城市气象科技信息监测简报
（资讯类）

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北京气象学会
北京城市气象研究院

2023 年 1 月 8 日

前 言

2021年7月，依托北京城市气象研究院行业信息监测与分析系统，北京气象学会与支撑单位北京城市气象研究院联合制作了《城市气象科技信息监测简报》，定期为会员提供科技信息服务。简报每月一期，每期分为文献和咨询两类。

目前，学会主要依据城市气象领域的关键词搜索信息，并形成每月简报。欢迎各位会员向我们提供相关科技领域信息及其搜索关键词，不断扩充简报的专业领域范围，丰富简报的内容，以更好地满足广大会员朋友们对快速更新科技信息的需求。

同时，热诚欢迎广大会员对简报的科技信息内容、展现形式、阅读体验和收获感悟等提出建议和点评。编辑团队将遴选出优秀建议和点评内容刊载在简报上。

2020年12月，学会换届成立了第21届理事会，现拥有52 家理事单位和 947 名会员。我们希望借助此简报，为广大会员朋友们提供高质高效的科技信息服务，同时在大家的支持和帮助下，我们共同将简报建设成为会员交流的友好平台。

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目　录

❖报告概述 2

✧监测周期 2

✧监测主题 2

❖行业动态 2

✧新闻资讯 2

1. Climate and weather extremes in 2022 show need for more action 2
2. UN seeks to track hazardous events and disaster losses and damages 3
3. Early warnings are vital for safe cities 4
4. AAS: 条件非线性最优扰动敏感性分析新方法及其初步应用 4
5. Climate change, natural variability combine to create extreme events 5
6. AAS: 陆面水文过程模拟主要影响因子研究 6
7. Weather Forecasting Enters New Era 7
8. California wildfire smoke dimmed solar energy in 2020 7
9. JGR-A: 地表交换系数的改进及其在中国区域数值模拟中的应用 8

❖报告概述

✧监测周期

2022 年 12 月 01 日 – 2022 年 12 月 30 日

✧监测主题

行业动态——新闻资讯

❖行业动态

✧新闻资讯

本监测周期内，资讯信息共更新 9 条：

1. Climate and weather extremes in 2022 show need for more action

摘要：Weather, water and climate-related disasters, including extreme flooding, heat and drought affected millions of people and cost billions this year, as the tell-tale signs and impacts of human-induced climate change intensified.The events of 2022 once again underlined the clear need to do much more to cut greenhouse gas emissions – with better monitoring of this - and to strengthen climate change adaptation – including through universal access to early warnings, according to the World Meteorological Organization.The past eight years are on track to be the eight warmest on record. Global temperature figures for 2022 will be released in mid-January. The persistence of a cooling La Niña event, now in its third year, means that 2022 will not be the warmest year on record. But this cooling impact will be short-lived and will not reverse the long-term warming trend caused by record levels of heat-trapping greenhouse gases in our atmosphere.The annual global temperature forecast by the UK's Met Office suggests that the average global temperature for 2023 will be between 1.08 °C and 1.32°C (with a central estimate of 1.20 °C) above the average for the pre-industrial period (1850-1900).

来源：WMO

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数据类型：资讯

https://public.wmo.int/en/media/news/climate-and-weather-extremes-2022-show-need-more-action

2. UN seeks to track hazardous events and disaster losses and damages

摘要：The UN Development Programme (UNDP), the UN Office for Disaster Risk Reduction (UNDRR) and the World Meteorological Organization (WMO) are collaborating to develop a new tracking system to record and analyse hazardous events and disaster losses and damages.As part of this collaboration, the three organisations jointly organized a Technical Forum in Bonn, 29-30 November 2022 that saw participation of around 175 representatives of disaster risk management, hydro-meteorological services, and other sectoral entities from around 50 governments and 60 international organisations.One of the key reference points for this system is DesInventar that has been in existence since 1994, serving 110 UN Member States. The Forum has recommended to build off this system, while ensuring that the new-generation system is interoperable, matches with the level of data and digital maturity in a country, produces disaggregated information, and is able to track hazardous events and losses and damages at localized scales and on a continual basis.The new system will be fully aligned with the Sendai Framework and related SDG targets and indicators, and also be interoperable with the WMO Catalogue of Hazardous events which will provide authoritative records of weather, climate, and water-related hazardous events at the national and regional levels. Better understanding of the extent and dimension of losses and damages is essential in order to inform the WMO-spearheaded Early Warnings for All initiative, and to calibrate risk models for risk-informed planning and decision-making.There was a call for the partnership among the three organisations to strengthen the capacity of National Disaster Management Offices (NDMOs), and facilitate operational relationship with the National Meteorological and Hydrological Services (NMHS) and other specialized scientific institutions to better track hazardous event and losses and damages. The new system will allow countries to generate better analytics and data visualization to support risk-informed development, preparedness, and humanitarian action. With a strong collaboration among the three organisations, the new system is expected to be in place in 2023. The new system design will be developed in a collaborative way among the three partner organizations with regular inputs and consultations from the governments and other relevant partners.

来源：WMO

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数据类型：资讯

https://public.wmo.int/en/media/news/un-seeks-track-hazardous-events-and-disaster-losses-and-damages

3. Early warnings are vital for safe cities

摘要："Together for a shared safer and greener urban future: resilient, carbon-neutral and nature-positive cities" was the theme of the 17th Annual Session of the theme of the annual session of the Global Forum on Human Settlements on December 15-16.WMO was a co-organizer of the virtual event, which made a joint urgent call for substantial action and investment at the local and national level to greatly enhance urban resilience, inclusiveness, productiveness and sustainability, and build a safer, greener urban future for all.WMO also led a thematic session on "Urban Hydrology and Integrated Water Resources Management" to engage key stakeholders, provide technical insights and facilitate cooperation at a wider scale.WMO Secretary-General Prof. Petteri Taalas stressed the importance and urgency to provide early warnings for all, and shared the corresponding action plan which focuses on disaster risk knowledge, preparedness and response capabilities, detection, observations, monitoring, analysis and forecasting of hazards, and warning dissemination and communication."WMO's main focuses is the Early Warnings for All initiative. UN Secretary-General Antonio Guterres tasked WMO in March to prepare an action plan for 2023-27 to reach 100 % coverage of early warning services globally. Today, only half of our 193 Members have state-of-the-art early warning systems in place," said Prof. Taalas."To reach the 100 % coverage of Early Warnings during 5 years there is a need to invest in basic meteorological, climate and hydrological observing stations.

来源：WMO

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https://public.wmo.int/en/media/news/early-warnings-are-vital-safe-cities

4. AAS: 条件非线性最优扰动敏感性分析新方法及其初步应用

摘要：数值模式的模拟和预测仍然存在较大的不确定性，其中物理参数的不确定性是导致该类不确定性的重要来源之一。由于模式中包含大量的物理参数，减少所有物理参数的不确定性以提高模式的模拟能力和预测技巧将耗费大量的人力和物力。因此，识别敏感的物理参数或参数组合至关重要。复旦大学穆穆院士和中科院大气所的联合研究提出了一种识别相对重要和敏感物理参数和参数组合的新方法：条件非线性最优扰动敏感性分析（CNOPSA）方法，将该方法应用到了理论的 g-函数和五变量草原生态系统模型，检验了 CNOPSA 方法的适用性和有效性。结果表明，与从统计角度出发且依赖离散参数样本的 Variance-based 方法相比较，CNOPSA 方法由于充分考虑了物理参数间的非线性协同效应，可识别出更为敏感

和重要的物理参数和参数组合，能够定量估计由物理参数变化导致的数值模拟和预测不确定性的最大程度，因而适用于对极端事件的研究。CNOPSA 方法的流程图基于五变量草原生态系统模型，研究团队还发现了利用 CNOPSA 方法所识别的物理参数（或参数组合）较传统统计方法更敏感。与此同时，他们还研究分析了两种方法识别的敏感物理参数的误差对于枯草量模拟影响的物理过程，对由 CNOPSA 方法和传统统计方法识别的敏感物理参数（或参数组合）的误差对枯草量模拟影响差异作出了物理解释。在未来工作中，团队建议考虑将 CNOPSA 方法应用于性能优越的复杂陆面过程模式，识别出模拟和预测中的关键物理参数和物理过程，为提高陆面过程模式的模拟能力和预测技巧提供科学指导。Citation: Ren, Q. J., M. Mu, G. D. Sun, and Q. Wang. 2022: A new sensitivity analysis approach using conditional nonlinear optimal perturbations and its preliminary application. Adv. Atmos.

来源：大气物理所

发布时间：2022-12-20

数据类型：资讯

http://www.iap.cas.cn/gb/xwdt/kyjz/202212/t20221220_6585941.html

5. Climate change, natural variability combine to create extreme events

摘要：An international team of researchers who examined high sea levels off Indonesia has demonstrated the extent to which the compounding impacts of warming temperatures and natural variability can create extreme events.The new study, led by the University of Colorado Boulder and co-authored by four scientists at the National Center for Atmospheric Research (NCAR), used computer models and data from tidal gauges and satellites to identify why sea levels along the Indian Ocean coast of Indonesia reached extreme heights from 2010 to 2017. They traced the causes to a combination of climate change and natural climate cycles linked to oscillations of sea surface temperatures in the Indian and Pacific oceans.Sea levels worldwide have risen by an average of 8 to 9 inches since 1880 because of warming temperatures associated with greenhouse gas emissions. The amount of sea level rise varies greatly from one region to another and fluctuates with tides or storm surges. Higher sea levels can cause flooding, erosion, saltwater contamination of water supplies, and other serious risks for people living along the coast.“This research emphasizes the need to better understand the interplay between human-caused climate change and natural climate variability in order to better prepare for the impacts of regional sea level rise,” said NCAR scientist Aixue Hu, a co-author of the

study.The study was published in Nature Communications. For more, see the University of Colorado Boulder news release.

来源：NCAR

发布时间：2022-12-16

数据类型：资讯

https://news.ucar.edu/132878/climate-change-natural-variability-combine-create-extreme-events

6. AAS: 陆面水文过程模拟主要影响因子研究

摘要：陆面过程模式广泛应用于获取陆面水文变量信息，但模式参数化方案、气象强迫和地表参数等不确定性导致陆面水文过程模拟仍存在较大偏差。来自怀化学院数学与计算科学学院、美国德克萨斯大学、中科院大气所、中国气象局的联合研究团队，利用多种模式参数化方案、气象强迫和地表参数开展了陆面水文过程集合模拟试验，通过与观测对比分析，揭示了影响中国区域土壤湿度、蒸散发和雪深等陆面水文要素模拟的主要因子，对增强水文过程理解、改进模型方案、减少模型模拟不确定性等具有重要意义。Advances in Atmospheric Sciences 在线发表了这项研究。研究发现：1）气象强迫是陆面水文过程模拟的主要影响因子，土壤湿度和雪深的模拟分别与土壤质地信息和陆面模式参数化方案紧密相关研究针对中国区域，基于两类不同的地表参数信息，采用两个不同的气象强迫场驱动两个不同陆面模式开展陆面水文过程集合模拟，利用观测资料验证评估模拟的土壤湿度、蒸散发、雪深等陆表水文变量，分析气象强迫、地表主要参数、模式参数化方案等对陆面水文过程模拟不确定性的影响。研究发现，气象强迫是土壤湿度模拟的主要影响因子，土壤质地是另一个重要因子，特别是干旱半干旱地区；对蒸散发模拟，陆面模式参数化方案影响最大，特别是在南方湿润区域，陆地覆盖对干旱半干旱区蒸散发模拟也有重要影响；对于雪深模拟，气象强迫是主要影响因子，模式中雪的参数化方案影响次之。图 1 中国八大流域 2008-2013 年观测和利用不同模式参数化方案、气象强迫和地表参数模拟的表层（0-10cm）月均土壤湿度时间序列。2）新发展的融合观测信息的中国区域气象强迫和地表参数信息驱动陆面模式能够有效减少模拟不确定性，显著改善中国区域陆面水文过程模拟将六个集合模拟结果与观测的土壤湿度、蒸散发、雪深进行对比分析，结果表明新发展的融合观测信息的中国区域气象强迫和地表参数信息驱动陆面模式能够有效减少模拟不确定性，提高了模拟精度。其中，土壤湿度模拟与观测的相关系数从 0.46 提高到 0.54，雪深模拟与观测的相关系数从 0.54 提高到 0.67；土壤湿度模拟与观测的均方根误差从 0.093 降低到 0.085，雪深模

拟与观测的均方根误差从 1.277 降低到 0.201。图 2 不同模拟与站点观测土壤湿度相关系数的差: (a) CMFD_CLM3.5 -Prin_CLM3.

来源：大气物理所

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http://www.iap.cas.cn/gb/xwdt/kyjz/202212/t20221215_6584913.html

7. Weather Forecasting Enters New Era

摘要：Europe’s Meteosat Third Generation Imager MTG-I1 has been successfully launched – the first a new generation of meteorological satellites which will help the WMO community to improve forecasts of severe weather as well as long-term climate monitoring.It was successfully launched on an Ariane-5 rocket on 13 December from Europe’s Spaceport in French Guiana. It is now on its way to its correct orbit, 36,000km above the Equator.MTG-I1 will ensure the continuity of data for weather forecasting from geostationary orbit for the next 20 years and significantly enhances the current imager capabilities and near real-time lightning imaging – a new capability for European weather satellites.“Meteosat Third Generation is a European success story. The purpose of this multi-billion-euro investment is to provide meteorological services with a vastly increased amount of more precise information which will help them protect lives, property and infrastructure. This system will, literally, save lives,” said Phil Evans, Director General at EUMETSAT.The MTG-I satellites carry two new instruments, a Flexible Combined Imager and Europe’s first Lightning Imager, to deliver high-quality data for better short-term weather forecasting.The innovative Lightning Imager will be able to capture individual lightning events in the sky, whether day or night. This is the first time a geostationary weather satellite can detect lightning across Europe, Africa and the surrounding waters.

来源：WMO

发布时间：2022-12-14

数据类型：资讯

https://public.wmo.int/en/media/news/weather-forecasting-enters-new-era

8. California wildfire smoke dimmed solar energy in 2020

摘要：Engine crews at a staging area during the 2020 August Complex wildfire in California. Intense smoke had substantial impacts on solar energy forecasts. (Photo by

Mike McMillan, U.S. Forest Service.) The smoke from intense California wildfires in September 2020 darkened the skies so much that it slashed the state's solar power production during peak hours by 10-30%, according to a study led by scientists at the National Center for Atmospheric Research (NCAR). This meant that solar energy forecasts for several days substantially overestimated the amount of power that would be generated by the Sun.The study drew on advanced computer models of wildfire smoke and meteorological conditions, as well as records of solar irradiance and energy production. Although previous research looked at the impact of 2020 wildfires on solar energy production, the new study is notable for using a specialized weather forecasting model, pointing the way to developing systems that can better predict smoke impacts."The key takeaway from this research is that wildfire smoke can have a substantial and negative impact on solar energy production in areas near major wildfires," said NCAR scientist Timothy Juliano, the lead author.

来源：NCAR

发布时间：2022-12-07

数据类型：资讯

https://news.ucar.edu/132875/california-wildfire-smoke-dimmed-solar-energy-2020

9. JGR-A: 地表交换系数的改进及其在中国区域数值模拟中的应用

摘要：陆面和低层大气间的能量和水分交换强烈地影响着区域气候变化。地表交换系数(Ch)是表征陆气耦合强度的重要参量之一，其参数化方案通过影响陆气间水热交换过程在陆气相互作用过程模拟中起着关键性作用，进而对天气和气候演变的预测准确性产生影响。然而，数值模式中陆气相互作用的表征仍然存在很大的不确定性，其中陆气耦合强度在很大程度上被高估，Ch 的确定是主要问题之一。为此，中国科学院大气物理研究所东亚区域气候-环境重点实验室马柱国研究员团队的张霞博士（现为挪威科技大学博士后）攻读博士期间在陈亮副研究员和马柱国研究员的指导下，将随植被冠层高度变化的地表交换方案引入 WRF/Noah-MP 模式并在中国区域进行了系统评估。首先，使用离线 Noah-MP 陆面模式通过单点和区域模拟系统地检验了新方案对中国地区地表通量模拟的改进效果；接着，新方案被应用于耦合 WRF-NoahMP 模式，分别进行了 13km 分辨率的气候模拟和 3km 对流解析模拟，系统研究了地表交换参数化方案对中国地区大气降水的影响，并就强降水事件进行了个例模拟分析。其中，离线模式模拟结果和耦合气候模式模拟结果分别发表在 International Journal of Climatology 和 Climate Dynamics。基于我们以往给出的模拟结果来看，新方案在离线陆面模式和大气耦合模式中均能呈现出较好的模拟

性能。因此，在近年来强降水事件频繁发生造成严重生态和社会经济影响的背景下，我们把新方案引入了高分辨率对流解析模式。通过对北京、宁夏和江西 3 个强降水个例进行 3km 对流解析模拟发现，陆气交换强度显著地改变了降水强度以及降水的起始和峰值时间，但对降水落区影响不大。对于发生在湿润和半湿润区的 2012 年北京 7 月 21 日和 2010 年江西 6 月 19 日的两个强降水事件，强交换方案模拟的降水与观测值具有更好的一致性，而对于发生在干旱和半干旱区的 2012 年宁夏 7 月 30 日强降水事件，弱交换方案模拟值与观测值更接近。

来源：大气物理所

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http://www.iap.cas.cn/gb/xwdt/kyjz/202212/t20221205_6566408.html