November 2020

No.13 Total:13

Aerospace Information Research Institute, Chinese Academy of Sciences

Key laboratory of Digital Earth Science, Chinese Academy of Sciences

Big Earth Data Science Engineering Project (CASEarth)

Sino-UK Crop Pest and Disease Forecasting & Management Joint Laboratory

Key Lab of Aviation Plant Protection, Ministry of Agriculture and Rural Affairs, P.R. China

National Engineering Research Center for Agro-Ecological Big Data Analysis & Application

Report of Monitoring and Assessment of Desert Locust in Africa and Asia

Early November 2020

Desert Locust monitoring and loss assessment in Ethiopia

Overview

Integrated with multi-source Earth Observation data, e.g. meteorological data, field data, and remote sensing data (such as GF series in China, MODIS and Landsat series in US, Sentinel series in EU), and self-developed models and algorithms for Desert Locust monitoring and forecasting, the research team constructed the 'Vegetation pests and diseases monitoring and forecasting system', which could regularly release thematical maps and reports on Desert Locust.

This report focuses on the dynamic update of desert locust monitoring and loss assessment in Ethiopia from September to October. The results showed that from September to October 2020, desert locusts in Ethiopia were mainly distributed along the western and eastern edges of the northern Rift Valley, and newly harmed about 1544.0 thousand hectares of vegetation area, including 488.2 thousand hectares of cropland, 410.3 thousand hectares of grassland, and 645.5 thousand hectares of the shrub. In November, the desert locust will continue breeding and will migrate north to the east, then is expected to reach northeastern Kenya in December. The period from November to December coincides with the important crop harvest season and planting season in countries of the Horn of Africa. If not properly controlled, locusts will bring a major threat to agricultural and pasture production. It is necessary to continue the monitoring and early warning of the desert locust plague, and organize joint prevention and control in multiple countries, ensuring the safety of agricultural and pasture production, as well as regional stability.

Content

Monitoring and assessment of Desert Locust in Ethiopia

In September 2020, the desert locusts in Ethiopia were mainly located along the western and eastern edges of the northern Rift Valley. The locusts continued to reproduce, lay eggs, hatch and mature, and the number of locusts continued to increase. The results showed that, by the end of September 2020, desert locust in Ethiopia harmed about 1107.1 thousand hectares of vegetation area, an increase of 776.7 thousand hectares compared with August 2020 (including 214.7 thousand hectares of cropland, 282.1 thousand hectares of grassland, and 279.9 thousand hectares of shrub) (Figure 1). In October, the locust swarms in northern Ethiopia gradually dispersed to the eastern Somali State, and continued to reproduce and lay eggs. As the locust swarms matured and the population continued to increase, some locust swarms began to migrate to central Somalia. The results showed that, by the end of October 2020, desert locust in Ethiopia newly harmed about 767.3 thousand hectares of vegetation area, including 273.5 thousand hectares of cropland, 128.2 thousand hectares of grassland, and 365.6 thousand hectares of the shrub (Figure 2).

The results showed that, from September to October 2020, desert locust in Ethiopia newly harmed about a total of 1544.0 thousand hectares of vegetation area, including 488.2 thousand hectares of cropland, 410.3 thousand hectares of grassland, and 645.5 thousand hectares of shrub, accounting for 2.0%, 2.3% and 0.9% of the total cropland, grassland, and shrub, respectively. The affected areas are mainly located in the northern part of Oromiya (with affected area of 618.5 thousand hectares), western and southern Afar (with affected area of 356.2 thousand hectares), and northern Somali (with affected area of 265.8 thousand hectares), the eastern part of Amhara (with affected area of 205.2 thousand hectares), the southern part of Tigray (with affected area of 96.7 thousand hectares). While the Southern Nation, Tribe and People State (SNNPR) had less affected areas as 1.6 thousand hectares.

We also used Sentinel-2 remote sensing images to monitor desert locust disasters in the more severely affected areas at northern Ethiopia. The data acquisition time is October 2020, and the spatial resolution is 10m. The study area is located at the junction of the western part of Afar State and the southeastern part of Tigray State, about 66 kilometers northwest of Ethiopia's second largest city, the capital of Tigray State, Mek'ele, and about 46 kilometers southeast of Gaibu. The total area of the study area is 624.3 thousand hectares. The vegetation types in the study area include cropland, grassland and shrub, with the areas as 208.7 thousand hectares, 52.1 thousand hectares, and 363.5 thousand hectares, respectively. The monitoring results showed that, in October 2020, the affected area of vegetation in the study area was 78.9 thousand hectares, accounting for 12.6% of the total area of the study area. Among them, the shrub was affected most severely with 43.1 thousand hectares, while the affected areas of cropland and grassland are 29.6 thousand hectares and 6.2 thousand hectares, accounting for 11.9%, 14.2%, and 11.9% of the total area of shrub, cropland and grassland, respectively (Figure 3). The results of the study show that desert

locusts have caused huge damage to Ethiopia's vegetation, and continuous monitoring of the locust situation is needed to ensure Ethiopia's agricultural production and food security.

The comprehensive analysis showed that, in November 2020, Ethiopia's desert locusts will continue to reproduce. The locust swarms in the north will migrate north to the eastern coast of Eritrea, south to the southern Rift Valley, and east and southeast to eastern Somali and central Somalia. As the locust swarms in Somali continue to mature, the epicentre of locust populations in Ethiopia will shift from the north to the east, and the population will further increase. At the same time, some locust swarms in eastern Somalia will also migrate south to eastern Ethiopia. It is expected that the locust swarms will migrate south to northeastern Kenya in December. November to December is the important harvest season of crops in Ethiopia. If the locusts couldn't be controlled effectively, the locust plague will continue, which may bring a heavy blow to the agricultural and pasture production in Ethiopia.

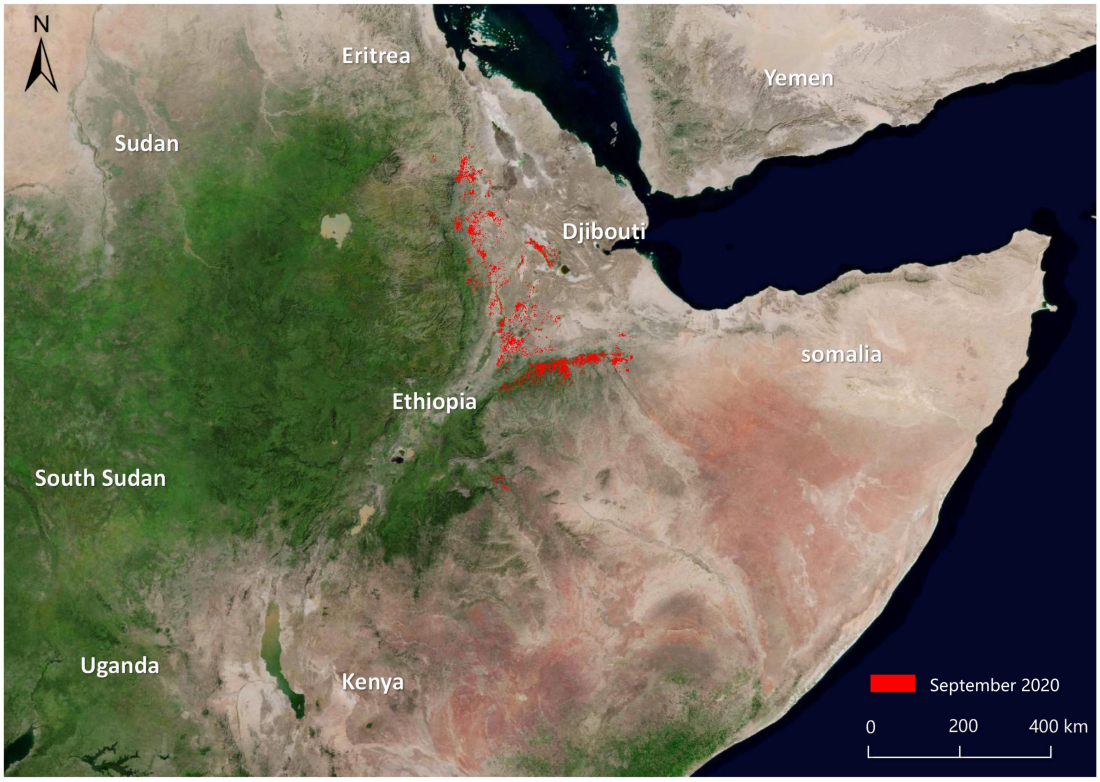

Figure 1 *Monitoring of Desert Locust damage in Ethiopia (September 2020)*

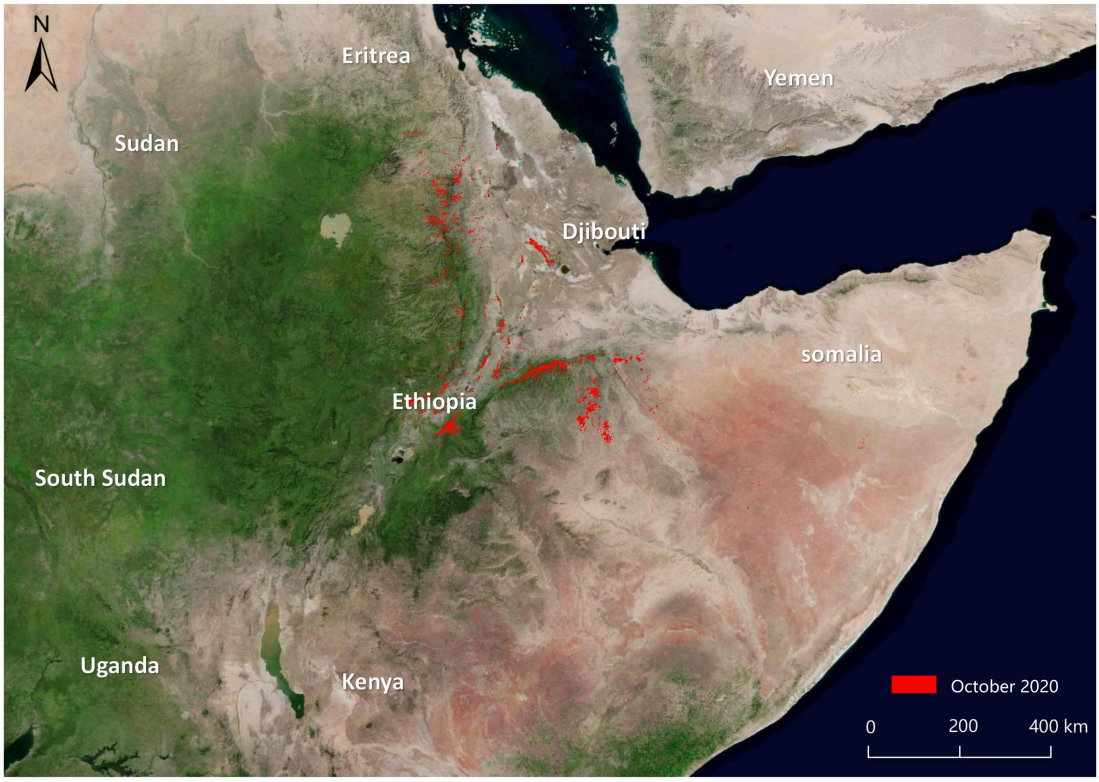

Figure 2 *Monitoring of Desert Locust damage in Ethiopia (October 2020)*

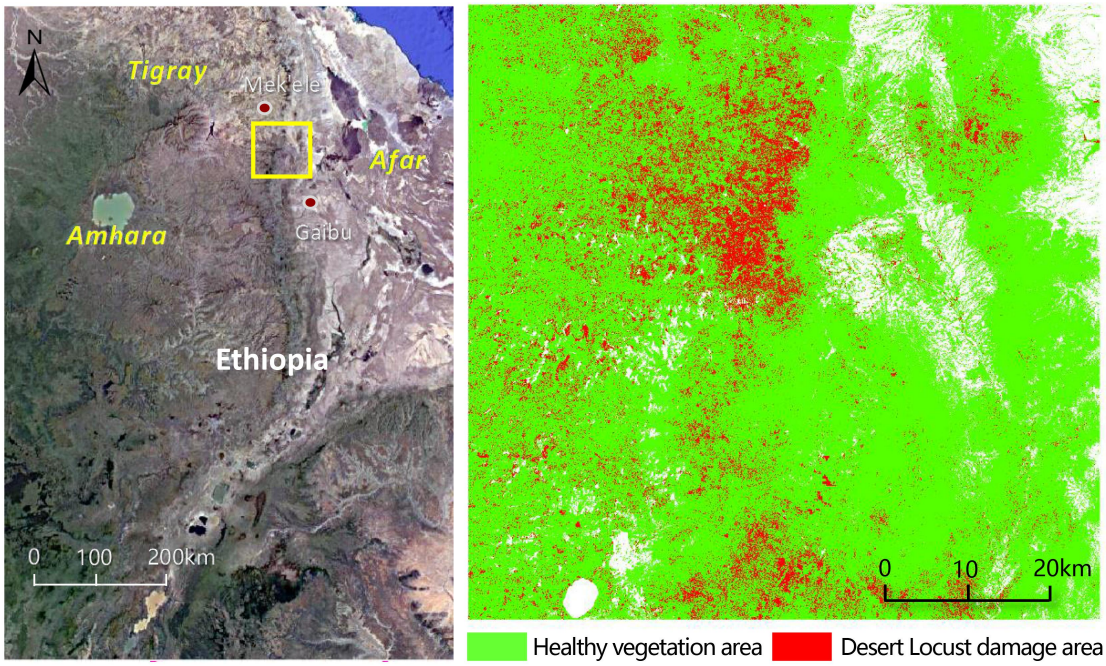

Figure 3 *Monitoring of Desert Locust damage in the key damage area of India based on Sentinel-2 images (October 2020)*

Contact us

Aerospace Information Research Institute
Chinese Academy of Sciences
No.9 Dengzhuang South Road, Haidian District,
Beijing 100094, P.R.China.
http://www.rscrop.com/
http://www.rscropmap.com

Chinese English

The Vegetation Pests and Diseases Monitoring and Forecasting system are available under:
http://www.rscropmap.com/

Legal Notice

Neither the Aerospace Information Research Institute nor any person action on behalf of the institute is responsible for the use which might be made of the publication.

Disclaimer

This report is a product of the Vegetation Remote Sensing & Pest and Disease Application Research Team of the Aerospace Information Research Institute, Chinese Academy of Sciences. The analyses and conclusions in the report do not represent the views of the Chinese Academy of Sciences or the Aerospace Information Research Institute. Users can legally quote the data in this report and indicate the source. However, any judgments, inferences or opinions made based on the report do not represent the views of the Team. The data published in this report are for reference only. The Team does not bear any legal responsibility arising from the use of the report. Official Chinese boundaries are used in the report.

Mission statements: As the science and knowledge service, the Sino-UK Crop Pest and Disease Forecasting & Management Joint Laboratory is to support independent evidence for crop monitoring.

Supported by the Strategic Priority Research Program of the Chinese Academy of Sciences (XDA19080304), National Key R&D Program of China (2017YFE0122400, 2016YFB0501501), National Natural Science Foundation of China (61661136004, 41801338, 41801352, 41871339), Beijing Nova Program of Science and Technology (Z191100001119089), National special support program for high-level personnel recruitment (Wenjiang Huang), and Youth Innovation Promotion Association CAS (2017085).

Citation

Report of Monitoring and Assessment of Desert Locust in Africa and Asia, (2020). Desert Locust monitoring and loss assessment in Ethiopia. Beijing, China: RSCROP. DOI: 10.12237/casearth.5fab6aa3819aec14c53d8ec2.

Contact us **Email:** rscrop@aircas.ac.cn

Corresponding author
Professor Wenjiang Huang
Aerospace Information Research Institute, Chinese Academy of Sciences
Email: huanwj@aircas.ac.cn
Tel: +86-10-82178178
FAX: +86-10-82178177

Main contributors

This report was released by Professor Wenjiang Huang's and Associate Professor Yingying Dong's research team in Aerospace Information Research Institute, Chinese Academy of Sciences.

Chinese contributors: Wenjiang Huang, Yingying Dong, Longlong Zhao, Huichun Ye, Mingquan Wu, Kun Wang, Xiaoping Du, Changyong Dou, Jun Yan, Jingcheng Zhang, Bei Cui, Linsheng Huang, Dailiang Peng, Hong Chang, Yun Geng, Chao Ruan, Huiqin Ma, Anting Guo, Linyi Liu, Naichen Xing, Yue Shi, Qiong Zheng, Yu Ren, Hansu Zhang, Tingguang Hu, Yanru Huang, Yu Jin, Chao Ding, Biyao Zhang, Zhongxiang Sun, Xiangmei Qin, Xueling Li, , Yingxin Xiao, Zhuoqing Hao, Kang Wu, Yong Liu, Bo Wu, Weiping Kong, Juhua Luo, Jinling Zhao, Dongyan Zhang, Xiaodong Yang, Yanhua Meng, Wenjie Fan, Yue Liu, Gang Sun, Bin Wu, Qing Zhang, Dacheng Wang, Wei Feng, Xianfeng Zhou, Qiaoyun Xie, Muyi Huang, Jing Jiang, Zhaochuan Wu, Cuicui Tang, Fang Xu, Jianli Li, Wenjing Liu, Junjing Lu, Furan Song, Qingsong Guan, Qinying Yang, Chuang Liu.

Foreign contributors: Belinda Luke, Bethan Perkins, Bryony Taylor, Hongmei Li, Wenhua Chen, Pablo Gonzalez-Moreno, Sarah Thomas, Timothy Holmes, Stefano Pignatti, Giovanni Laneve, Raffaele Casa, Simone Pascucci, Martin Wooster, Jason Chapman.

Advisory Experts: Bing Zhang, Gensuo Jia, Jihua Wang, Qiming Qin, Puyun Yang, Guofei Fang, Shouquan Chai, Jingquan Zhu, Yuying Jiang, Zhonghua Zhao, Binyuan Ren, Dongmei Yan, Xiangtao Fan, Jianhui Li, Jie Liu, Yubin Lan, Jingfeng Huang, Anhong Guo, Zhanhong Ma, Yilin Zhou, Xiongbing Tu, Wenbing Wu, Feng Zhang, Zhiguo Wang, Lifang Wu, Dong Liang, Yanbo Huang, Chenghai Yang, Liangxiu Han, Ruiliang Pu, Hugh Mortimer, Jon Styles, Andy Shaw, Jadu Dash.