Curtis Palms via Burro Flats (SAF and Banning)						
Leg 2 CA62 to Bombay Beach (Mission Creek and SAF)						
David K. Lynch, John R. Bayless, Bradley Busch (pilot)						
folder name	longitude	longitude	longitude	longitude	# images	
date_folder_leg	start	start	stop	stop	in folder	
		picture #		picture #		
1st memory card	28July2011					
28July2011_1_1	117.503231	0001	117.080161	0999	999	NW of Lost Lake to E of Redlands
28July2011_2_1	117.079656	0001	116.617067	0999	999	E of Redlands to Super Creek Rd
28July2011_3_1	116.616533	0001	116.205892	0984	984	Super Creek Rd to Curtis Palms
28July2011_4_2	116.636894	0986	116.631381	0999	14	Short track W of CA62
28July2011_5_2	116.630944	0001	116.248906	0999	999	W of CA62 to Biskra Palms
28July2011_6_2*	116.248603	0001	115.978336	0890	890	Biskra Palms to E of Box Cny Rd
2nd memory card	28July2011					
28July2011_7_2*	116.100725	0006	115.798869	999	994	52nd Ave to far north Imperial Co
28July2011_8_2	115.798533	0001	115.723450	256	256	Far north Imperial Co to Bombay Bch
1st memory card	29July2011					
29July2011_1_2	115.720344	0208	116.263175	999	792	Bombay Beach to Macomber Palms
29July2011_2_2	116.263844	0001	116.640681	520	520	Macomber Palms to W of CA62
29July2011_3_1	116.201069	521	116.584200	999	479	Biskra Palms to E of CA62
29July2011_4_1	116.585042	0001	117.424217	999	999	E of CA62 to NW of Devore Heights
29July2011_5_1	117.425061	0001	117.504456	097	97	NW of Devore Hts to NW of Lost Lake

* During Leg 2 on the 28th we had to interrupt the data acquisition because the memory card filled up (1st memory card). We put in a new card (2nd memory card), flew back two way points and reacquired the ground track. As a result, there are some duplicate images.

Image Availability and Usage

The images are presently located at www.sanandreasfault.org/research, as are all of the photographs for this project. All images are in the public domain and may be freely used by anyone for any purpose. We ask that people using this data cite the following paper based on this work.

Lynch, David K., Kenneth W. Hudnut and David S. P. Dearborn “**Low Altitude Aerial Color Digital Photographic Survey of the San Andreas Fault in the Carrizo Plain**”, *Seismological Research Letters*, 81, 453-459 (2010) DOI: 10.1785/gssrl.81.3.453

Also please cite this website: <http://www.sanandreasfault.org/Research.html>

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David K. Lynch Principle Investigator
Kenneth W. Hudnut Co-Investigator
Michael Bevis Co-Investigator

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David K. Lynch Principle Investigator
Kenneth W. Hudnut Co-Investigator
Lawrence S. Bernstein Co-Investigator