AIR NAVIGATION ARTIFACTS NEAR THE HESSDALEN VALLEY NORWAY

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ABSTRACT:

Earthlight researchers must be vigilant for artifact lights. In addition to vehicle headlights, house and ranch lights, stars, planets, Fata Morgana mirages, and natural aerial phenomenon, an important source of artifact lights are commercial and private aircraft operating near observation sites. Observation areas that are within ~32 km (20 miles) of a jet airway or between 32-97 km (20-80 miles) of major airports are especially vulnerable to aircraft artifacts. Arriving and departing aircraft become visible or disappear as they turn on and off landing lights at these distances from airports. In order to evaluate light sightings, locations of airports and jet routes need to be identified and sightings in the direction the airways carefully scrutinized. A map showing airports and airways near the Hessdalen Valley, from Tolga to Trondheim is presented.

KEY WORDS: Earthlight, Hessdalen, VOR, aircraft, jet, airway, navigation, anti-collision lights, strobe

BACKGROUND:

During Earthlight investigations, it is necessary to carefully scrutinize each light sighting in order to verify that the observed light is genuine and not an artifact. Erroneous or artifact sightings can introduce contamination into sightings databases thereby decreasing the reliability of the entire database and evaluation of associated geophysical measurements. One common source of contamination is aircraft. Although one might surmise that experienced observers would recognize aircraft by their strobe lights, many are unaware that the configuration of aircraft lights may change suddenly enroute. When the lights change suddenly, aircraft may be mistaken for earthlights.

MATERIALS AND METHODS:

Garmin Mapsource version 6.11.3 was used to plot the area around the Hessdalen Valley, Norway. Exact locations of the Trondheim, Røros, and Tolga VOR/DME air navigation aids were plotted. Magnetic bearings were used. Mapsource was set to 0.9° E declination. Exact geographical coordinates of VOR/DME stations were obtained from World Aero Data [1] Note that the VOR/DME locations are near but not identical with locations of nearby cities after which they are named. The AIP Norge Enroute Chart Lower Airspace, Southern Part of Mid-Norway ENR 6.2-3, 11 Jul 2002, was used to identify the location of jetways. Major airways were plotted on the map: UM609, 179° vector from Trondheim to Tolga VOR, UL998 162° from Trondheim to Røros, UZ101. 018° from Tolga that runs northward along the western Norwegian coast, and UZ103 that runs northward from Røros. After plotting measurements were made.

MEASUREMENTS:

Table 1 shows the jet airway names and bearings from the various VOR navigation stations. It also shows the shortest distance and general direction of each of the airways from a popular viewing area in the Hessdalen Valley, Aspåskjolen vista. Two airways, UL998 and UZ101 intersect 6.3 km (4 mi.) north of Aspåskjolen. These airways can be seen for long distances when the view is unobstructed by hills or vegetation. Table 2 shows the geographic coordinates of the VOR/DME stations and the distances in km and miles from Aspåskjolen. It also shows the bearings to the VOR/DME stations from Aspåskjolen.

Table 1 Bearings and distances from jetways

AIRWAY NAME	BEARING from VOR	FROM Location	TO Location	Nearest Dist JETWAY to VISTA km	Nearest Dist JETWAY to VISTA mi
UM609	179	Trondheim	Tolga	14.6 West	9.1 West
UL998	162	Trondheim	Røros	2.2 East	1.4East
UZ101	018	Tolga	north	1.6 West	.99 West
UZ103	360	Røros	north	7.7 East	4.8 East
UL998		Intersection	UZ101	6.3 North	4 North

Table 2 Coordinates, distances and bearings from Aspåskjolen to VOR stations

VOR name	Lat	Long	Dist km	Dist miles	Bearing to
Trondheim	63.525869	10.890075	70	44	349°
Røros	62.579778	11.334942	30	19	166°
Tolga	62.461639	10.878833	46	29	200°

Figure 1 Aircraft turns off landing light

DISCUSSION:

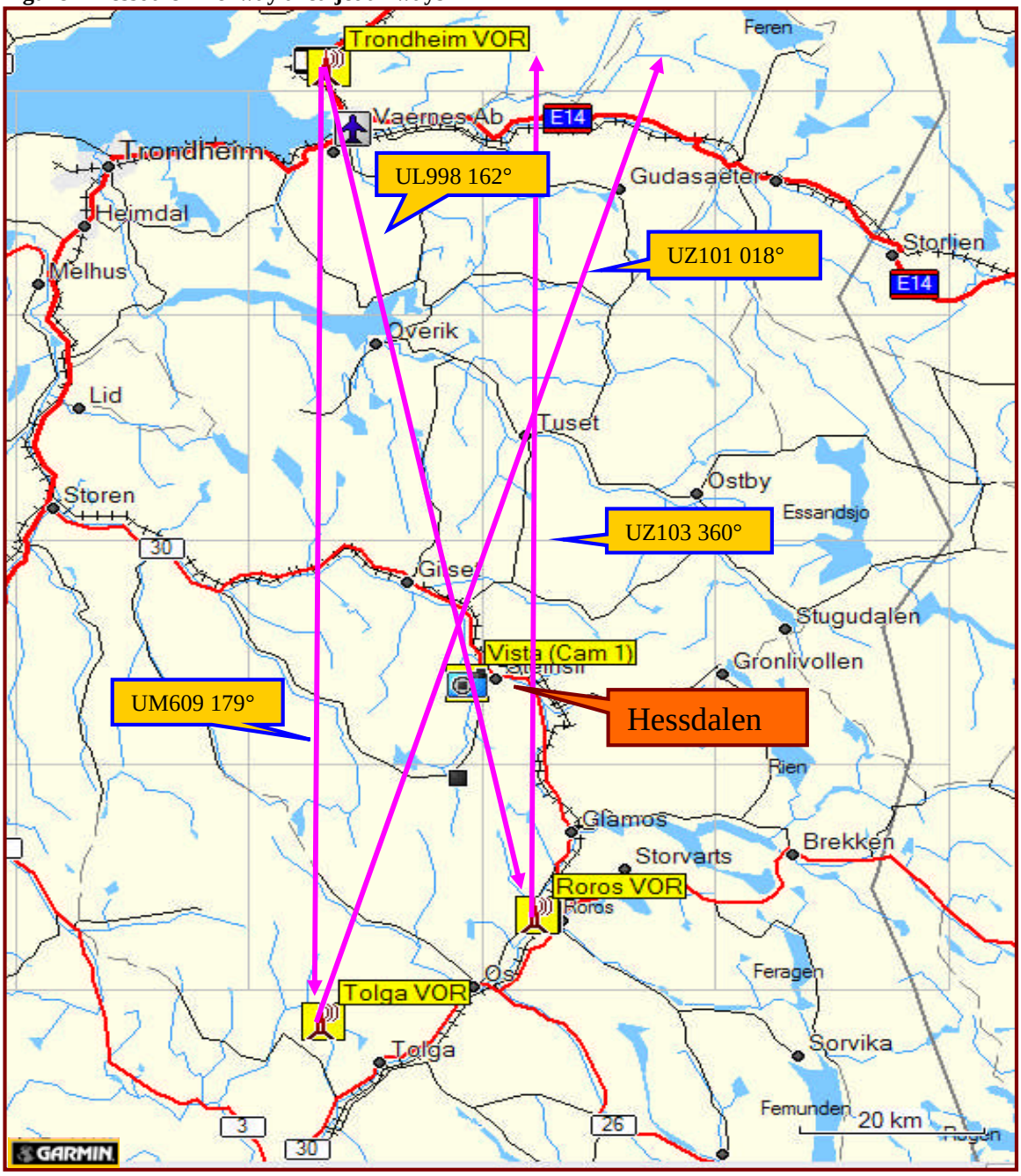
There are many erroneous reports of earthlights in locations throughout the globe that are 10-80 miles from major airports, and/or locations that can easily view jet airways. The misidentification occurs for two reasons: Airplanes on climb out after takeoff that are heading directly towards the observer appear to ascend vertically until they suddenly disappear. At other locations, aircraft directly overhead suddenly seem to vanish. Conversely, approaching aircraft may suddenly seem to appear out of nowhere. The sudden changes in aircraft light configuration are due to high intensity lights being turned on and off in preparation for landing or after takeoff. A characteristic of earthlights is their sudden appearance and disappearance. The sudden appearance or disappearance of airplane lights can be mistaken for earthlight activity.

There is a prescribed altitude for commercial aircraft in the United States, 18,500 feet, where lights are turned on or off. It is presumed that a similar altitude applies to European aviation. For commercial jets, this altitude usually translates (depending on glide path), to 97 km (60 miles) from an airport for landing, and 32 km (20 miles) from the airport for takeoffs (where the climb out is steeper). A ground observer may be many miles closer or farther away from the airport and still be able to view the light configuration changes.

Figure 1 shows a 30 second night time exposure taken from an observation site about ten miles from a typical airport, Phoenix,

Arizona. (The sky is characteristically red during nighttime long exposures because of the reflection of city lights). Initially, the aircraft flies with landing light on. The high intensity lights are so bright they obliterate the belly light/strobe and wingtip strobes. When the light is turned off the dimmer belly light and wing tip strobes can be seen. Characteristic strobe tracks remain until the airplane vanishes into the clouds. During observations, often observers fail to notice fainter strobes, or if they do, they are puzzled by the change in configuration when landing lights are turned on or off. They discount their strobe observation in favor of the bright landing lights, not realizing that both observations are correct.

Figure 2 Hessdalen Norway area jet airways



One cannot depend on the observation of strobe lights to identify aircraft. Strobe anti-collision lights are mandatory on commercial aircraft; however, they are optional on light aircraft in the United States. Light aircraft may fly without anti-collision lights emitting only dim wing tip lights. (Wing tip lights are always red on the left and green on the right as seen from inside the cockpit.) Observers in various parts of Europe would be prudent to learn aviation regulations for the countries in which they observe. For this reason, it is especially important to know the location of jet airways (also used by light aircraft). Figure 2 shows the airways for the Hessdalen, Norway region. Note that the airways are in close proximity to both the east and west and there is an intersection of two airways just north of the favorite viewing area.

CONCLUSIONS:

In order to reduce or eliminate artifact lights when making observations in areas within 130km (~80 miles) of a major airport it is advisable to know the air traffic routes (and even traffic patterns) around these airports. Many earthlight areas are in remote places that require many hours of travel. Because of this, the observer may believe they are also remote from air traffic. This is not necessarily the case, many airways pass over very remote terrain. Observers need to be aware of this. Anticipating where artifact lights may appear will help to discern authentic lights.

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[1] World Aero Data: http://worldaerodata.com/wad.cgi?nav=TOLGA&nav_id=TGA&nav_type=4