Advances in resource mapping from space:

Development of Earth Observing Dashboards

Younes Dehghan Soraki

Iranian Space Agency

Prepared for:
59th session of Scientific and Technical Subcommittee
Of UN-COPUOS
Feb 2022

Ministry of I.C.T

IRANIAN SPACE AGENCY

An Outline

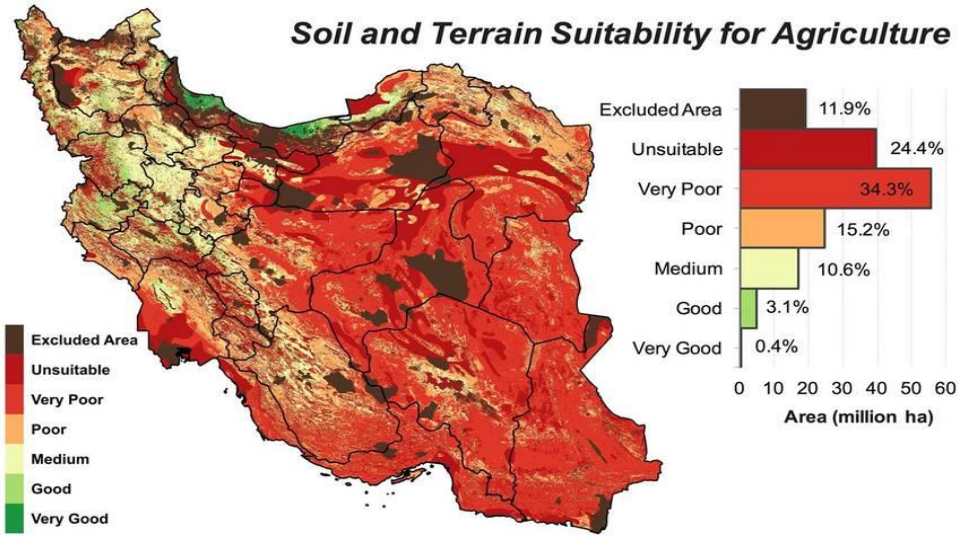
- **Justification for space based resource monitoring in Iran**
- **Current activities**
- **Big Data in Earth Observation: A glance**
- **Earth observing Dashboards**
- **Air Pollutant Monitoring & Management Dashboard**
- **Water Body Monitoring & Management Dashboard**
- **Fire detection and burnt area mapping & Management Dashboard**
- **New Dashboards are under Development…**
- **Collaboration is Welcomed!**

Ministry of I.C.T

IRANIAN SPACE AGENCY

Justification for space based resource monitoring in Iran

- Geographic Extent: Iran covers an area of around 1.6 M-square kilometers
- Food security: land suitability; productivity mapping; Import/Export balance
- Country's development programs vs, Ecosystem Vulnerability
- Iran is experiencing unprecedented climate-related issues such as drying of lakes and rivers, dust storms, record-breaking temperatures, droughts, and floods



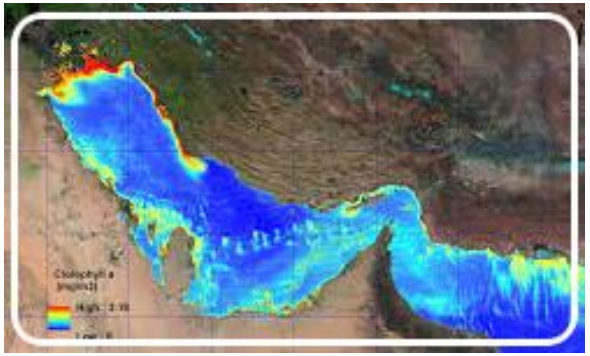
Ref: Mesgaran, Mohsen & Madani, Kaveh & Hashemi, Hossein & Azadi, Pooya. (2017). Iran's Land Suitability for Agriculture. Scientific Reports. Nature, 7. 10.1038/s41598-017-08066-y.

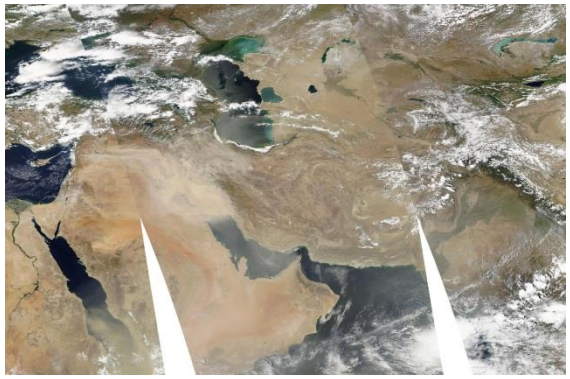
Ministry of I.C.T

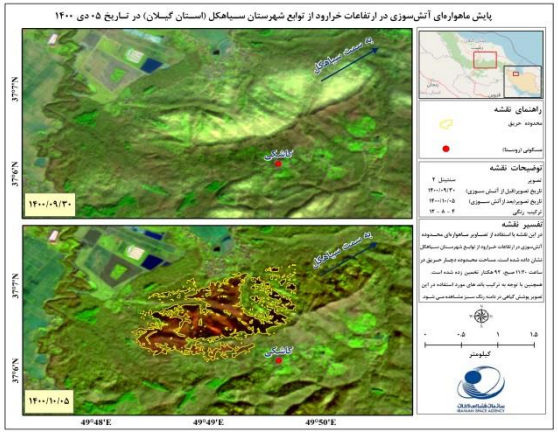
IRANIAN SPACE AGENCY

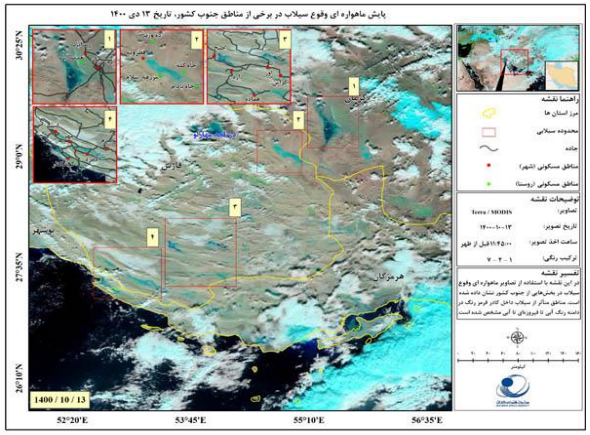
Current activities

- Fire Monitoring
- Dust & air pollution
- Flood
- Red Tide
- Earthquake
- Drought and plant stress
- Subsidence
- Water bodies
- …









Ministry of I.C.T

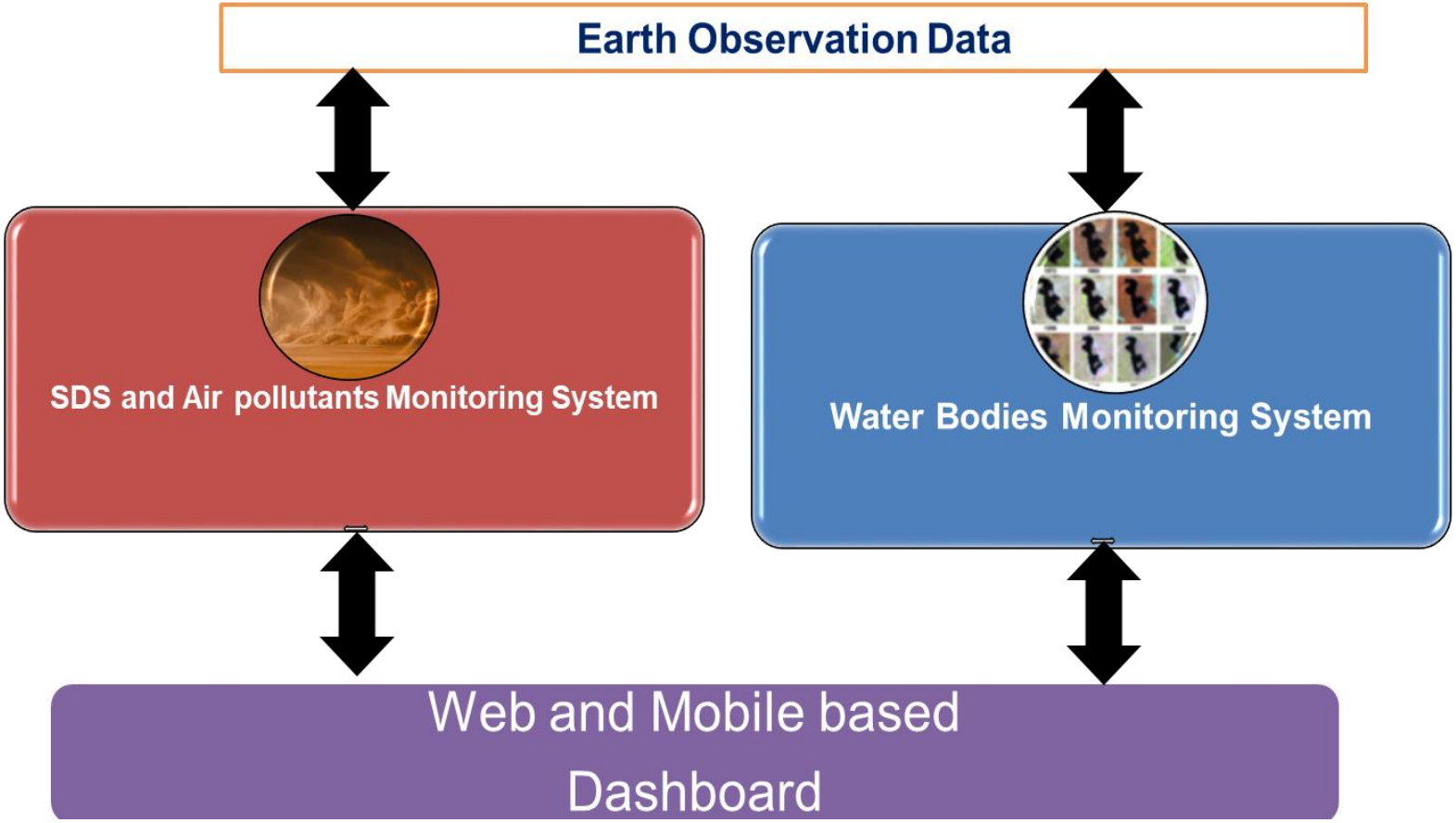
IRANIAN SPACE AGENCY

Big Data in Earth Observation: A glance

Ministry of I.C.T

IRANIAN SPACE AGENCY

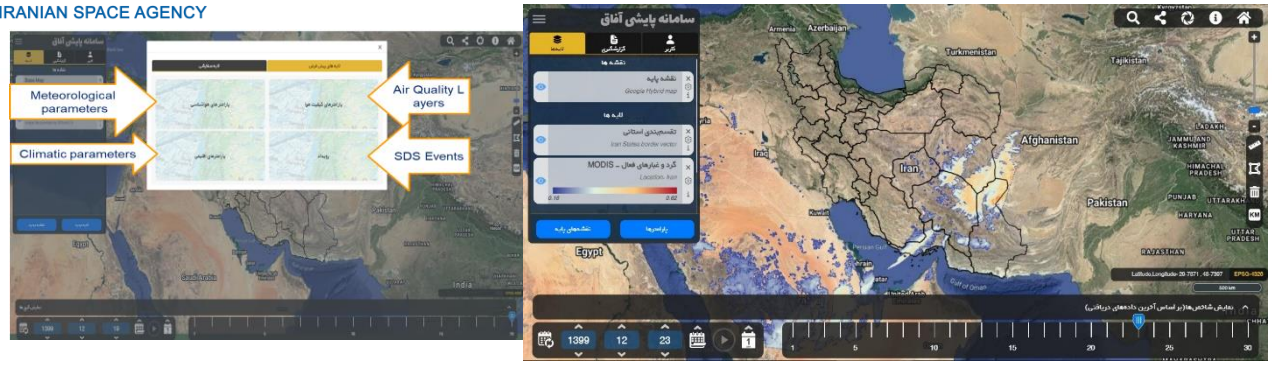
Earth observing Dashboards:
Integration of EO data, science and technology

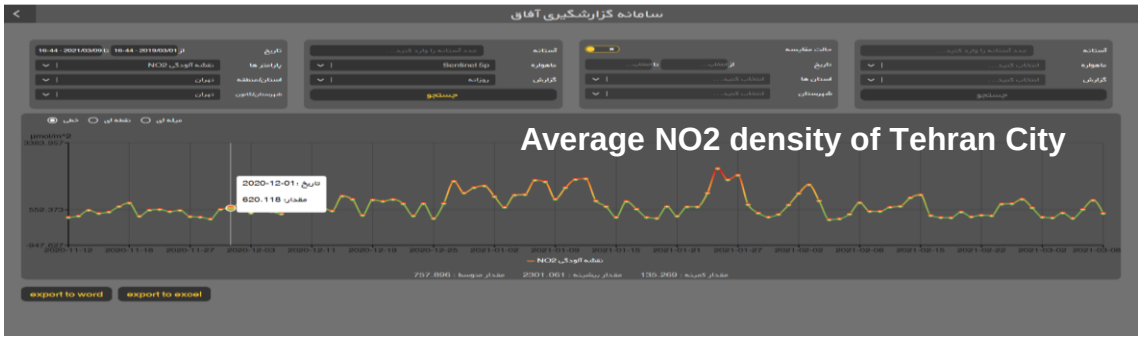


Ministry of I.C.T

IRANIAN SPACE AGENCY

SDS ~ Air Pollutant Monitoring & Management Dashboard (Afagh:آفاق)





Air pollution monitoring:

- Carbon monoxide (CO)
- Sulfur dioxide (SO2)
- Nitrogen dioxide (NO2)
- Ozone density (O3)
- Suspended particles (PM10 / PM2.5)
- Methane density (CH4)
- Formaldehyde (HCHO)
- Aerosol Optical Depth (AOD)
- Aerosol Optical Thickness (AOT)
- UV Indicators (UV AI)

SDS monitoring:

- Meteorological parameters (temperature, humidity, wind, etc.)
- Soil surface moisture of SDS hotspots
- Monitoring SDS hotspots
- Forecasting affected areas
- Dust abundance map
- Cumulative SDS map

Ministry of I.C.T

IRANIAN SPACE AGENCY

Water Body Monitoring & Management Dashboard (Afagh:آفاق)

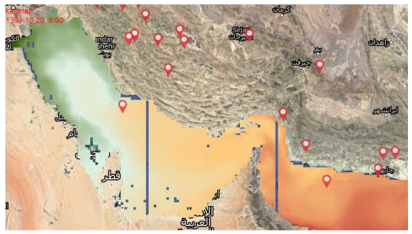
Area

Temperature

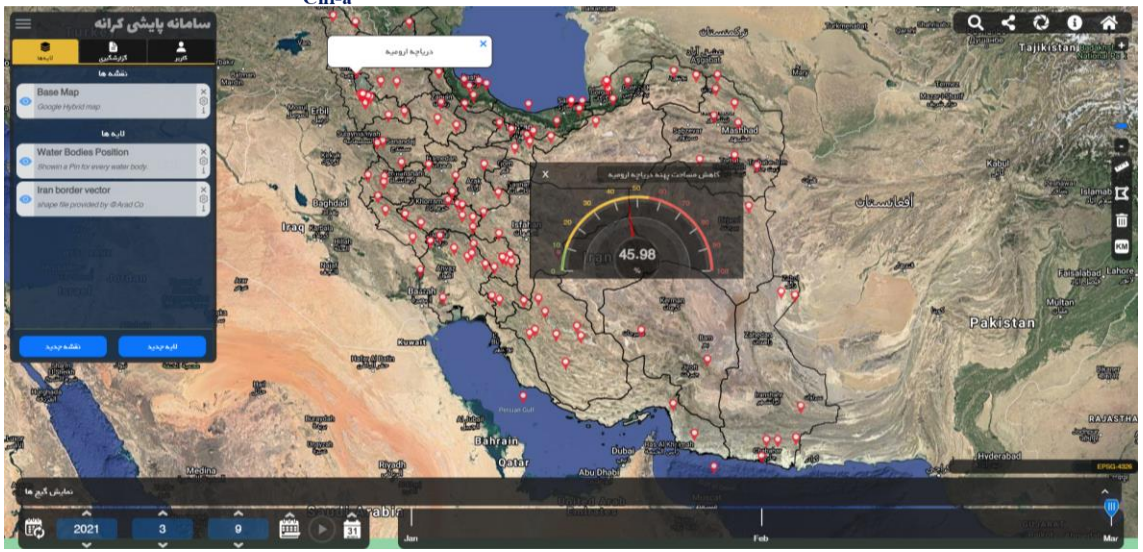
Cyanobacteria

Suspended Organic Matters

Chl-a



Seas Surface Temperature



Water Body Parameters:

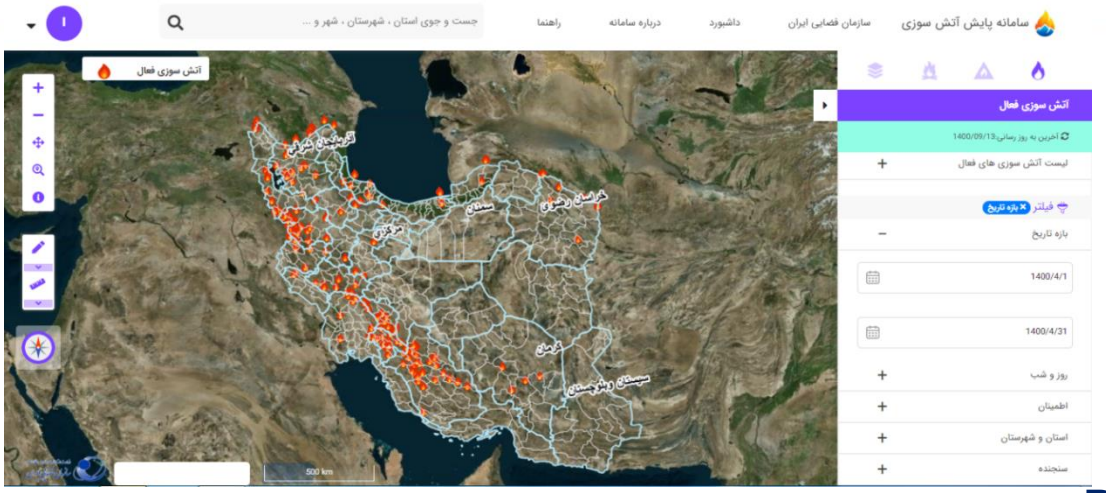
- Area
- Level
- Coastline changes of seas and lakes
- Water surface temperature
- Wind speed at water level
- Direction of water flow
- Oil Slick
- Chlorophyll content
- Particulate matter organic/Inorganic
- Particulate matter (calcium carbonate)
- Water salinity
- Cyanobacteria
- Photosynthetic active radiation

Ministry of I.C.T

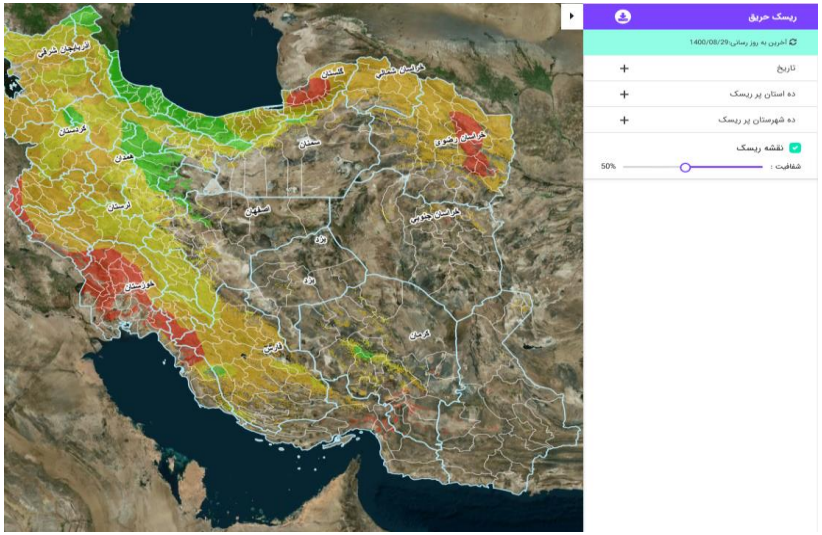
IRANIAN SPACE AGENCY

Fire detection and burnt area mapping

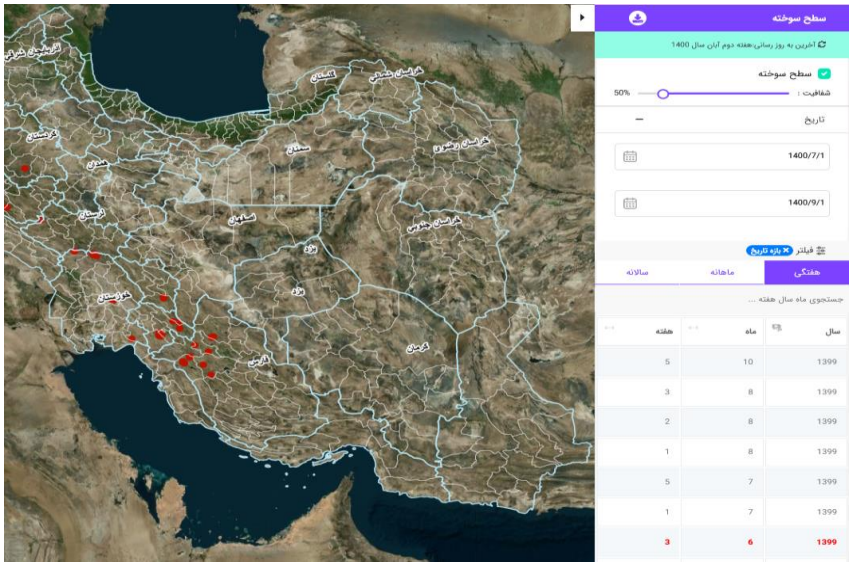
Near Real Time Fire Detection



Fire Danger Risk



Burnt-area mapping



Ministry of I.C.T
IRANIAN SPACE AGENCY

New Dashboards are under Development…

- Rice area mapping and production forecast system (2022)
- Wheat/Barley area mapping (2022)
- Drought mapping and forecast system (2023)
- Flood mapping and early-warning system (2023)
- Sugar beet, Rapeseed and Sugar cane area mapping system
- Marine ecosystem monitoring and fishing potential zone mapping system



Ministry of I.C.T

IRANIAN SPACE AGENCY

Collaboration is Welcomed!

- Training and capacity building for resource mapping from space
- Joint EO-based dashboard development for common understanding of regional and global issues:
  - ✓ Climate changes issues (GHGs emission, NDCs monitoring)
  - ✓ Water resources issues
  - ✓ Disaster monitoring

Thank You!