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Measurement of Transient Heat Flux and Surface Temperature Using Embedded Temperature Sensors (Preprint). **Surface Temperature Sensor Calibration** *Use of an Infrared Temperature Sensor for the Monitoring of Surface Temperature in an Incubator* **A Probe for the Instantaneous Measurement of Surface Temperature A Probe for the Measurement of High Surface Temperatures** *A Probe for the Instantaneous Measurement of Surface Temperature Surrogate Human Sensor for Human Skin Surface Temperature Measurement in Evaluating the Impacts of Thermal Behaviour at Outdoor Environment* Multi-Sensor Improved Sea Surface Temperature (MISST) for GODAE. *Development of Micro/nano-scale Sensors for Investigation of Heat Transfer in Multi-phase Flows Research and Design of Snow Hydrology Sensors and Instrumentation* **Ground Surface Temperature Reconstructions Thermal Infrared Remote Sensing** *Sensor Technology for in Situ Monitoring of the Surface Temperature Distribution of SOFC.* **Global Distribution of Maximum Land Surface Temperature Inferred from Satellites Temperature Sensor Array System for Thermal Diagnostics on Human Disease** Comparing Robust and Physics-based Sea

Surface Temperature Retrievals for High Resolution, Multi-spectral Thermal Sensors Using One Or Multiple Looks Temperature Fluctuations at a Fixed Position in San Diego Bay *The Use of Infrared Sensor and Radiation Shielding in Monitoring Surface Temperature An Investigation of Sea Surface Temperature Patterns in the Gulf of Mexico as Determined by an Airborne Infrared Sensor Operational Implementation of Global Australian Multi-sensor Sea Surface Temperature Analysis Development of Sensors for Ceramic Components in Advanced Propulsion Systems* **The Aurora Consortium** *Quantitative Measurements of Sea Surface Temperature at Several Locations Using the NOAA-3 Very High Resolution Radiometer* **Transient Surface Temperature Measurements** *Smart Sensing Technology for Agriculture and Environmental Monitoring* **World Congress of Medical Physics and Biomedical Engineering 2006 Improved Surface Temperature Estimates with MASTER/AVIRIS Sensor Fusion** *Environmental Characteristics of the Grand Fir Mosaic and Adjacent Habitat Types* **Surface Emissivity and Temperature Retrieval for a Hyperspectral Sensor** *Feasibility of Miniaturizing a Heater for a Thin-film Oxygen Partial-pressure Sensor* **Infrared Thermography for Thermo-Fluid-Dynamics** An Investigation of a Remote Transient Heat Flux Sensor. Part I. Prediction of Surface Temperature and Heat Flux **Sensors and Microsystems** Introduction to Micrometeorology Official Gazette of the United States Patent and Trademark Office *Mirror Mounted Pavement Temperature Sensor* **Integration of Land Based Embedded and Remote Sensed Temperature for Daily Temperature Mapping** Diagnosis of Solar Water Heaters Using Solar Storage Tank Surface Temperature Data How to Investigate Damp **Reconciling Observations of Global Temperature Change**

Surface Temperature Sensor Calibration Jan 23 2023 The surface temperature dectors on a

guarded hot plate can be calibrated in place using differential thermopiles. A ten-junction Type T thermopile was used to calibrate a 1.22-m (4-ft) guarded hot plate using water triple point cells as the reference temperature. The stability and precision of these thermopiles, over a year's span, was on the order of 20 to 30 millidegrees.

Introduction to Micrometeorology Apr 21 2020 James R. Holton

Surface Emissivity and Temperature Retrieval for a Hyperspectral Sensor Sep 26 2020 With the growing use of hyper-spectral imagers, e.g., AVIRIS in the visible and short-wave infrared there is hope of using such instruments in the mid-wave and thermal IR (TIR) some day. The author believes that this will enable him to get around using the present temperature-emissivity separation algorithms using methods which take advantage of the many channels available in hyper-spectral imagers. A simple fact used in coming up with a novel algorithm is that a typical surface emissivity spectrum are rather smooth compared to spectral features introduced by the atmosphere. Thus, a iterative solution technique can be devised which retrieves emissivity spectra based on spectral smoothness. To make the emissivities realistic, atmospheric parameters are varied using approximations, look-up tables derived from a radiative transfer code and spectral libraries. One such iterative algorithm solves the radiative transfer equation for the radiance at the sensor for the unknown emissivity and uses the blackbody temperature computed in an atmospheric window to get a guess for the unknown surface temperature. By varying the surface temperature over a small range a series of emissivity spectra are calculated. The one with the smoothest characteristic is chosen. The algorithm was tested on synthetic data using MODTRAN and the Salisbury emissivity database.

Smart Sensing Technology for Agriculture and Environmental Monitoring Jan 31 2021 The book

focuses on the different aspects of sensing technology, i.e. high reliability, adaptability, recalibration, information processing, data fusion, validation and integration of novel and high performance sensors specifically aims to monitor agricultural and environmental parameters. This book is dedicated to Sensing systems for Agricultural and Environmental Monitoring offers to variety of users, namely, Master and PhD degree students, researchers, practitioners, especially Agriculture and Environmental engineers. The book will provide an opportunity of a dedicated and a deep approach in order to improve their knowledge in this specific field.

Research and Design of Snow Hydrology Sensors and Instrumentation May 15 2022 This book is a collection of seven in-depth and detailed research papers authored by Dr. Raman K Attri between 1996 to 2005. The book presents early-career scientific work by the author as a scientist at a research organization. The book provides the conceptual background and key electronics and mechanical design principles used in designing sensors and instrumentation systems to measure snow hydrological parameters. The systems discussed in this book can be used to measure snow depth, layer temperature, temperature distribution profile, surface porosity, etc. The snow parameters measured from instruments and sensors discussed in this book are integrated into larger systems and are used in computer-driven models for snow avalanche predictions. The book presents the design challenges and design methods from electronics and instrumentation design point of view. While the book provides essential understanding of analog electronics design and associated mechanical design for snow hydrological sensors, the book also presents the background theoretical and mathematical models from snow hydrology physics that governs this electronics design. The first research paper discusses the design control techniques used to the design a remote surface detector to detect objects with porous, uneven, irregular surfaces like snow using ultrasonic beams.

The second research paper describes signal processing techniques and electronics design approaches to design a snow depth sensor with improved sensitivity and directional response using Ultrasonic Pulse-Transit Method. The third research paper explains theoretical and mathematical model that governs the physical, mechanical, and electronics design to implement the theory of Arrayed Ultrasonic transducers to shape up the directional response and beam width of an ultrasonic beam to improve the chances of receiving sufficient reflection from the non-smooth, highly porous, uneven, non-planar, irregular snow surface. The fourth paper presents the design considerations and performance characteristics of Snow Temperature Profile Sensing System used to measure the temperature gradient and temperature distributions within and outside the snowpack at different depths. The fifth research paper focuses on describing the design of Snow Temperature Profile Sensing System in details and discusses the theoretical and mathematical model that outline important temperature parameters. Then the paper describes how the system is implemented to record or measure those parameters. The sixth paper presents the design considerations, constraints and design techniques used to use RTD temperature sensors for snow temperature measurement applications. The paper also presents the performance evaluation and suitability of such sensors. The seventh paper focuses design techniques for front-end analog signal conditioning module and the design challenges faced when interfacing analog unit to a data acquisition system. The eighth paper describes the design of snow air temperature sensing probe and methods to ensure that it measures true air temperature over a snow cover and is not influenced by solar radiations and winds. The book may be read as an applied text-book in conjunction with standard electronics and instrumentation design textbooks. The book will guide students on how to apply basic principles of instrumentation systems design, integrate concepts of physical sciences and

measurement sciences for the field applications.
The Aurora Consortium May 03 2021 The Aurora Consortium is a joint program of collaborative research, evaluation and deployment of advanced technologies for detailed road weather monitoring and forecasting. Members seek to implement advanced road and weather information systems that fully integrate state-of-the-art roadway and weather forecasting technologies. Many agencies use various models of in-ground and mobile sensors to measure pavement temperature. However, little documentation exists on the accuracy of the various sensors, and there is no standard methodology for sensor testing. The data and conclusions drawn from this study are published so that Aurora members and others will have additional information to assist in their implementation and procurement decisions. Additionally, results from this study will be used by the NCHRP to develop testing and calibration standards for pavement sensors. The objective of this project was to conduct both laboratory and field studies of various competing models of in-pavement (contact) and mobile (non-contact) type pavement temperature sensors and compare them to baseline readings in order to quantify the surface temperature measurement performance of each sensor and sensor type. The laboratory tests were conducted at the Braun Intertec laboratory in Bloomington, Minnesota. Field tests were conducted at the Minnesota Department of Transportation's (Mn/DOT's) Mn/ROAD facility near Monticello, Minnesota.
Development of Sensors for Ceramic Components in Advanced Propulsion Systems Jun 04 2021 The report presents the final results of Tasks 1 and 2, Development of Sensors for Ceramic Components in Advanced Propulsion Systems (NASA program NAS3-25141). During Task 1, an extensive survey was conducted of sensor concepts which have the potential for measuring surface temperature, strain and heat flux on ceramic components for advanced propulsion systems. Each sensor concept

was analyzed and evaluated under Task 2; sensor concepts were then recommended for further development. For temperature measurement, both pyrometry and thermographic phosphors are recommended for measurements up to and beyond the melting point of ceramic materials. For lower temperature test programs, the thin-film techniques offer advantages in the installation of temperature sensors. Optical strain measurement techniques are recommended because they offer the possibility of being useful at very high temperature levels. Techniques for the measurement of heat flux are recommended for development based on both a surface mounted sensor and the measurement of the temperature differential across a portion of a ceramic component or metallic substrate. Atkinson, W. H. and Cyr, M. A. and Strange, R. R. Unspecified Center CERAMICS; COMPONENTS; EVALUATION; HEAT FLUX; PROPULSION SYSTEM CONFIGURATIONS; STRAIN RATE; SURVEYS; TEMPERATURE SENSORS; OPTICAL MEASURING INSTRUMENTS; PHOSPHORS; PYROMETERS; THERMOGRAPHY; THIN FILMS...

World Congress of Medical Physics and Biomedical Engineering 2006 Dec 30 2020 These proceedings of the World Congress 2006, the fourteenth conference in this series, offer a strong scientific program covering a wide range of issues and challenges which are currently present in Medical physics and Biomedical Engineering. About 2,500 peer reviewed contributions are presented in a six volume book, comprising 25 tracks, joint conferences and symposia, and including invited contributions from well known researchers in this field.

Reconciling Observations of Global Temperature Change Oct 16 2019 An overall increase in global-mean atmospheric temperatures is predicted to occur in response to human-induced increases in atmospheric concentrations of heat-trapping "greenhouse gases." The most prominent of these gases, carbon dioxide, has increased in concentration by over 30% during the past 200

years, and is expected to continue to increase well into the future. Other changes in atmospheric composition complicate the picture. In particular, increases in the number of small particles (called aerosols) in the atmosphere regionally offset and mask the greenhouse effect, and stratospheric ozone depletion contributes to cooling of the upper troposphere and stratosphere. Many in the scientific community believe that a distinctive greenhouse-warming signature is evident in surface temperature data for the past few decades. Some, however, are puzzled by the fact that satellite temperature measurements indicate little, if any, warming of the lower to mid-troposphere (the layer extending from the surface up to about 8 km) since such satellite observations first became operational in 1979. The satellite measurements appear to be substantiated by independent trend estimates for this period based on radiosonde data. Some have interpreted this apparent discrepancy between surface and upper air observations as casting doubt on the overall reliability of the surface temperature record, whereas others have concluded that the satellite data (or the algorithms that are being used to convert them into temperatures) must be erroneous. It is also conceivable that temperatures at the earth's surface and aloft have not tracked each other perfectly because they have responded differently to natural and/or human-induced climate forcing during this particular 20-year period. Whether these differing temperature trends can be reconciled has implications for assessing: how much the earth has warmed during the past few decades, whether observed changes are in accord with the predicted response to the buildup of greenhouse gases in the atmosphere based on model simulations, and whether the existing atmospheric observing system is adequate for the purposes of monitoring global-mean temperature. This report reassesses the apparent differences between the temperature changes recorded by satellites and the surface thermometer network on the basis of the latest available information. It also offers an informed

opinion as to how the different temperature records should be interpreted, and recommends actions designed to reduce the remaining uncertainties in these measurements.

Development of Micro/nano-scale Sensors for Investigation of Heat Transfer in Multi-phase Flows

Jun 16 2022 The objective of this investigation was to develop micro/nano-scale temperature sensors for measuring surface temperature transients in multi-phase flows and heat transfer. Surface temperature fluctuations were measured on substrates exposed to phase change processes. Prior reports in the literature indicate that these miniature scale surface temperature fluctuations can result in 60-90% of the total heat flux during phase change heat transfer. In this study, DTS (Diode Temperature Sensors) were fabricated with a doping depth of ~100 nm on n-type silicon to measure the surface temperature transients on a substrate exposed to droplet impingement cooling. DTS are expected to have better sensor characteristics compared to TFTs (Thin Film Thermocouples), due to their small size and faster response (which comes at the expense of the smaller operating temperature range). Additional advantages of DTS include the availability of robust commercial micro fabrication processes (with diode and transistor node sizes currently in the size range of ~ 30 nm), and that only 2N wire leads can be used to interrogate a set of N x N array of sensors (in contrast thermocouples require 2 N x N wire leads for N x N sensor array). The DTS array was fabricated using conventional semi-conductor processes. The temperature response of the TFT and DTS was also calibrated using NIST standards. Transient temperature response of the DTS was recorded using droplet impingement cooling experiments. The droplet impingement cooling experiments were performed for two different test fluids (acetone and ethanol). An infrared camera was used to verify the surface temperature of the substrate and compare these measurements with the temperature values recorded by individual DTS. PVD (Physical Vapor Deposition) was used for

obtaining the catalyst coatings for subsequent CNT synthesis using CVD (Chemical Vapor Deposition) as well as for fabricating the thin film thermocouple (TFT) arrays using the "lift-off" process. Flow boiling experiments were conducted for three different substrates. Flow boiling experiments on bare silicon wafer surface were treated as the control experiment, and the results were compared with that of CNT (Carbon Nano-Tube) coated silicon wafer surfaces. Similar experiments were also performed on a pure copper surface. In addition, experiments were performed using compact condensers. Micro-scale patterns fabricated on the refrigerant side of the compact heat exchanger were observed to cause significant enhancement of the condensation heat transfer coefficient.

Transient Surface Temperature Measurements Mar 01 2021

An Investigation of a Remote Transient Heat Flux Sensor. Part I. Prediction of Surface Temperature and Heat Flux Jun 23 2020 The first part of the final report is the prediction of transient surface temperature and heat flux by inverting the temperature response measured at an interior point of a solid material. The configuration considered is a semi-infinite slab, but the inversed solution for prediction of surface temperature and heat flux is shown applicable to a thick slab and hollow cylinder in a transient period for most gun barrel problems to within 5% of accuracy. A table of calibration for use of a foreign single thermocouple wire, with the other wire being the barrel material, is given for constantan, iron, chromel and alumel between 75 to 210 deg. F. (Author).

The Use of Infrared Sensor and Radiation Shielding in Monitoring Surface Temperature Sep 07 2021

Integration of Land Based Embedded and Remote Sensed Temperature for Daily Temperature Mapping Jan 19 2020 Temperature variability is an important driver of many important global and regional processes, which has inspired researchers to understand and predict

the spatial variability of surface air temperature. This importance has increased demand for quality, high resolution gridded climatological datasets that deliver detailed information on the variability of temperature at regional scales. Several interpolation and extrapolation techniques have been introduced that use point data sources (land-based data from weather stations). However, the scarcity of weather stations with long-term records and good spatial coverage and the impacts of a non-stationary climate limits these traditional methods. Through the analysis of existing ground-based temperature sensors we have shown that there are inadequate ground-based measurements to estimate the spatial variability of daily min/max temperature. Furthermore, we have shown that existing interpolation methods are insufficiently accurate to estimate the local temperature at ungauged locations because they cannot capture anthropogenic (e.g. urban heat island) or microclimatological (e.g. cold air pooling) effects. This result implies that, in general, ground-based temperature measurements are too sparse to capture the spatial variability of temperature. Together with satellite observations, gridded meteorological variables can provide important information of the complex interactions of these features in order to accurately map temperature across broad regions. Satellite remote-sensing is another way for acquisition of land surface temperature (LST) data. However, due to technical constraints, satellite thermal sensors are incapable to supply both spatially and temporally dense 1st image data. The reason for this is that the spatial and temporal resolutions of a satellite thermal sensor are anti-correlated, meaning that a high spatial resolution is related with low temporal resolution and vice versa. The trade-off between spatial and temporal resolution of satellite data, encouraged us to apply the Moderate Resolution Imaging Spectroradiometer (MODIS) as a source of remote-sensed land surface temperature data to capture many of the rapid biological and meteorological changes that MODIS (Spatial Resolution

[bands 20-23]: 1km, 5km) observes in every 1 to 2 days. This work develops a new method for integrating remote sensed and ground-based observations of temperature to account for anthropogenic and microclimatological impacts on the surface air temperature. This method is based on a mathematical function that relates the temperature at each point in space as a summation of the remote-sensed measurement at that location and a spatially dependent bias term, which is calculated using the ground based measurements. This model combines the spatial patterns captured within the remote-sensed measurements with the high accuracy of the land-based embedded sensors to construct continuous maps of daily min/max temperature over broad regions. Thus, this model is able to capture the underlying spatial variability of temperature better than other traditional spatial methods.

Improved Surface Temperature Estimates with MASTER/AVIRIS Sensor Fusion Nov 28 2020 Land surface temperature (LST) is an important parameter in many ecological studies, where processes such as evapotranspiration have impacts at temperature gradients less than 1 K. The current Root Mean Square Errors (RMSE) in standard MODIS and ASTER LST products are greater than 1 K, and for ASTER can be as large as 4 K for graybody pixels such as vegetation. Errors of 3 to 8 K have been observed for ASTER in humid conditions, making knowledge of atmospheric water vapor content critical in retrieving accurate LST. For this reason improved accuracy in LST measurements through the synthesis of visible-to-shortwave-infrared (VSWIR) derived water vapor maps and Thermal-Infrared (TIR) data is one goal of the Hyperspectral Infrared Imager, or HyspIRI, mission. The 2011 ER-2 Delano/Lost Hills flights acquired data with both the MODIS/ASTER Simulator (MASTER) and Airborne Visible InfraRed Imaging Spectrometer (AVIRIS) instruments flown concurrently. This study compares LST retrieval accuracies from the standard JPL MASTER

temperature products produced using the Temperature Emissivity Separation (TES) algorithm, and the Water Vapor Scaling (WVS) atmospheric correction method proposed for HyspIRI. The two retrieval methods are run both with and without high spatial resolution AVIRIS-derived water vapor maps to assess the improvement from VSWIR synthesis. We find improvement using VSWIR derived water vapor maps in both cases, with the WVS method being most accurate overall. For closed canopy agricultural vegetation we observed canopy temperature retrieval RMSEs of 0.49 K and 0.70 K using the WVS method on MASTER data with and without AVIRIS derived water vapor,respectively.

Measurement of Transient Heat Flux and Surface Temperature Using Embedded Temperature Sensors (Preprint). Feb 24 2023 Approximate solutions have been obtained for surface temperature and heat flux for the case of two embedded temperature sensors. The solutions have been verified and the range of validity has been established using several methods including comparisons with an exact analytical solution for a linear problem and a numerical calculation for a non-linear problem. The performance of the model is presented in both the frequency domain and the time domain. A propagation of error analysis is presented and is used to establish the optimum spacing between the sensors. The solutions place no restrictions on the boundary or initial conditions and rely only on current values of temperature and its rate of change. The temperature dependence of transport properties is accounted for in an approximate way. The method requires minimal computation and is suitable for implementation in a real-time sensor.

Mirror Mounted Pavement Temperature Sensor Feb 18 2020

Use of an Infrared Temperature Sensor for the Monitoring of Surface Temperature in an Incubator Dec 22 2022

How to Investigate Damp Nov 16 2019 The aim of this book is to take the reader by the hand and show them exactly how to carry out various inspection techniques to identify the causes of damp in buildings. This is achieved by taking them through a variety of investigation methods using real-life case studies illustrated by dozens of sketches, drawings and photographs – and considerable insight into how investigations can be conducted on site – and also including most importantly the Client's input and perspective on a damp issue. Written in non-technical language by a leading expert and author on damp, the book begins by outlining the common types and phases of an investigation, the equipment required and the nature of potential remedial work. Case studies then cover condensation, penetrating damp, plumbing and roof leaks, below ground moisture and flooding – and less common causes such as residual construction moisture. The final section contains step by step guidance on procedures such as using a humidity box, inspecting a cavity wall, using a damp meter and extracting and testing a plaster sample for salt content. The book is full of hints and tips developed over a career spent investigating, diagnosing and remediating damp issues and is essential reading for surveyors looking to improve their skills and knowledge of this often complex defect. The book will also be very useful for homeowners trying to self-diagnose, and architects, engineers and other professionals who need to gain insight into common problems caused by moisture imbalance in buildings.
Feasibility of Miniaturizing a Heater for a Thin-film Oxygen Partial-pressure Sensor Aug 26 2020
Diagnosis of Solar Water Heaters Using Solar Storage Tank Surface Temperature Data Dec 18 2019 Based on the tank energy balance, net gain into the solar storage tank can be inferred from the time derivative of the average tank temperature. Using temperature at the tank wall under insulation as a surrogate for fluid temperature, sensor mounting is simple and the inferred gains are useful for solar

water heater (SWH) diagnostics. Positive daytime gain is compared to solar gain computed from site-specific parameters for an assumed clear day. The solar storage tank loss coefficient is inferred from temperature decay at night and is compared to the value computed from tank description. Larger draws are evident as sharp drops in storage temperature. Analyses are embodied in a tool validated against directly measured gains. Inoperative single-family SWHs are easily detected, signaling the need for repair. Detection of system control issues and shading are exemplified. In large multi-family systems, frequent day-time draws will bias the comparison to expected solar gain.

A Probe for the Measurement of High Surface Temperatures Oct 20 2022 The report describes the design, operation and performance of a probe system with which temperatures can be measured quickly and accurately on a variety of surfaces. In operation the probe is touched to the surface and through its own sensor, heater and electronic servo system is automatically adjusted to the undistorted surface temperature. Extensive testing on a variety of materials (including alumina, stainless steel, titanium, Rene 41, disil coated molybdenum, disil coated columbium, zirconium, and quartz) has shown it generally to have an accuracy of better than 1/2%. The highest temperature measured successfully in intermittent steady state tests was about 2450F (1343C) and in transient tests was 2994F (1645C).

A Probe for the Instantaneous Measurement of Surface Temperature Nov 21 2022

Operational Implementation of Global Australian Multi-sensor Sea Surface Temperature Analysis Jul 05 2021

Official Gazette of the United States Patent and Trademark Office Mar 21 2020

A Probe for the Instantaneous Measurement of Surface Temperature Sep 19 2022 This report describes the design, development and evaluation of a probe system with which instantaneous

temperatures can be measured on a variety of surfaces heated by radiation. It discusses a 1000 F system, its methods of operation and its performance characteristics. It shows that the 1000 F probe operates on a variety of materials with an accuracy generally better than 3/8% and with a time constant of the order of 0.1 seconds. A comparison of the performance of permanent surface thermocouple installations using iron-constantan, chromel-constantan and chromel-alumel thermocouples, various thermocouple wire sizes, orientations, rates of heating and surface materials was made with the 1000 F probe performance. In almost every case, the accuracy of the probe was better than the accuracy of permanent surface thermocouple installation. The design of a probe system believed to be feasible for extending the range of operation to 3000 F is presented. The report also includes detailed information on the development of the sensor, fabrication of a probe, and a discussion of thermocouple attachment methods to non-metallic surfaces.

Infrared Thermography for Thermo-Fluid-Dynamics Jul 25 2020 Infrared thermography is a measurement technique that enables to obtain non intrusive measurements of surface temperatures. One of the interesting features of this technique is its ability to measure a full two dimensional map of the surface temperature and for this reason it has been widely used as a flow visualization technique. Since the temperature measurements can be extremely accurate it is possible, by using a heat flux sensor, also to measure convective heat transfer coefficient distributions on a surface making the technique de facto quantitative. This book, starting from the basic theory of infrared thermography and heat flux sensor guides, both the experienced researcher and the young student, in the correct application of this powerful technique to various practical problems. A significant number of examples and applications are also examined in detail.

Surrogate Human Sensor for Human Skin Surface Temperature Measurement in Evaluating the

Impacts of Thermal Behaviour at Outdoor Environment Aug 18 2022
Comparing Robust and Physics-based Sea Surface Temperature Retrievals for High Resolution, Multi-spectral Thermal Sensors Using One Or Multiple Looks Nov 09 2021 With the advent of multi-spectral thermal imagers such as EOS's ASTER high spatial resolution thermal imagery of the Earth's surface will soon be a reality. Previous high resolution sensors such as Landsat 5 had only one spectral channel in the thermal infrared and its utility to determine absolute sea surface temperatures was limited to 6-8 K for water warmer than 25 deg C. This inaccuracy resulted from insufficient knowledge of the atmospheric temperature and water vapor, inaccurate sensor calibration, and cooling effects of thin high cirrus clouds. The authors will present two studies of algorithms and compare their performance. The first algorithm they call robust since it retrieves sea surface temperatures accurately over a fairly wide range of atmospheric conditions using linear combinations of nadir and off-nadir brightness temperatures. The second they call physics-based because it relies on physics-based models of the atmosphere. It attempts to come up with a unique sea surface temperature which fits one set of atmospheric parameters.
Sensor Technology for in Situ Monitoring of the Surface Temperature Distribution of SOFC. Feb 12 2022
An Investigation of Sea Surface Temperature Patterns in the Gulf of Mexico as Determined by an Airborne Infrared Sensor Aug 06 2021 Recent advances in infrared technology have made possible near synoptic surveys of sea surface temperature of large oceanic areas from aircraft. In an effort to employ this technology in studies of the circulation of the Gulf of Mexico, six flights were conducted over the central and southern Gulf in 1965 and 1966 to determine the feasibility of defining surface current patterns from gradients of sea temperature, as measured by infrared thermometer.

Oceanographic cruise data, and commercial vessel reports of sea temperature taken during this period, have shown that airborne measurements of infrared radiation from the sea surface may be used to delineate reliable horizontal patterns of surface temperature. The airborne data have revealed horizontal temperature changes of 1.5C to 4.0C across the boundary of the major current systems in the Gulf during March, April, and May. The surface currents in the eastern Gulf are postulated from a composite of surface temperature patterns and surface drift data. These investigations have also defined a region, over the continental shelf north of Yucatan, Mexico, of extensive upwelling which is shown to be active from April through September. (Author).
Multi-Sensor Improved Sea Surface Temperature (MISST) for GODAE. Jul 17 2022 The Multi-sensor Improved Sea Surface Temperatures (MISST) for the Global Ocean Data Assimilation Experiment (GODAE) project intends to produce an improved, high-resolution, global, near-real-time (NRT), sea surface temperature analysis through the combination of satellite observations from complementary infrared (IR) and microwave (MW) sensors and to then demonstrate the impact of these improved sea surface temperatures (SSTs) on operational ocean models, numerical weather prediction (NWP), and tropical cyclone intensity forecasting. The improved sensors on the Terra, Aqua, and EnviSAT-1 satellites, in conjunction with previously existing sensors on several other US Navy, NASA, and NOAA satellites, provide the opportunity for notable advances in SST measurement. In addition to more frequent coverage for increased temporal resolution, these sensors permit the combination of highly complementary IR and MW retrievals. Merging multiple SST sensors into a single analysis will result in enhanced operational reliability, data availability, and analysis accuracy.
Quantitative Measurements of Sea Surface Temperature at Several Locations Using the NOAA-3 Very High Resolution Radiometer Apr 02 2021

Environmental Characteristics of the Grand Fir Mosaic and Adjacent Habitat Types Oct 28 2020 Grand Fir Mosaic habitats differ from adjacent forest habitats in their slow rate of secondary succession to woody vegetation. Remote monitoring stations were used to sample the environment at a Grand Fir Mosaic site and three adjacent habitat types. The Grand Fir Mosaic site has shorter growing seasons, cooler temperatures, and more soil moisture than the other sites. Soil pH at the Grand Fir Mosaic site cycled from 5.5 to 6.5 in winter months to 4.0 to 5.0 in summer months. These unique site and environmental characteristics are shown to cause highly acidic soils with high aluminum availability below pH 5.0.

Thermal Infrared Remote Sensing Mar 13 2022 This book provides a comprehensive overview of the state of the art in the field of thermal infrared remote sensing. Temperature is one of the most important physical environmental variables monitored by earth observing remote sensing systems. Temperature ranges define the boundaries of habitats on our planet. Thermal hazards endanger our resources and well-being. In this book renowned international experts have contributed chapters on currently available thermal sensors as well as innovative plans for future missions. Further chapters discuss the underlying physics and image processing techniques for analyzing thermal data. Ground-breaking chapters on applications present a wide variety of case studies leading to a deepened understanding of land and sea surface temperature dynamics, urban heat island effects, forest fires, volcanic eruption precursors, underground coal fires, geothermal systems, soil moisture variability, and temperature-based mineral discrimination. 'Thermal Infrared Remote Sensing: Sensors, Methods, Applications' is unique because of the large field it spans, the potentials it reveals, and the detail it provides. This book is an indispensable volume for scientists, lecturers, and decision makers interested in thermal infrared technology, methods, and applications.

Sensors and Microsystems May 23 2020
Temperature Fluctuations at a Fixed Position in San Diego Bay Oct 08 2021 The purposes of the report were to investigate the thermal structure of San Diego Bay and to determine the mechanisms that significantly influence it. The results show the following. (1) There are oscillations in the thermal structure that are related to tidal forces with periods of 24.6, 12.3, 8.3, and 6.2 hr. (2) A two-layer system develops in the spring and remains until autumn. The surface layer responds in phase to the surface tides, and the bottom layer follows the phase of the surface tide in time from 0.5 to 1.5 hr. (3) Temperature inversions occur in the spring and autumn, at night, and only during the low-water phase of spring tides. (4) The bay has an annual temperature cycle: The Maximum temperatures occur in July and August and the minimum in January and February. The annual temperature change for surface and bottom water is 17.4C. The vertical temperature gradient is maximum during the summer, about 0.5C/m. (Author).
Ground Surface Temperature Reconstructions Apr 14 2022 We have developed a borehole methodology to estimate formation thermal conductivity in situ with a spatial resolution of one meter. In parallel with a fiber-optic distributed temperature sensor (DTS), a resistance heater is deployed to create a controlled thermal perturbation. The transient thermal data is inverted to estimate the formation's thermal conductivity. We refer to this instrumentation as a Distributed Thermal Perturbation Sensor (DTPS), given the distributed nature of the DTS measurement technology. The DTPS was deployed in permafrost at the High Lake Project Site (67 degrees 22 minutes N, 110 degrees 50 minutes W), Nunavut, Canada. Based on DTPS data, a thermal conductivity profile was estimated along the length of a wellbore. Using the thermal conductivity profile, the baseline geothermal profile was then inverted to estimate a ground surface temperature

history (GSTH) for the High Lake region. The GSTH exhibits a 100-year long warming trend, with a present-day ground surface temperature increase of 3.0 ± 0.8 C over the long-term average.
Global Distribution of Maximum Land Surface Temperature Inferred from Satellites Jan 11 2022 Satellite-borne infrared radiometers are currently used to determine the surface temperature of the earth. These sensors often saturate over very hot surfaces because of restrictions in the digital electronics used to record the signals. Regions of the earth's land surface where surface temperatures exceed a prescribed maximum temperature are determined using a global land surface temperature data set. These maps are used to daignose times and places where a satellite-borne sensor is likely to encounter saturation. The implications of this study for the Advanced Along Track Scanning Radiometer (AATSR) are described and some possible solutions are suggested.
Temperature Sensor Array System for Thermal Diagnostics on Human Disease Dec 10 2021 A technique using a plane temperature sensor array to dynamically image the transient temperature response of the human skin subject to intentionally applied heating or cooling was proposed. A human disease diagnostic system with satisfactory accuracy and rapid response speed was constructed. Preliminary experiments show the potential clinical application of this device, which is simple to fabricate and thus cheap in price. Further theoretical analysis shows that the surface heat flux may serve as a better thermal index for disease diagnostics than the commonly used surface temperature, due to that it included all the thermal contributions from any abnormal tissues underneath the skin. An approach was proposed to measure the skin surface heat flux using the currently constructed temperature sensor array system.