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

Late May 2020

Desert Locust monitoring and loss assessment in Kenya and 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 damage monitoring of the Desert Locust in Kenya and Ethiopia. The result showed that from March to mid-May 2020, Desert Locust in Kenya harmed about 3359.2 thousand hectares of vegetation area (including 864.6 thousand hectares of cropland, 1393.8 thousand hectares of grassland and 1100.8 thousand hectares of shrub), mainly distributed in Rift Valley Province and Eastern Province, while Central, Coastal, Northeastern, Western and Nyanza Provinces were less affected. Desert Locust in Ethiopia harmed about 1654.1 thousand

Content	

hectares of vegetation area from April to mid-May (including 497.0 thousand hectares of cropland, 453.9 thousand hectares of grassland and 703.2 thousand hectares of shrub), mainly distributed in central Afar, western and southern Somalian, eastern Oromia, southern Interracial and eastern Amhara. At present, locusts in Kenya and Ethiopia are constantly breeding and spreading. The period from May to July coincides with the important growing season or harvesting season of wheat, corn, barley, millet, sorghum in these two countries. If not properly controlled, locusts will bring major threats to agricultural and pasture production, national economy and people's livelihood. It is necessary to continue the monitoring and early warning of the

intercontinental 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.

Monitoring and assessment of Desert Locust in Kenya

In March 2020, the Desert Locusts, mostly mature swarms in the south and immature swarms in the north, were mainly located in northern and central Kenya, including Turkana, Samburu, Baringo, Laikipia, Marsabit, Isiolo, Meru, Nyeri and Nairobi in Rift Valley Province, Garissa in Eastern Province. Our results showed that by the end of March 2020, the Desert Locusts had affected 1077.4 thousand hectares of vegetation area in Kenya, including 385.9 thousand hectares of cropland, 437.2 thousand hectares of grassland and 254.3 thousand hectares of shrub. At the early April, the swarms are getting larger due to precipitation at the end of March, and spread westward migration. Immature swarms began to appear in West Pokot of western Kenya, while in Kericho, in the south, mature swarms developed and began to spawn. From Mid to late March, swarms expand and hatch expanding swarms. And at the end of March, swarms moved west into Uganda. By the end of April 2020, the Desert Locusts had affected 1119.5 thousand hectares of vegetation area in Kenya, including 82.5 thousand hectares of cropland, 497.4 thousand hectares of grassland and 539.6 thousand hectares of shrub. In early May, mature and immature swarms in northern Kenya continued to mature, spawn and migrate to the north, and reach the northern Marsabit. In mid-May, immature swarms appeared in the northwest of Kenya and some migrated to Kapoeta in the southeast of South Sudan on the 14th and entered Moroto in the northeast of Uganda on the 20th. 1162.3 thousand hectares (including 396.2 thousand hectares of cropland, 459.2 thousand hectares of grassland and 306.9 thousand hectares of shrub) were newly damaged this month (Fig 1).

The result showed that from March to mid-May 2020, Desert Locust in Kenya harmed about 3359.2 thousand hectares of vegetation area (including 864.6 thousand hectares of cropland, 1393.8 thousand hectares of grassland and 1100.8 thousand hectares of shrub)，accounting for 16.4%, 7.1% and 3.1% of the total cropland, grassland and shrub, respectively. Among them, Rift Valley Province had the largest affected area of 1787.5 thousand hectares And the Eastern province followed, with an damaged area of 1255.4 thousand hectares. The affected area in Central Province was 220.6 thousand hectares. The affected area in Coast Province was 53.2 thousand hectares. The Northeast Province, Nairobi Distract, Western Province and Nyanza Province were affected less seriously, at 15.0 thousand hectares, 12.7 thousand hectares, 9.4 thousand hectares and 5.4 thousand hectares, respectively.

In this study, Planet data with a spatial resolution of 3 m in March 2019 and March 2020 were also used to monitor the Desert Locusts damage in the heavily affected vegetation areas in the Western Province of Kenya. The study area is located in Shianda of Kakamega, northeast side of Lake Victoria, and to the west next to Mumias and Butele. The vegetation types are mainly cropland,

grassland and forest, and the total area is 43.2 thousand hectares. The monitoring results showed that the affected area of vegetation in the study area was 5.4 thousand hectares, accounting for 12.5% of the total area of the study area. Among them, the cropland was affected the most seriously at 3.9 thousand hectares, the damaged grassland area was 1.3 thousand hectares, and the affected area of forest was 0.2 thousand hectares, accounting for 12.8%, 12.1% and 10.0% of the total area of croplands, grasslands and forests in the study area, respectively. The results show that desert locusts can cause great loss to vegetation, and its outbreaks will seriously affect the agricultural and pastoral production and food security in Kenya.

The comprehensive analysis showed that, from May to June 2020. Swarms in the north-west will continue to spread west to northeastern Uganda, northwest to southern South Sudan and northeast to Ethiopia. Between June and July, the swarms are expected to migrate southwest to central Sudan for summer breeding. At present, a large number of locusts in Kenya have matured and begun lying eggs. May to July is the growing season or harvesting season of barley, corn and sorghum in Kenya. It is also growing season for wheat and harvesting and growing season for millet. If the locusts could not be controlled effectively, the locust plague will continue, which may bring a heavy blow to the agricultural and pasture production in Kenya.
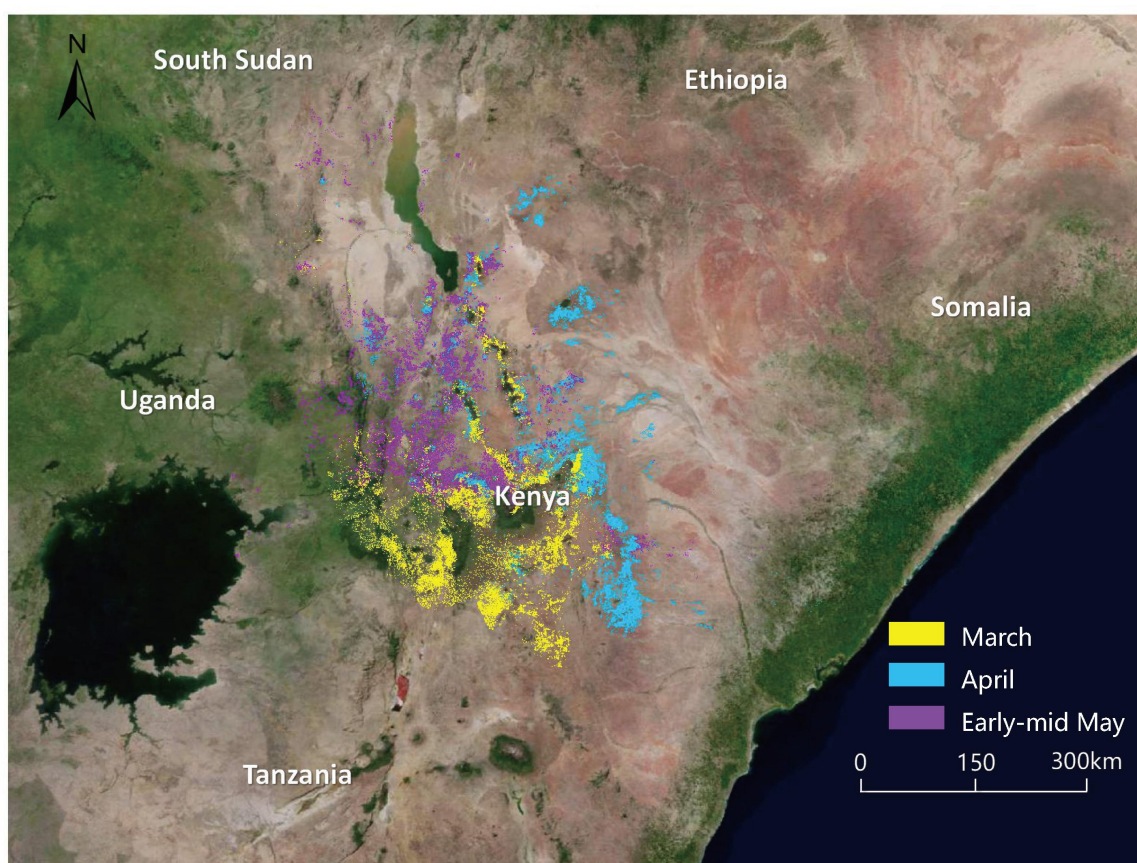
Figure 1 *Monitoring of Desert Locust damage in Kenya (March - Early-mid May 2020)*
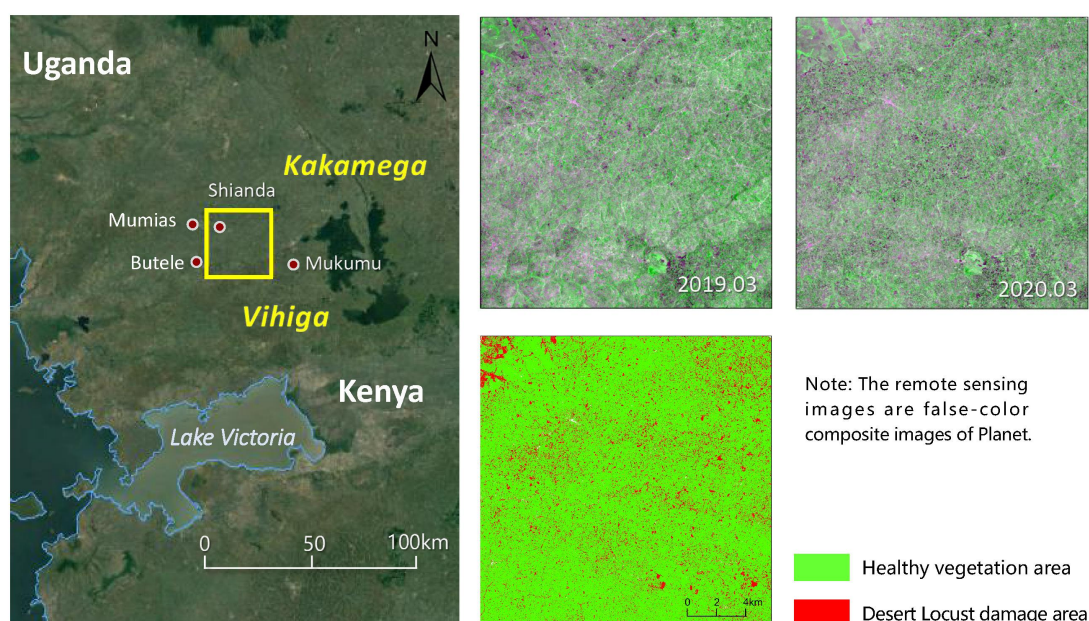
Figure 2 *Monitoring of Desert locust damage in key areas of Kenya based on Planet images*

Note: The remote sensing images are false-color composite images of Planet.

Healthy vegetation area

Desert Locust damage area

Monitoring and assessment of Desert Locust in Ethiopia

In late March 2020, abundant rainfall provided suitable conditions for locusts breeding in Ethiopia. In early April, locusts in northern Kenya spread northward. Locusts are increasing in SNNPR, Konso, Yabello, Negele, Arero in southern Oromiya. In mid-late April, new swarms appeared and multiplied in central Oromia, Gode in southern Somali and DireDawa and Jijjiga in the north Somali. 894.3 thousand hectares (including 167.6 thousand hectares of cropland, 153.2 thousand hectares of grassland and 573.5 thousand hectares of shrub) were newly damaged this month. In early-mid May, locusts in south spread to Afar in northwestern Ethiopia, Somali and Ogaden in eastern Ethiopia. With the control operations, the number of swarms in south is decreasing. Locusts in the border of DE Radhwa area and Somali are maturing, and the affected is further expanded to 759.8 thousand hectares (including 329.4 thousand hectares of cropland, 300.7 thousand hectares of grassland and 129.7 thousand hectares of shrub).

The result showed that from April to mid-May 2020, Desert Locust in Ethiopia harmed about 1654.1 thousand hectares of vegetation area (including 497.0 thousand hectares of cropland, 453.9 thousand hectares of grassland and 703.2 thousand hectares of shrub)，accounting for 2.1%, 2.6% and 1.0% of the total cropland, grassland and shrub, respectively. The harmed areas are mainly in the north and south of Ethiopia. Among them, Oromiya state had the largest harmed area of 842.2 thousand hectares. Southern states of all ethnic groups (SNNPR) were the second most harmed, with 306.1 thousand hectares. Somalia ranked the third with 238.5 thousand hectares of newly harmed areas. 214.8 thousand hectares have been harmed in the Afar state. The newly affected areas in Tigray and Amhara were 29.8 thousand hectares and 22.7 thousand hectares, respectively (Fig.3).

The comprehensive analysis showed that, from late-May to June 2020, Swarms in Ethiopia will continue to breed. Swarms in SNNRR and Oromiya will continue to migrate to Amhara, Tigray and eastern Somali in Northwest Somalia. Swarms in western Somalia will spread westward to Afar and Tigray. Meanwhile, swarms in northern Kenya will migrate to southern and southeastern Ethiopia. From late-June to July, swarms are expected to migrate westward to central Sudan and eastern Sahara, and migrate northeast to the Indo-Pakistan border for summer breeding. At present, large numbers of locusts are maturing in Ethiopia. May to July is the growing season for corn, millet and sorghum in Ethiopia. The situation of desert locust control and prevention is still imperious, which requires continuous monitoring and multinational joint prevention and control to ensure local agricultural, animal husbandry production and food security.
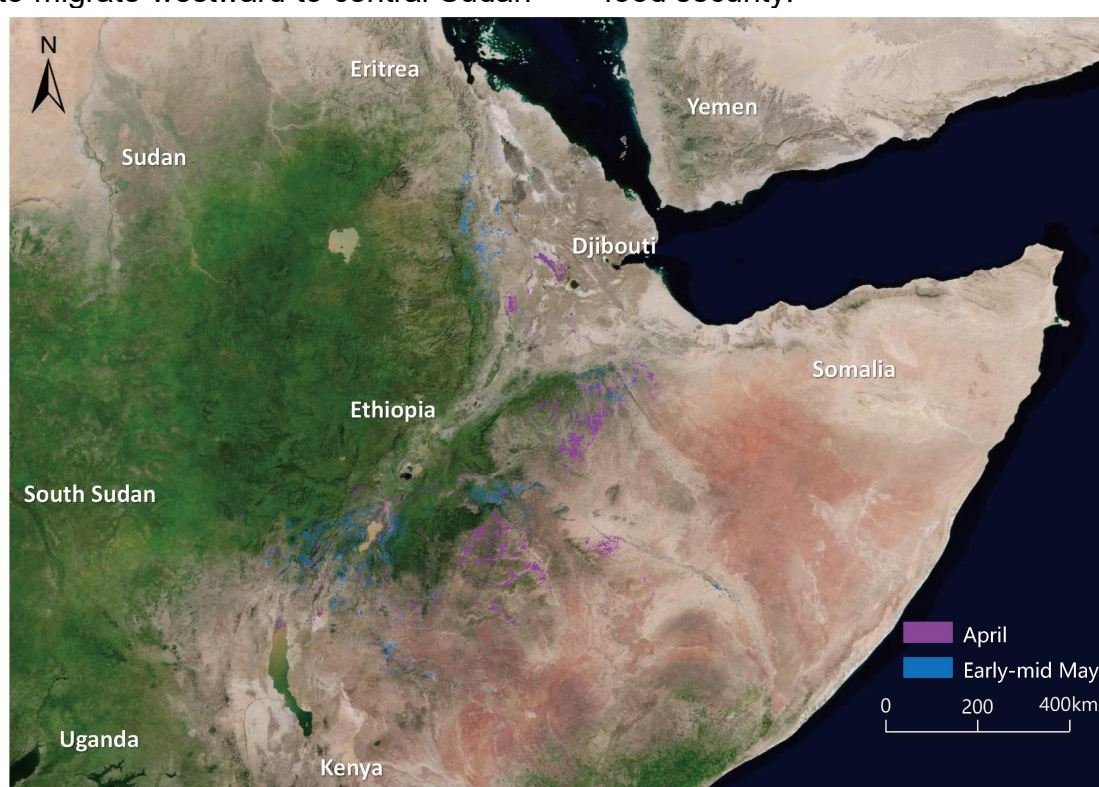
Figure 3 Monitoring of Desert Locust damage in Ethiopia (April - Early-mid May 2020)

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

Disclaimer

Citation

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