

Remote Sensing and Geospatial Data Used as Evidence: A Survey of Caselaw

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United States Supreme Court Cases

Kyllo v U.S.

The Supreme Court held that: (1) use of **sense-enhancing technology** to gather any information regarding interior of home that could not otherwise have been obtained without physical intrusion into constitutionally protected area constitutes a "search," and (2) use of **thermal imaging** to measure heat emanating from home was search.

Dow Chemical Company v. U.S.

Chemical company brought action for declaratory and injunctive relief against aerial surveillance and photography of its industrial complex by Environmental Protection Agency. The United States District Court for the Eastern District of Michigan, but the United States Court of Appeals for the Sixth Circuit, reversed. On certiorari, the Supreme Court, Chief Justice Burger, held that: (1) EPA had statutory authority to use **aerial photography** to perform "site inspection" under Clean Air Act, and (2) **aerial photography** of chemical company's industrial complex was not a "search" for Fourth Amendment purposes. Affirmed.

Daubert v. Merrell Dow Pharm., Inc.

The Supreme Court held that: (1) "general acceptance" is not necessary precondition to admissibility of scientific evidence under Federal Rules of Evidence, and (2) Rules assign to trial judge the task of ensuring that expert's testimony both rests on reliable foundation and is relevant to task at hand.

Katz v. U.S.

The Supreme Court held that government's activities in electronically listening to and recording defendant's words spoken into telephone receiver in public telephone booth violated the **privacy** upon which defendant justifiably relied while using the telephone booth and thus constituted a 'search and seizure' within Fourth Amendment. The Court further held that the search and seizure, without prior judicial sanction and attendant safeguards, did not comply with constitutional standards.

United States Courts of Appeals Cases

United States v. Lopez-Lopez

Defendants were convicted in the United States District Court for the District of Puerto Rico of importation and possession with intent to distribute drugs. Defendants appealed. The Court of Appeals, Lynch, Circuit Judge, held that: (1) police officers' identification of defendants was not impermissibly suggestive; (2) Customs Service agent could testify as expert on marine drug importation schemes; (3) agent's testimony was not substantially outweighed by danger of unfair prejudice; (4) evidence was sufficient to find defendants guilty; and (5) statutes under which they were charged were not unconstitutional. Affirmed. Customs Service agent could testify as expert in drug case, to explain to jury how drug importation schemes use **Global Positioning System, (GPS)**, to facilitate air drops and boat-to-boat transfers. Agent had prior experiences investigating drug importation operations and evidence was relevant because **GPS** device was found on speedboat.

Fairport International Exploration, Inc. v. The Captain Lawrence.

Admiralty in rem action was brought to establish the right to salvage a shipwrecked vessel. After remand by the Sixth Circuit Court of Appeals for a determination as to whether clear and convincing evidence showed abandonment, the United States District Court for the Western District of Michigan, dismissed the action, and plaintiff appealed. The Court of Appeals, held that finding that owner abandoned shipwrecked vessel was not clearly erroneous. Affirmed. Plaintiff/appellant asserted that "the technology necessary to locate an embedded wreck is **remote sensing**, which allows salvagers to find wrecks embedded in the bottomland."

Nutra Sweet Co. v. X-L Engineering Co.

Company which owned environmentally contaminated property brought action against corporate owner of neighboring property and its president/majority shareholder, alleging violations of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), requesting relief pursuant to Declaratory Judgment Act, and asserting claims of common-law nuisance, tortious trespass, and negligence. The United States District Court for the Northern District of Illinois entered partial summary judgment in favor of plaintiff. Defendants appealed. The Court of Appeals affirmed. Plaintiffs in this Superfund case used **aerial photographs** to determine the history of the dumping at a hazardous waste site. The **aerial photos** confirmed the dumping sequence in

which Volatile Organic Compounds (VOCs) were dumped on X-L's land and then migrated through the groundwater onto Nutra Sweet's land. Nutra Sweet used this evidence as well as other tests to prove that X-L Engineering was responsible for the dumping and the court affirmed the decision for the plaintiff.

Sea Hunt, Inc. v. The Unidentified Shipwrecked Vessel or Vessels

Maritime Salvage Corporation brought in rem action against two Spanish ships that had been wrecked off the coast of Virginia in 1750 and 1802. Spain filed claim asserting ownership over shipwrecks. The United States District Court for the Eastern District of Virginia found that Spain had expressly abandoned 1750 shipwreck but retained title to 1802 shipwreck. Spain and corporation appealed. The Court of Appeals held that Spain did not abandon. Sea Hunt asserted a right to the two shipwrecks, in part, because they "spent about a million dollars in conducting **remote sensing**, survey, diving, and identification operations" resulting in finding the remains.

St. Martin v. Mobil Exploration & Producing U.S. Inc., 224 F.3d 402, (5th Cir. 2000).

Owners of freshwater marsh sued canal servitude owners to recover for damage to marsh allegedly caused by failure to adequately maintain spoil banks. The United States District Court for the Eastern District of Louisiana, entered judgment for plaintiffs, and defendants appealed. The Court of Appeals, held that: (1) plaintiffs' expert testimony was admissible; (2) evidence supported finding that damage to marsh was at least partially caused by servitude owners' failure to adequately maintain spoil banks on canals operated by them; (3) servitude owners were contractually responsible for maintenance of canals; and (4) damage award was reasonable. Affirmed. Plaintiffs introduced **aerial photographs** to show open ponds produced by the oil companies that were eroding their marsh, presenting a series of photographs that showed the progression of the deterioration of the marsh. These **aerial photos**, combined with testimony from an expert witness interpreting the photographs, and testimony from the plaintiffs and others familiar with the land, led the court to conclude that defendants caused the degradation to the land.

Students Against Genocide v. Department of State

Citizens' organizations and others brought Freedom of Information Act (FOIA) action seeking information from government agencies regarding human rights violations by Bosnian Serb forces in Bosnia. The United States District Court for the District of Columbia, entered summary judgment for agencies. Plaintiffs appealed. The Court of Appeals held that: (1) release of some reconnaissance photographs displayed by Secretary of State to United Nations Security Council did not constitute waiver of right to withhold others in same series; (2) U.N. display did not constitute release of photographs into public

domain; (3) State Department conducted adequate responsive search; (4) National Security Agency (NSA) sufficiently justified application of national defense Freedom of Information Act (FOIA) exemption; and (5) national defense and "exempted by statute" FOIA exemptions were applicable to Defense Intelligence Agency (DIA) memo. Affirmed in part and remanded in part. Plaintiffs requested **satellite and aerial photographs** from defendants, the U.S. Departments of State and Defense, and the U.S. Central Intelligence Agency. The court gave the CIA's assessment of the security risk of disclosure of **satellite and aerial imagery** substantial weight. The court also discussed the difference between **satellite images** and standard photos.

United States v. Asarco Inc.

United States brought action against various mining companies. The United States District Court for the District of Idaho held that claims relating to land outside of originally- designated site were untimely, and government filed interlocutory appeal. The Court of Appeals held that Court of Appeals for the United States District of Columbia Circuit had exclusive jurisdiction to review decision of Environmental Protection Agency (EPA) to expand site. Vacated and remanded. The court found that a **GIS database** was part of the administrative record.

Pittson Co. v. Allianz Insurance Co.

Insured vendor of polluted property sought declaratory judgment that comprehensive general liability (CGL) and comprehensive marine liability package (CMLP) insurance policies covered insured's liability to purchaser for the contamination. Purchaser intervened. Summary judgment motions were filed. The plaintiff objected when an expert hydrogeologist referred to **aerial photos** during testimony. Plaintiff's counsel complained the hydrogeologist was not qualified to interpret **aerial photos**. The court allowed the testimony based on the expert's assertion that members of his profession reasonably rely on **aerial photos**.

United States v. Ishmael, 48 F.3d 850, (5th Cir. 1995).

In prosecution arising out of marijuana growing operation, the Court of Appeals, held that: (1) warrantless use of **thermal imager** did not violate Fourth Amendment, and (2) there was probable cause to issue warrant to search building. Reversed and remanded. The court asserted that as long as the law enforcement agents were lawfully present on Ishmael's property, the use of the **thermal imager** did not constitute a Fourth Amendment violation.

Chevron USA, Inc. v. US EPA

Petition was filed seeking review of a determination by the Administrator of the Environmental Protection Agency that wilderness area exceeded five thousand acres in size on relevant statutory date such that it was a mandatory Class I federal area and subject to visibility protection under the Clean Air Act. The Court of Appeals held that the determination of the Administrator was neither

arbitrary nor capricious. **Satellite evidence**, although admitted, was inconclusive. The Administrator noted in his denial of Chevron's administrative petition that he had requested FWS to determine whether Bretons' size could accurately be determined, and even "exotic attempts to estimate the acreage from blow-ups of **satellite photographs** were unsuccessful."

U.S. v Kilgus

Defendants were convicted in the United States District Court for the Central District of California of illegal importation of marijuana and possessing marijuana with intent to distribute. Defendants appealed. The Court of Appeals held that the **forward looking infrared system (FLIR)** can be used for generic identification of objects, but for various reasons, testimony of the officer identifying defendants' aircraft as the same aircraft which landed on a lake bed was inadmissible. Convictions reversed. Court found that it was error to admit evidence based on use of **Forward Looking Infrared System** where defense counsel were in essence foreclosed from impeaching or rebutting testimony because most of the necessary technical data were shrouded in military secrecy.

United States v. Reserve Mining Co.

The U.S. and the State of Minnesota brought an action against a taconite mining and processing company to prevent the company from continuing the discharge of taconite tailings into the waters of Lake Superior. The District Court, held that defendant's discharge of the tailings into interstate and intrastate waters both violated the Federal Water Pollution Control Act and constituted a common-law nuisance both in the waters of Lake Superior and in the ambient air in surrounding communities. Injunction issued. **Satellite photographs** of the green water in the western arm of the lake were introduced to show the widespread dispersion of the tailings.

United States Court of Federal Claims Cases

Banks v. U.S

Owners of property located on the shore of Lake Michigan brought takings claim, based on allegation that maintenance of harbor jetties by the United States Army Corps of Engineers from 1950 until 1989 caused the erosion of their shoreline property. The Court of Federal Claims granted government's motion to dismiss, "In its June 1996 technical report, the Corps observed that both **ground penetrating radar** and underwater video document considerable exposure of glacial till for the lake bed in the area."

Wetsel-Oviatt Lumber Co. v. United States

Successful bidder on timber sale contract brought action challenging cancellation of proposed timber sale. The Court of Federal Claims concluded that the forest service cancellation of the timber sale was arbitrary and capricious. Judgment for protestor. The area was evaluated using **satellite and aerial**

photography. However, the court did not rely on this evidence. The court found several flaws in the assessments, one being that the forest service failed to ground truth the information.

Gasser v. United States

This suit for compensation was based on the Fifth Amendment to the Constitution of the United States. Plaintiffs, owners of property interests in Baja California, Mexico, alleged that the construction and operation of Hoover Dam and Glen Canyon Dam in the United States resulted in a substantially reduced flow of water in the Colorado River, causing the development of a sediment blockage below their properties. **Aerial and satellite photography** introduced at trial detailed the progress of channel development subsequent to 1935.

Federal District Court Cases

Johnson v. Hamrick

Group of black citizens brought action challenging city's at-large system for electing city council. After remand, the District Court found for defendants. "Plaintiffs tendered Ms. Andrea Swansby as an expert in **GIS**." Ms. Swansby, a geographer and cartographer, used **GIS** software to create a proposed districting system.

Images Audio Visual Productions, Inc. v. Perini Building Company, Inc.

Holder of copyrights on **aerial photographs** showing construction site progress sued contractor that had ordered photographs, alleging that contractor violated copyrights by having duplicates photocopied and distributed to participants in arbitration dispute, rather than ordering extra copies from photographer. Both parties moved for summary judgment. The District Court, Rosen, J., held that contractor did not make fair use of photographs. Judgment for photographer.

Yankton Sioux Tribe v. U.S. Army Corps of Engineers

Indian tribe sought preliminary injunction protecting inadvertently discovered gravesites. The District Court held that tribe was entitled to preliminary injunction preventing Corps of Engineers from raising water level until expiration of statutory thirty-day period following inadvertent discovery of lakeshore grave sites, during which time exposed remains would be removed. "Richard Harnois, the Corps' field archeologist for South Dakota, testified that it would take not more than two days to pick up the remains which are already exposed and that, with proper planning, the Corps could use **remote sensing** equipment to locate undiscovered remains and remove them." Ordered accordingly.

I & M Rail Link v. Northstar Navigation

Satellite photos helped determine whether a barge accident occurred in Illinois or Iowa to determine whether a court had personal jurisdiction over a defendant. **Infrared aerial photography** helped to determine if the State of New Jersey claimed title to a substantial part of plaintiff's land as the tide-flowed riparian lands.

Surfrider Foundation v. Dalton

Environmental conservation organization brought action against Secretary of Navy and officers of United States Marine Corps (USMC), seeking declaration that defendants had failed to prepare environmental impact statement (EIS) regarding proposed military housing construction project, in violation of National Environmental Policy Act (NEPA). On cross-motions for summary judgment, and plaintiff's motion for preliminary injunction, the District Court granted defendants' motion. "USMC presented to Commission maps based on Camp Pendleton's Master Plan, its Range Compatible Use Zone Program, its **GIS** surveys, and the analysis of USFWS. The **GIS** surveys are digitized documents that draw from 60 years of aerial photographs, 70 years of water resource data, and 25 years of natural and cultural data."

United States v. Fisher

United States brought action against treasure-hunting company and its operator under Marine Protection, Research and Sanctuaries Act. The District Court held that United States was entitled to permanent injunction. So ordered. The determination of defendants' damages was made based on review of **photographs** taken of the damaged areas. The blowholes that Defendants made damaged at least 1.63 acres of seagrass.

Lathrop v. the Unidentified, Wrecked & Abandoned Vessel

Salvor sought preliminary injunction to prevent government from interfering with maritime right of salvage, and state sought to protect underwater national park land from damage from dredging or excavating. The District Court, denied a motion for preliminary injunction. "Salvage operations from August 1989 through September 1989 consisted mainly of magnetometer and **remote sensing** surveys of the alleged vessel. Salvage activity from October 1989 through December 1989 consisted of additional magnetometer and **remote sensing** surveys."

Good v. Austin

Two groups of plaintiffs, representing Republican and Democratic parties, brought separate actions asking that current apportionment of Michigan's congressional districts be declared unconstitutional and that new districting plan be adopted. A three-judge panel of the Eastern and Western Districts of Michigan adopted a plan which achieved precise mathematical equality of population in each district, complied with 1982 amendments to Voting Rights Act, and broke fewer political subdivision lines than were broken in current congressional district

plan. The court appointed a **GIS** specialist to examine the proposals submitted by both parties and to design a **GIS** plan for redistricting.

Nation Magazine v. U.S. Dep't of Defense

Various members of press brought action challenging regulations promulgated by United States Department of Defense governing coverage of military activities of American armed forces overseas during periods of open hostilities. The District Court upheld federal regulation that restricted access to **satellite data** over militarily sensitive areas during Operation Desert Shield

ANR Production Co. v. M/V Mekhanik Dren

This property damage case arises from damage to a platform sustained after being struck by a ship. Official **satellite photographs** taken 34 minutes before the collision, 4 minutes before the collision, and 26 minutes after the collision showed weather conditions in the vicinity at the time of the accident.

In re Vernon Sand & Gravel, Inc

Debtor objected to proof of claim filed by Ohio Department of Natural Resources. The Bankruptcy Court held that state was entitled to recover, as "administrative priority expense," any environmental reclamation costs incurred by state as request of debtor's postpetition surface mining activity. **Aerial photographs** were found to be dispositive on the question of a discrepancy as to the acreage of land involved.

Bayou Des Familles Development Corporation v. U.S. Corps of Engineers

Developer of river front property sought declaratory and injunctive relief from actions by the federal government which had prevented developer from developing its property. The District Court held that Army Corps of Engineers did not abuse its discretion in denying developer's after-the-fact application for a permit to construct a levee and pumping station to facilitate development. Expert used **remote sensing** to show indications of wetland hydrology. "Dr. Huffman is trained in **remote sensing** techniques. His examination of aerial **infra-red photographs** of the area taken in 1978, 1974, and 1973, together with his on-site investigation, led him to the opinion that the entire area in question . . . is and has been continuously since at least 1970 a wetland."

State Court Cases

Connecticut

State of Connecticut v. Wright

Defendant was convicted of drug offenses and he appealed. The Appellate Court held that, " (4) computer-generated engineering map showing

that defendant's residence was 1125 feet from an elementary school was admissible." "City **GIS** technician, to authenticate the map, testified that he went to the actual locations depicted on the map to determine their locations, that the coordination system that formed the basis of the map generation was checked by the state and by private engineering companies and that the map was a fair and accurate representation of the distance."

Gioielli v. Mallard Cove Condominium Ass'n, Inc.

Business sued adjoining landowner, seeking to establish prescriptive easement over defendant's private roadway that abutted plaintiff's driveway. The Superior Court granted injunction precluding defendant from interfering with plaintiff's use of roadway. Defendant appealed. The Appellate Court affirmed. **Aerial photos** of the plaintiff's business premises and the defendant's adjoining property were excluded from evidence because the defendant, in offering the photos, provided no argument as to how the photos would have defeated the claim of an access easement across its property.

Peterken v. Wetlands Commission of the Town of Haddam

An appeal from the approval of the Wetlands Commission of the Town of Haddam (Commission) for a regulated activity consisting of the construction of a driveway across a wetland area for access to a proposed home to be built on property owned by the intervening defendant. The court affirmed the approval. In the petition for approval, applicants "submitted a complete application as well as supplemental documents including a **GIS** Map."

Indiana

Amoco Products Co. v. Laird

Oil company sought injunctive relief against competitor which allegedly used company's trade secrets in order to obtain oil leases. The Circuit Court entered preliminary injunction against competitor, and competitor appealed. The Court of Appeals reversed and remanded. On oil company's appeal, the Supreme Court, held that information regarding location of potential oil fields that oil company generated only after seven months of investigation and after spending more than \$150,000 on **microwave radar surveys** was not "readily ascertainable by proper means" and was entitled to "trade secret" protection. Judgment of trial court affirmed. Only after allocation of considerable resources did Amoco contract with Airborne for \$150,000 to conduct **microwave radar surveys** of the 13,000-square-mile area. Airborne was provided with an Amoco-generated grid pattern to guide Airborne's flyover procedure.

Kentucky

Revenue Cabinet v. Gillig

Taxpayers brought action challenging constitutionality of Revenue Cabinet's method of assessing unmined tracts of coal. After researching the

matter, the Cabinet decided to adopt and implement a **Geographic Information System** for its future assessment of unmined coal. The Kentucky Supreme Court upheld the method as it was “fairly designed for the purpose of reaching and reasonably tends to reach an approximation of the fair voluntary sales price.”

Maryland

Kline v. Green Mount Cemetery

Distant relatives petitioned to have body disinterred from grave of John Wilkes Booth for verification, claiming body was not Booth's. Cemetery in which grave was located opposed petition. The Circuit Court dismissed petition. Relatives appealed. The Court of Special Appeals affirmed. “Appellants contended that, because the grave was lined with bricks, it would be possible, through the use of **ground penetrating radar**, to fix the location. Professor James Starrs, a forensic scientist, testified that **ground-penetrating radar** simply indicates an anomaly under the surface of the soil. Then it becomes a question of interpretation.”

Massachusetts

Commonwealth v. Whynaught

Defendant was convicted and she appealed. The Supreme Judicial Court, held that: (1) defendant's speeding conviction would not be reversed on ground that testimony of state trooper failed to provide any basis for evaluating the reliability of calibration procedure for determining accuracy of **radar** unit, since issue had not previously been raised in Commonwealth, and since **radar** reading, as well as police officer's testimony, showed evidence of a speed greatly in excess of the legal limit, and (2) prosecution was not required to present evidence establishing that defendant drove automobile for a distance of one quarter of a mile at a rate exceeding the speed limit. Conviction was affirmed.

Montana

Blasdel v Montana Power Co.

Landowners brought action against power company seeking damages for inverse condemnation of their farm. The District Court entered judgment in favor of landowners, and power company appealed. The Supreme Court affirmed. The court found that **aerial photographs** taken in 1972 and 1974 were not unduly prejudicial where evidence was that damage to property had stabilized in 1959.

New Jersey

Velsicol Chemical Corp. v. State of New Jersey DEP

In consolidated actions wherein the State claimed the title to substantial acreage on both properties as tide-flowed riparian lands, the State appealed from

the judgment of the Superior Court, Chancery Division, quieting title in the owners to the respective parcels, and one owner cross- appealed from the portion of the judgment quieting title in the State to a relocated tidal creek. The Superior Court, Appellate Division found that “maps and overlays which showed the incidence of mean high tide flow, based upon **infrared aerial photographs**, and which were based upon a report of **natural color photography** and of field observation was insufficient to sustain State's burden of proof where no witnesses responsible for preparation of report testified to application therein of biological methodology, its gathering, collating and analysis of scientific data.”

Oklahoma

Oklahoma Water Resources Board v. Texas County Irrigation and Water Resources Association

In a case involving groundwater elimination, the Oklahoma Supreme Court reversed the lower court's decision to grant an oil company a permit to withdraw groundwater for an oil recovery process. In reversing the decision, the court noted the problem of groundwater being drained faster than it is being replaced. The court also noted that Texas has the same problem and they have developed a technique using **satellite imagery** to get precise estimates of the depletion of the water table. In relation, Oklahoma has done nothing to try and remedy the problem.

Tennessee

State of Tennessee v. Perry

Defendant was convicted of two counts of possession of cocaine within 1000 feet of a school and possession of marijuana. On appeal, the court affirmed defendant's convictions and sentences. “At trial the State proved that the initial stop defendant's residence were both within 1000 feet of a school through the testimony of Jeff Fleming, a city employee. Fleming testified that he was Manager of **GIS** for the city, and that as such he was in charge of using and applying a computer mapping system to assist with planning of city projects, and used **GIS** program to identify a 1000 foot buffer zone around each school.”

Washington

State of Washington v. Jackson

Defendant was convicted in the Superior Court of first-degree murder and he appealed. The Court of Appeals held, in part, that: “in a matter of first impression, police installation of **Global Positioning System (GPS)** tracking device on defendant's vehicles did not offend either Fourth Amendment or state constitutional provision protecting a person's home and private affairs from warrantless searches; (4) seeking grant of judicial permission in form of search warrant to install **GPS** tracking devices on defendant's vehicles was appropriate.” “Defendant's privacy interests were insufficient to require warrants, given that

monitoring of his public travels in his truck by use of **GPS** device was merely sense augmenting, revealing open view information of what might easily have been seen from lawful vantage point without such aids.”

For More Information on how to use geographic information, including satellite and aerial images at trial contract:

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