

Satellite Earth Observation & Disaster Risks

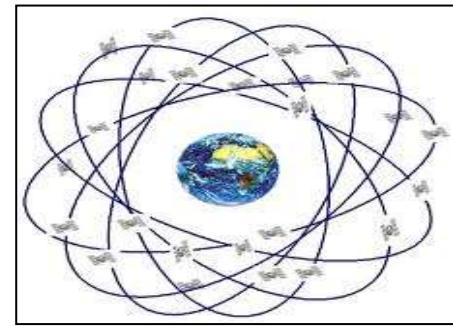
Applications of Earth Observation for Disaster Risk Management



Hicham EZZINE,
Regional Centre for Disaster Risk Reduction

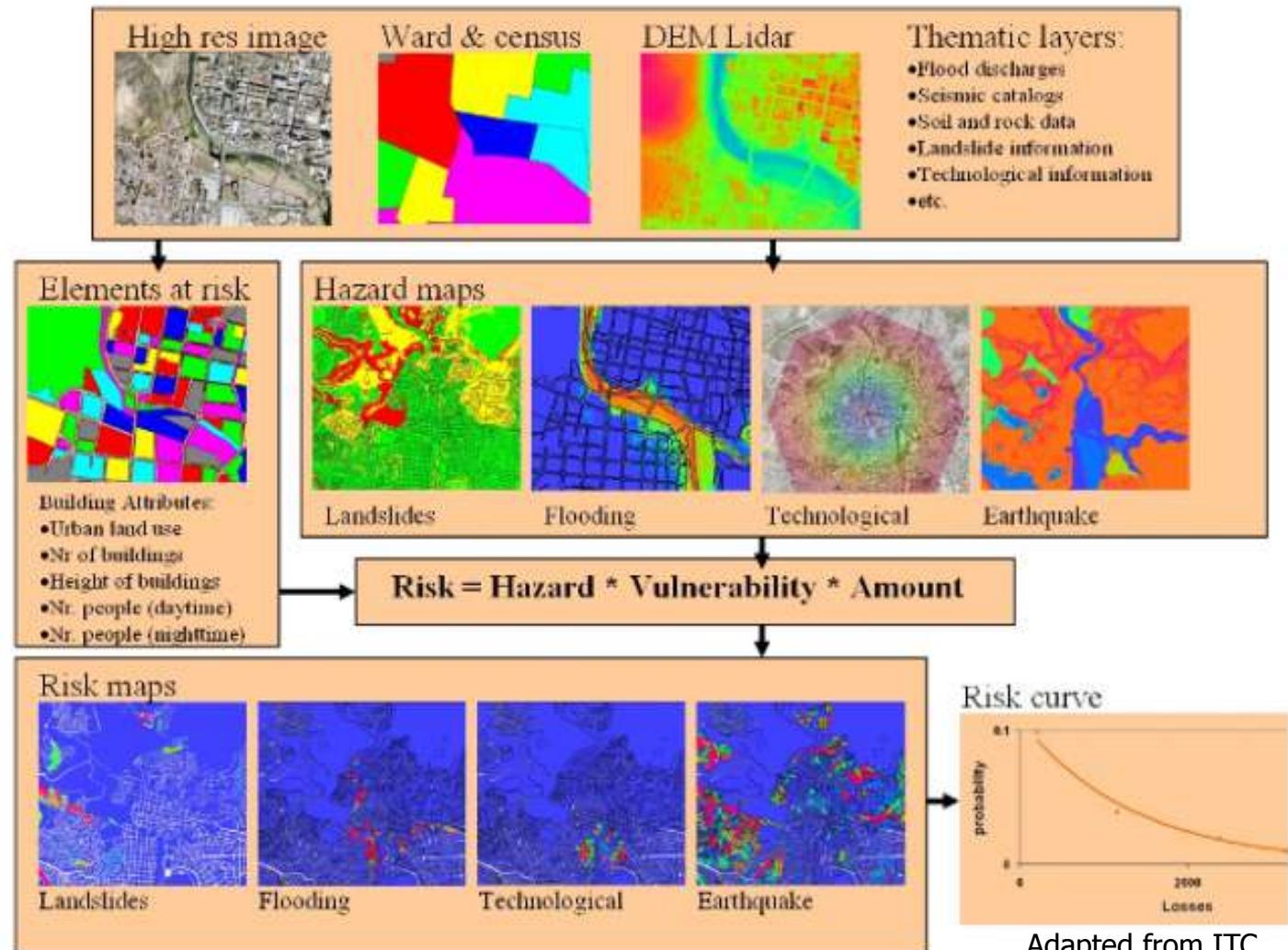
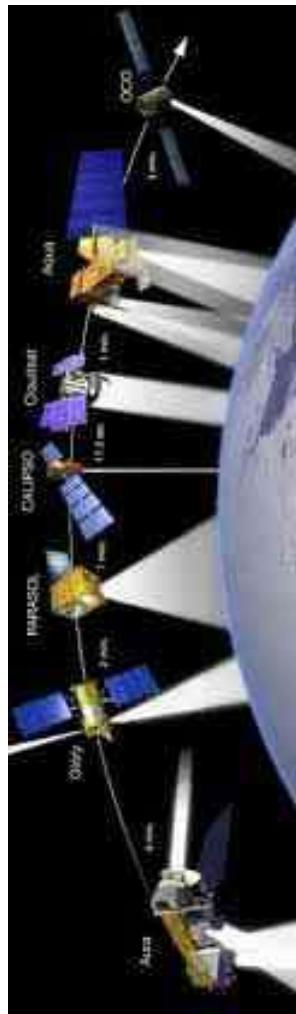


THE DISASTER RISK MANAGEMENT CYCLE



INTRODUCTION

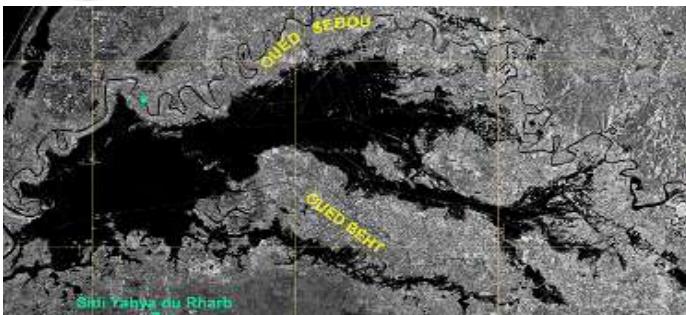
Pre-Disaster: Risk Assessment



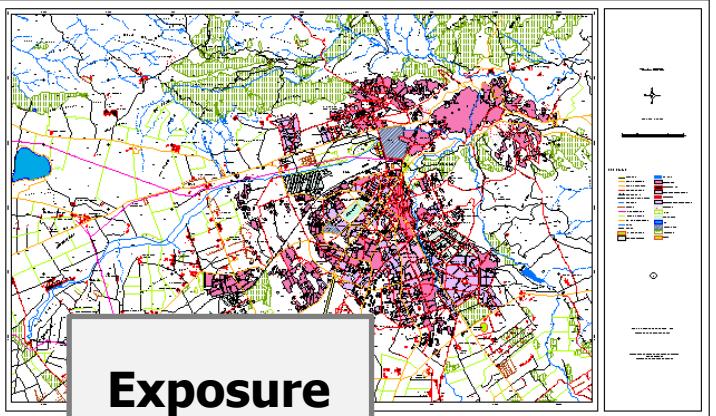
Adapted from ITC

INTRODUCTION

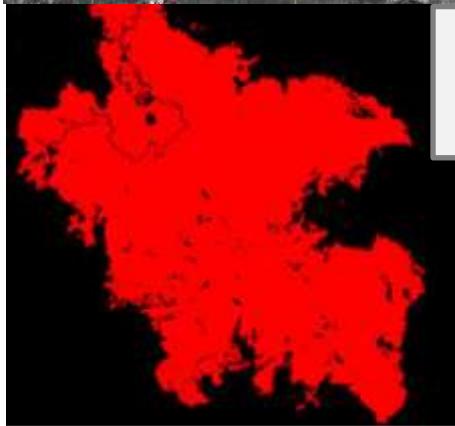
Post-Disaster: Damage Assessment



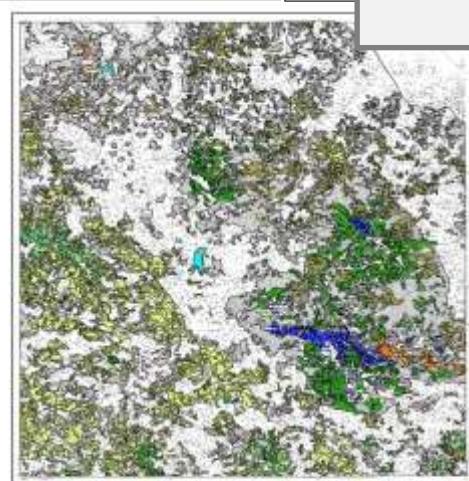
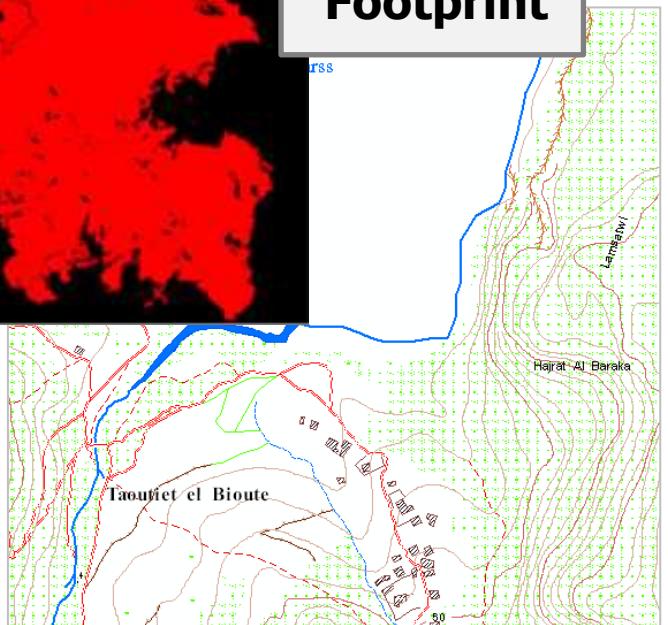
DaLa / PDNA



Exposure



Disaster
Footprint



LEGENDE
Masseux à pourrir Feutre pourri Masseux à décomposition lenteuse Masseux à dormir
Cultures Forêt Garrigue Chêne vert Chêne rouge Chêne noir Chêne gris Chêne moyen
Pâturage Géotherme Thuya Chêne gris Chêne moyen Chêne noir Chêne gris Chêne moyen
Bois mort Bois mort
Autres herbacées Autres arbustes Autres arbustes Autres arbustes Autres arbustes Autres arbustes Autres arbustes Autres arbustes
Autres végétaux Autres végétaux
Molasses Molasses Molasses Molasses Molasses Molasses Molasses Molasses
FORÊT ARTIFICIELLE FORÊT ARTIFICIELLE
Broussailles forestière Broussailles forestière
Terrain non cult. Terrain non cult.

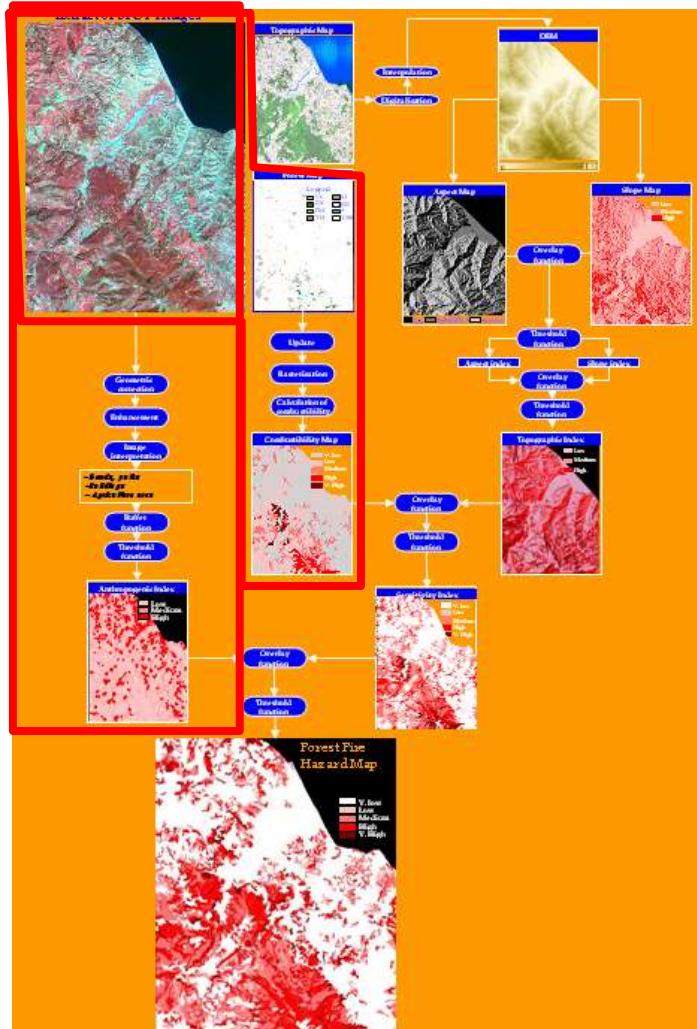


Figure 7 : Carte d'occupation des sols correspondant à la feuille d'Ait Baha (au 1/50.000)

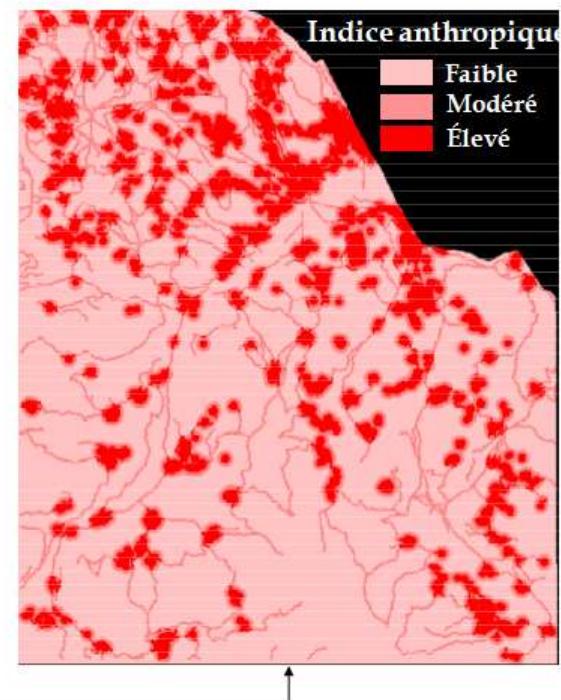
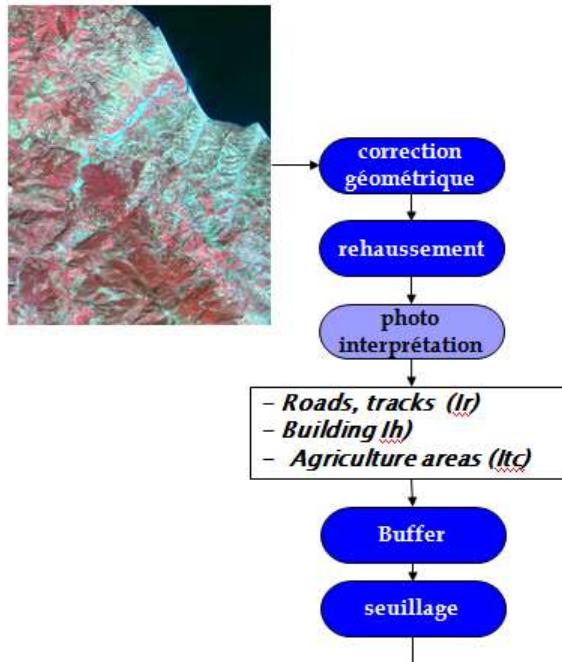
FOREST FIRES

Pre-Disaster: Risk Assessment

- **Assessment of structural Risk**
- **Assessment of conjectural Risk**

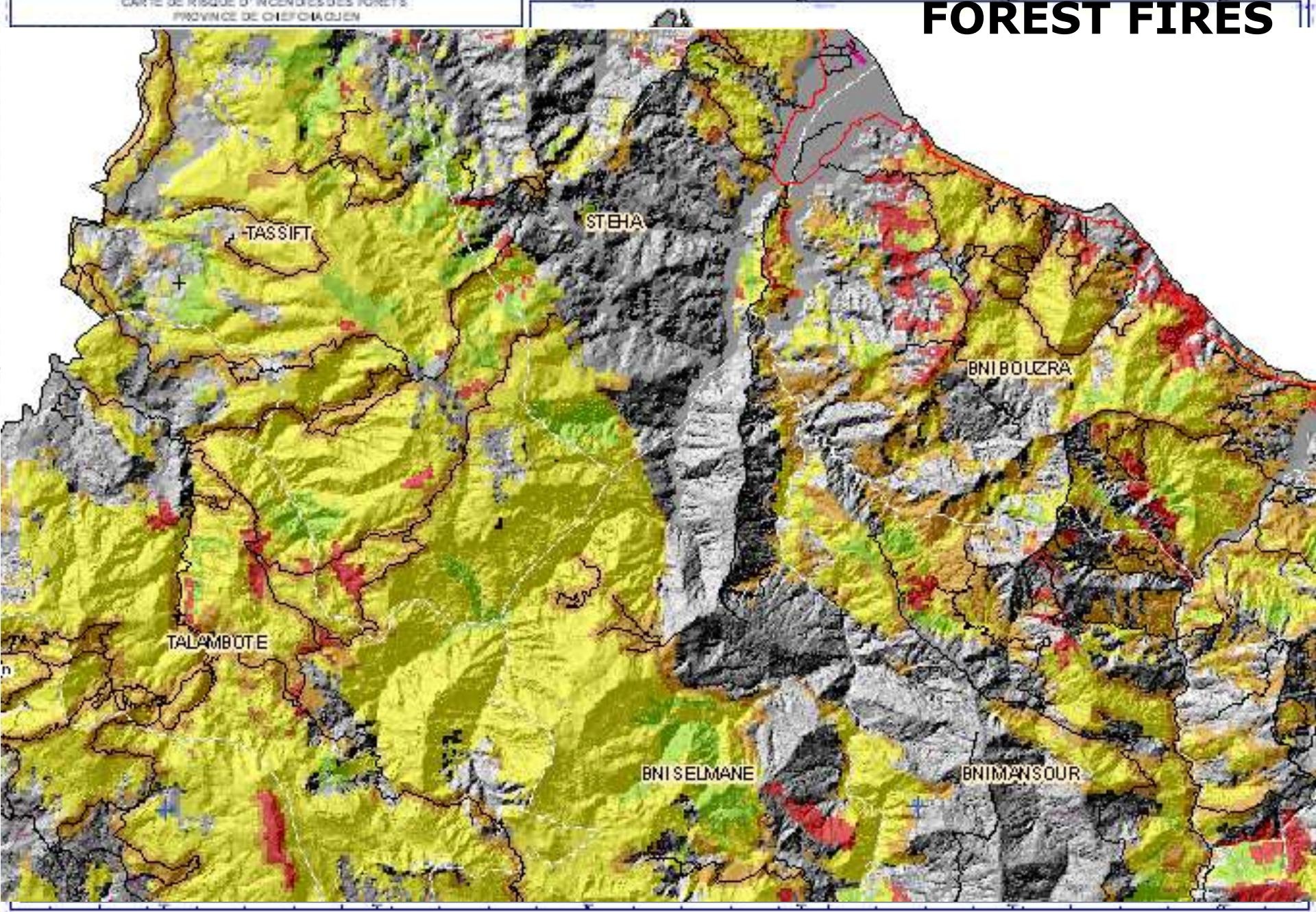


Anthropogenic Index



CARTE DE RISQUE D'INCENDIES DES FORêTS
PROVINCE DE CHÉFCHAOUEN

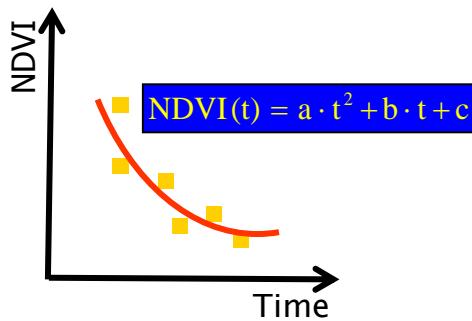
FOREST FIRES



FOREST FIRES

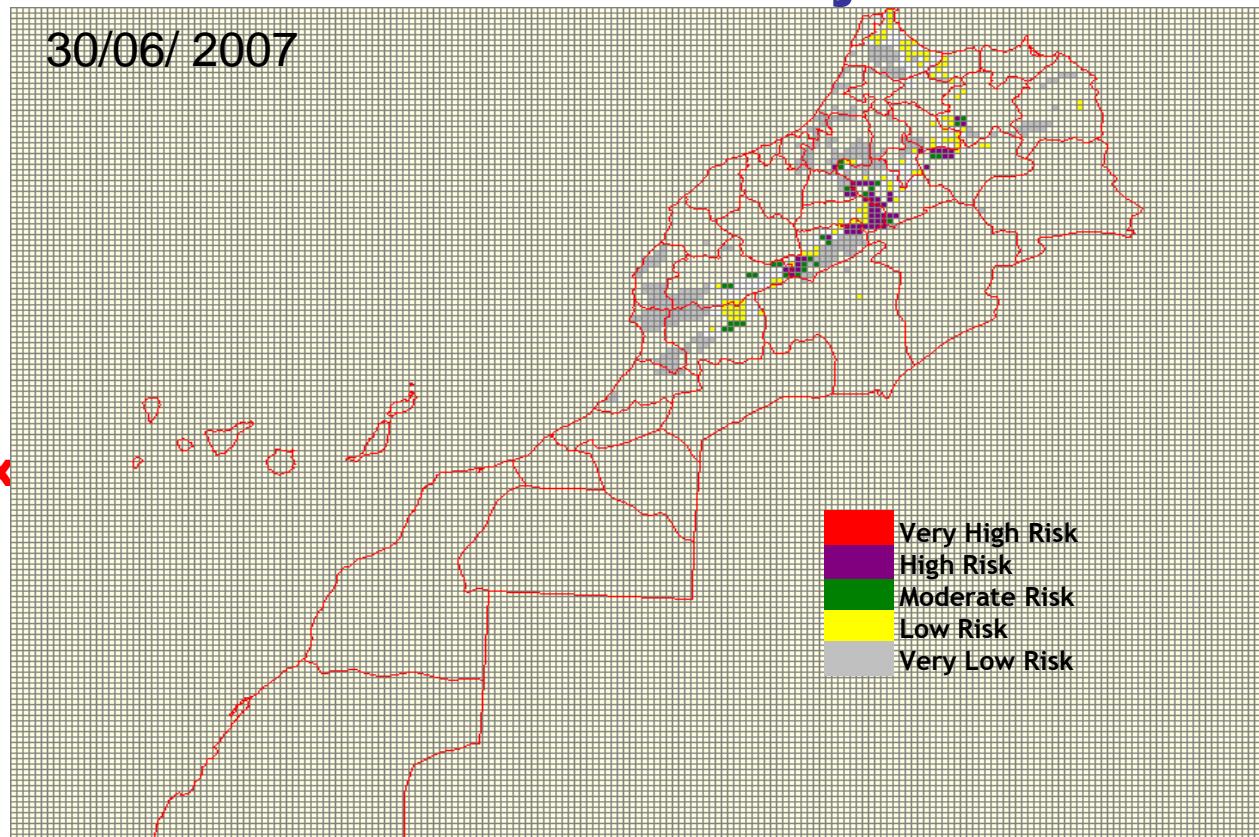
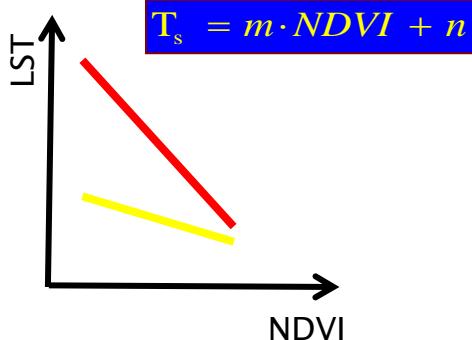
Pre-Disaster: Risk Assessment

- Vegetation regression index



- Assessment of structural Risk
- **Assessment of conjectural Risk**

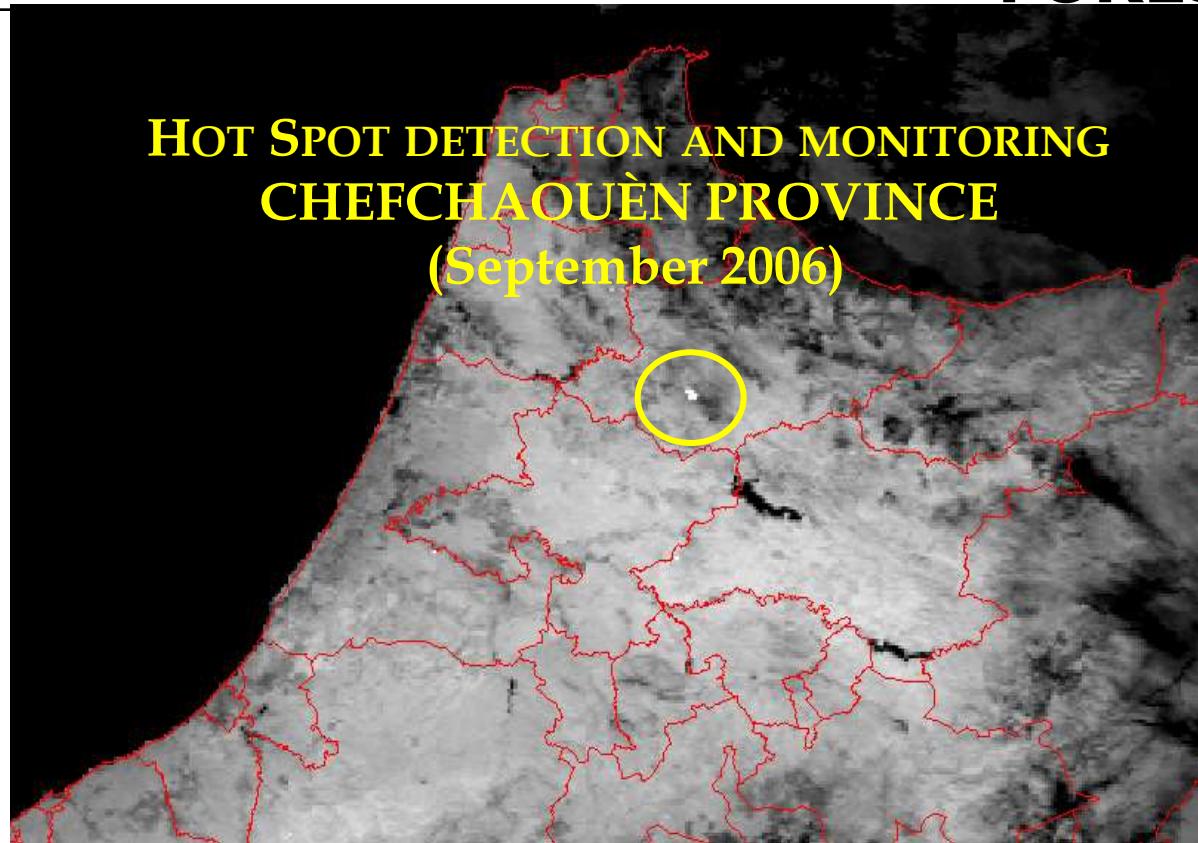
- Vegetation drought index



FOREST FIRES

detection

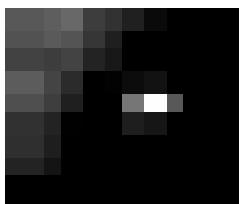
HOT SPOT DETECTION AND MONITORING CHEFCHAOUËN PROVINCE (September 2006)



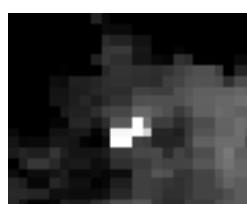
04/09/2006
à 13 h 25



07/09/2006
à 13 h 36



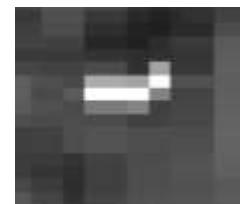
05/09/2006
à 13 h 15



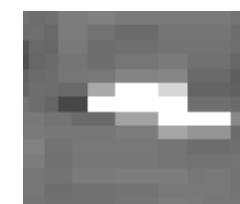
06/09/2006 à
13 h 05



08/09/2006
à 14 h 27



08/09/2006
à 14 h 30



09/09/2006
à 14 h 18

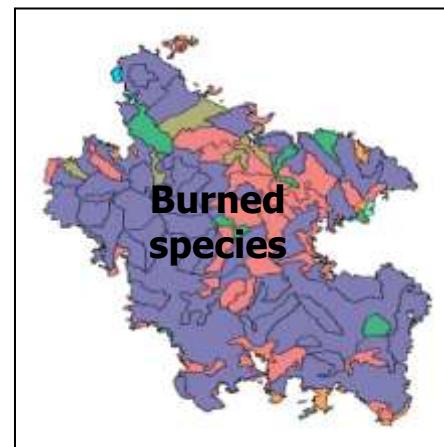
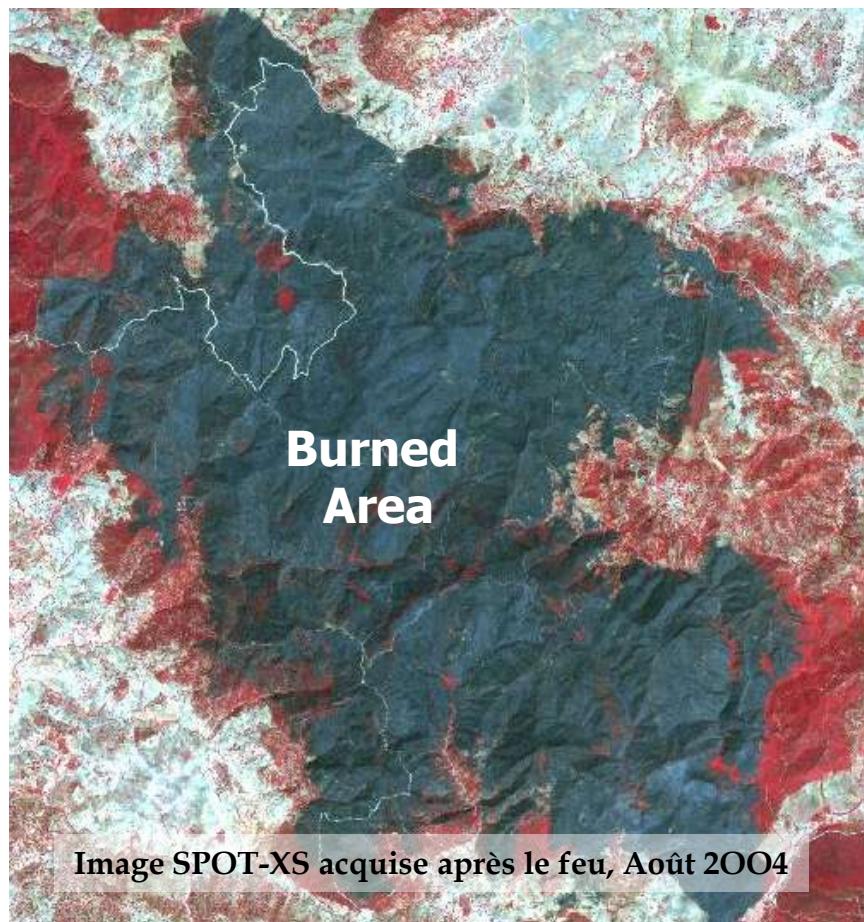


10/09/2006
à 14 h 18

FOREST FIRES

Post -Disaster: Damage Mapping

Cartography of burned area



| Species | Area (ha) |
|----------------------|-----------|
| Chêne liège | 761,404 |
| Chêne Vert | 6,624 |
| Feuillues | 118,869 |
| Matorral | 142,127 |
| Reboisement feuillu | 6,999 |
| Reboisement Résineux | 2717,074 |
| Terrains non Boisés | 67,36 |
| Total | 3820,457 |
| Commune | Area (ha) |
| Zoumi | 2733 |
| Beni Quoulla | 1087 |
| Total | 3820 |

PDSI : 1900 - 2002

NMDC – Normalized Multi-Band Drought Index

VCADI – Vegetation Condition Albedo Drought Index

PDI – Perpendicular Drought Index

MPDI – Modified Perpendicular Drought Index

RDRI – Remote Sensing Drought Risk Index

VegDRI – Vegetation Drought Response Index

ADI – Aggregate Drought Index

SMDI – Soil Moisture Deficit Index

ETDI – Evapotranspiration Deficit Index

RDI – Reconnaissance Drought Index

RSDI – Regional Streamflow Deficiency Index

SDI – Sperling Drought Index

NDVI – Normalized Difference Vegetation Index

VCI – Vegetation Condition Index

NDVIA – Anomaly of Normalized Difference Vegetation Index

SVI – Standardized Vegetation Index

NDWI – Normalized Difference Water Index

NDII – Normalized Difference Infrared Index

LWCI – Leaf Water Content Index

DTx – agricultural drought index

PDSI

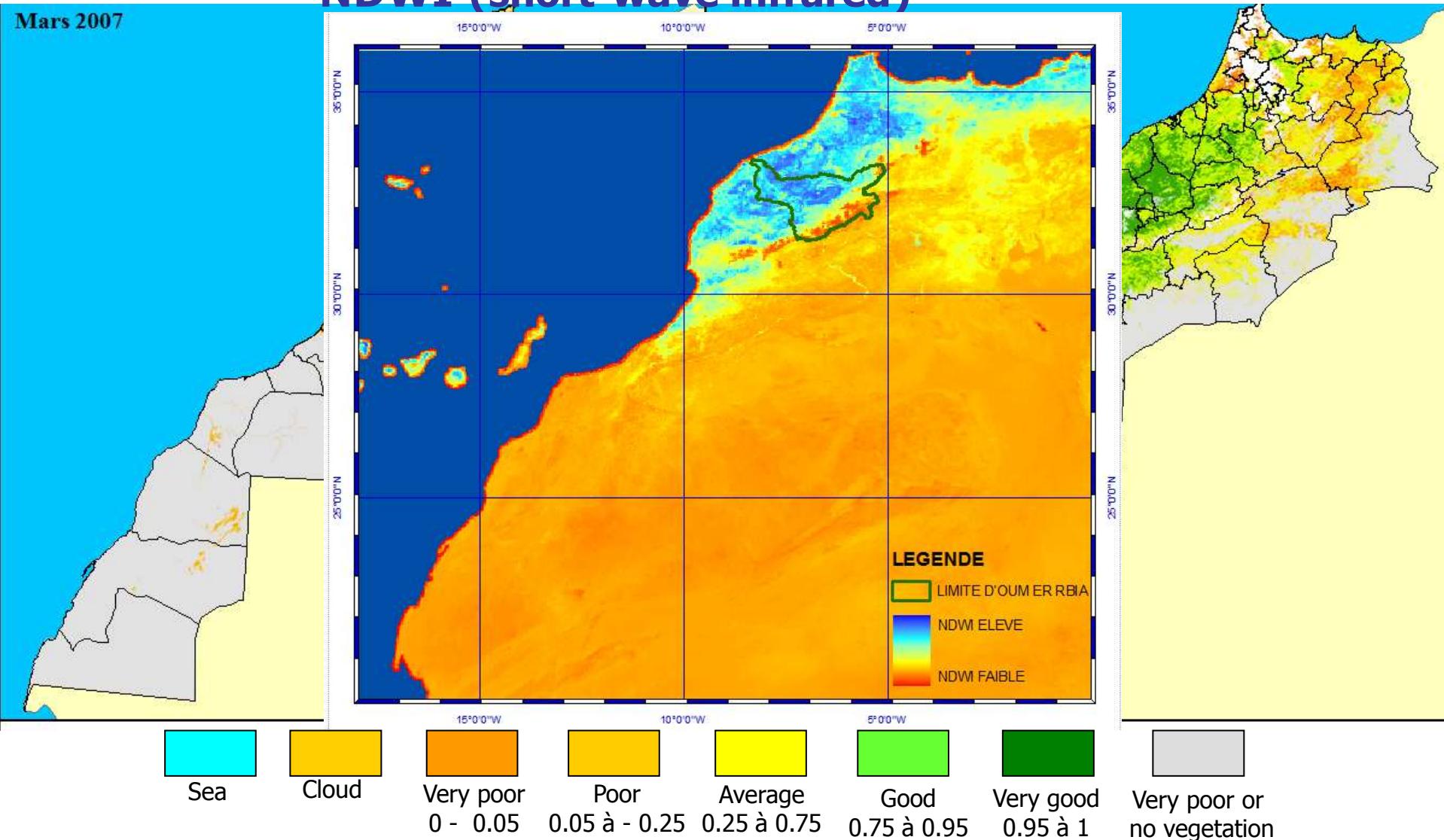
IPCC, 2007

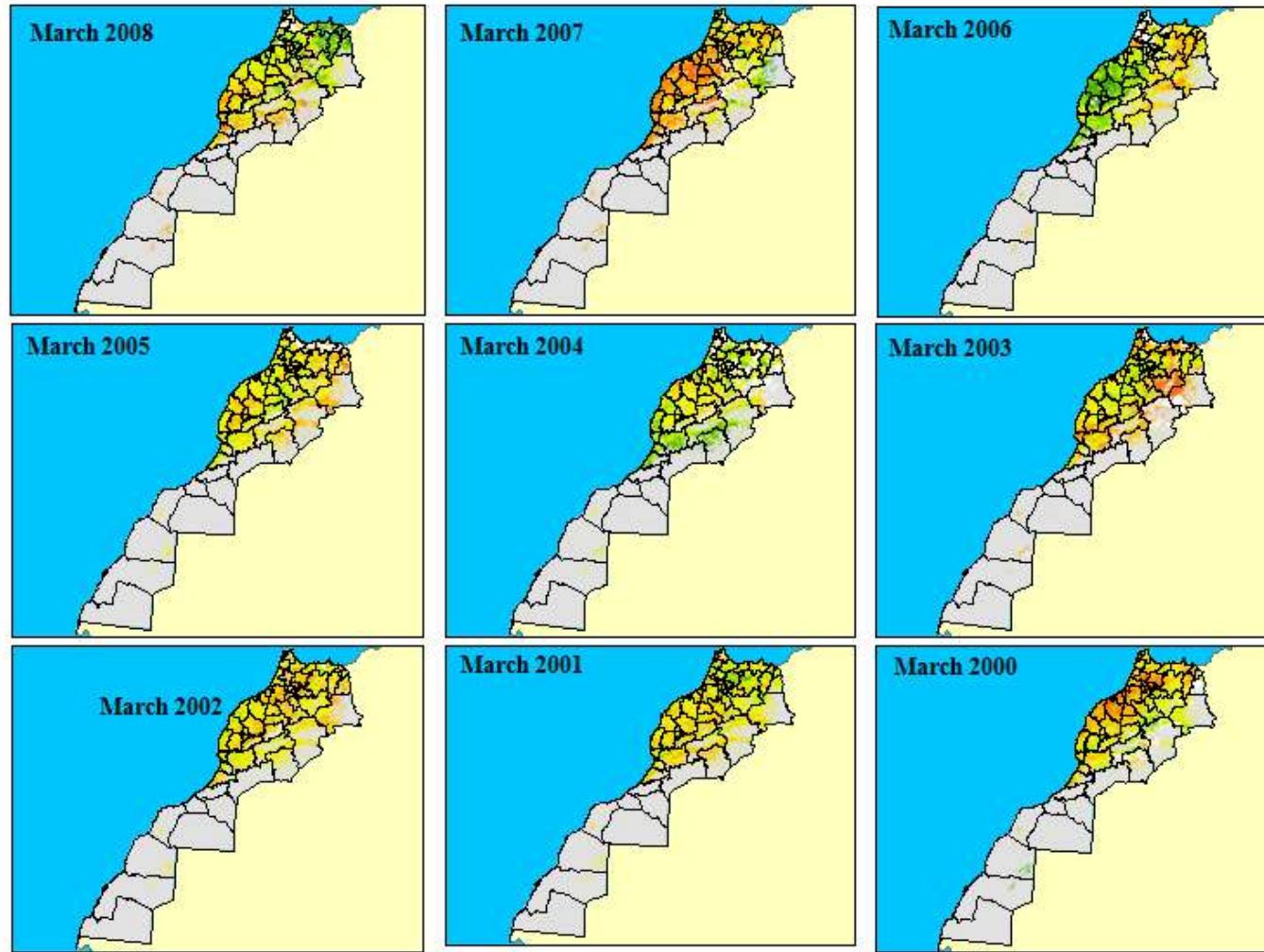
DROUGHT

Standardized Vegetation Index: Drought Monitoring

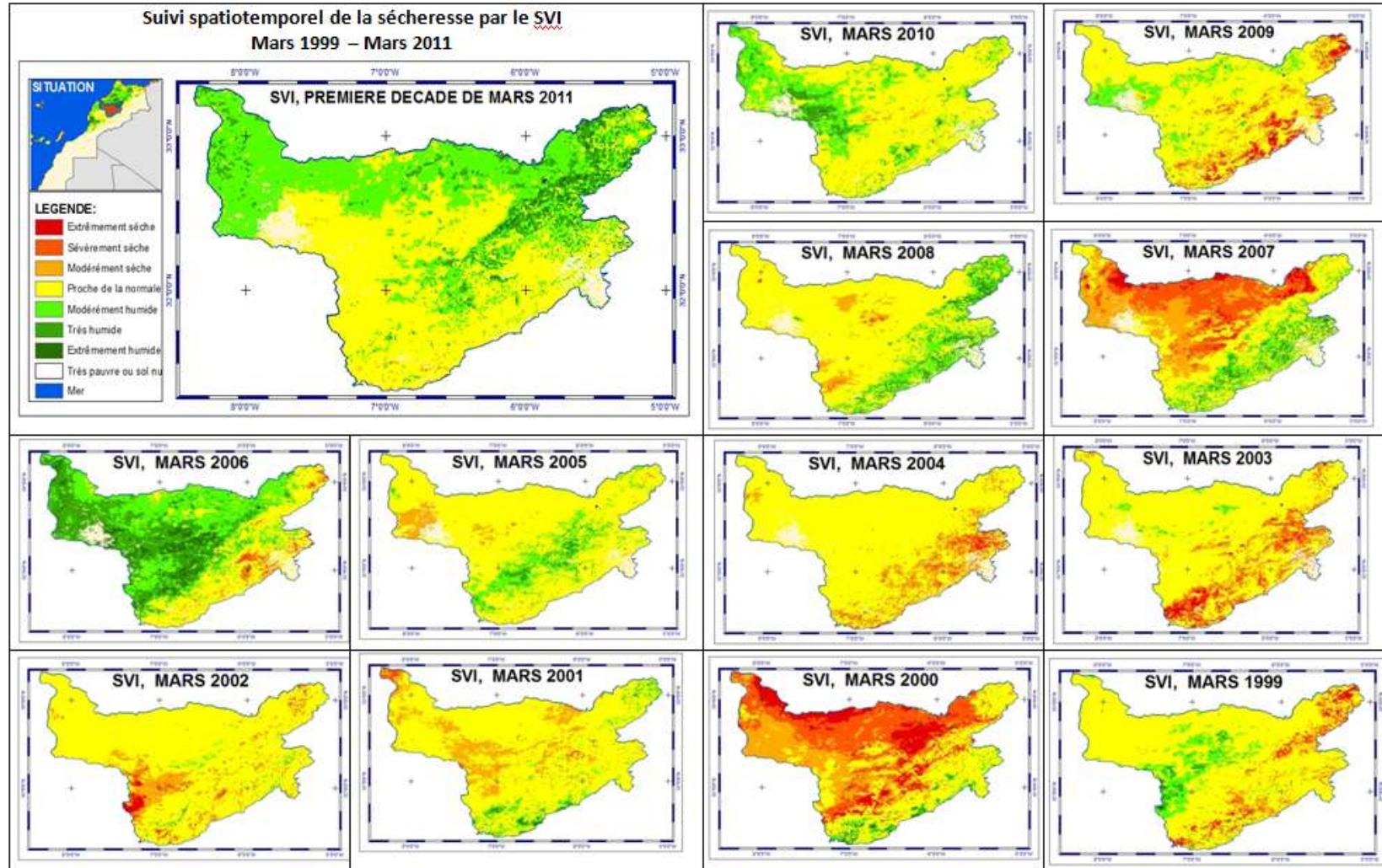
- NDVI
- NDWI (short-wave infrared)

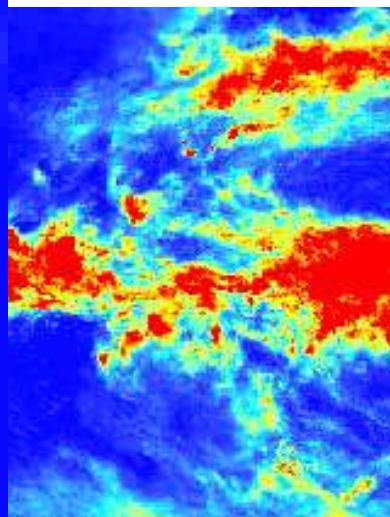
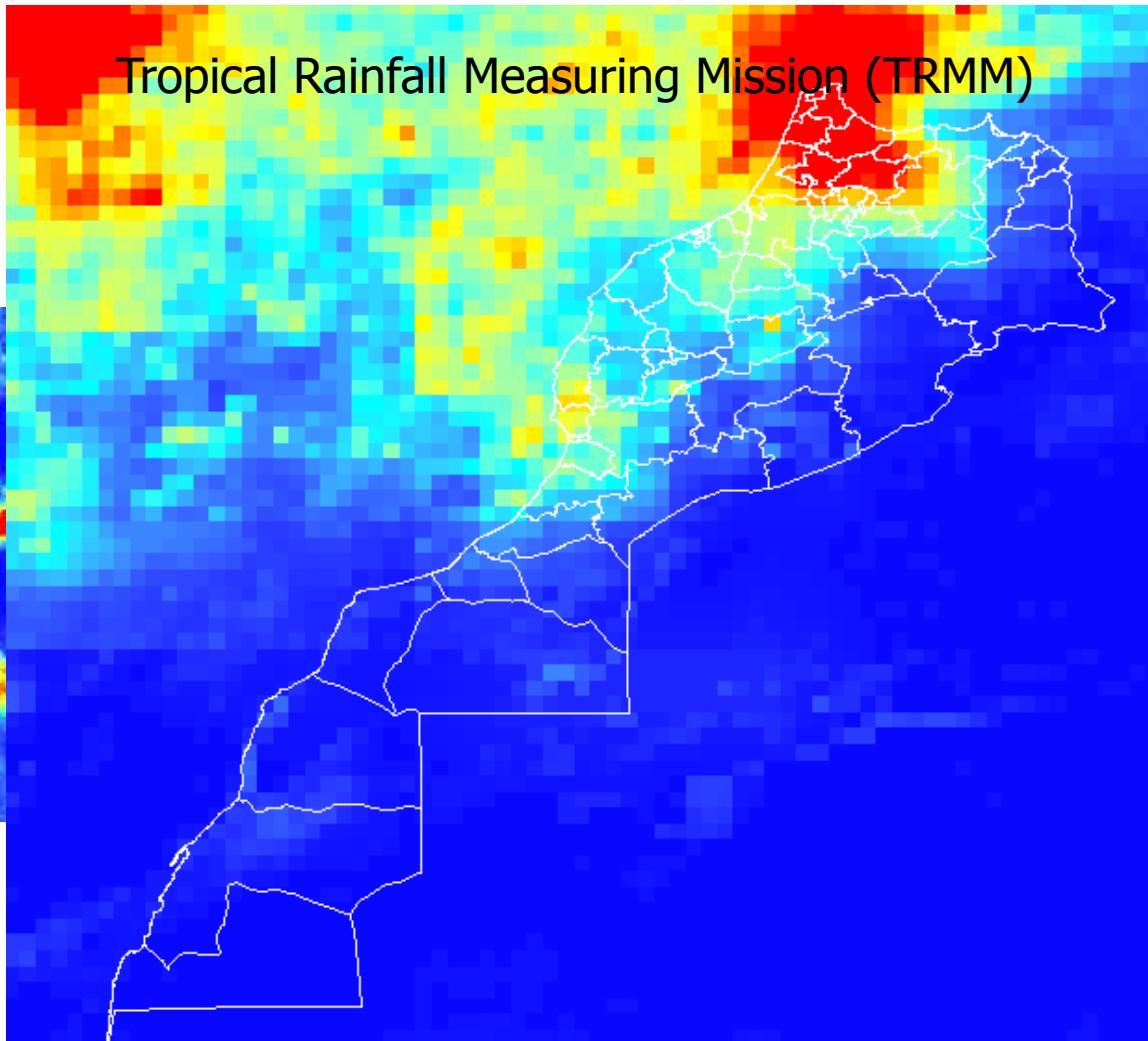
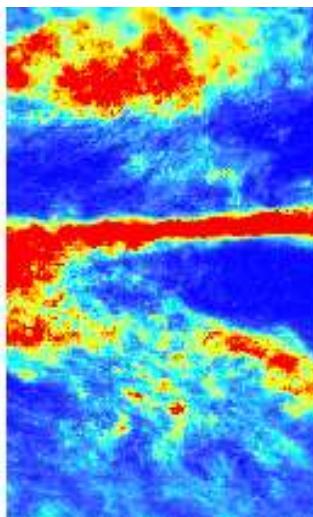
Mars 2007

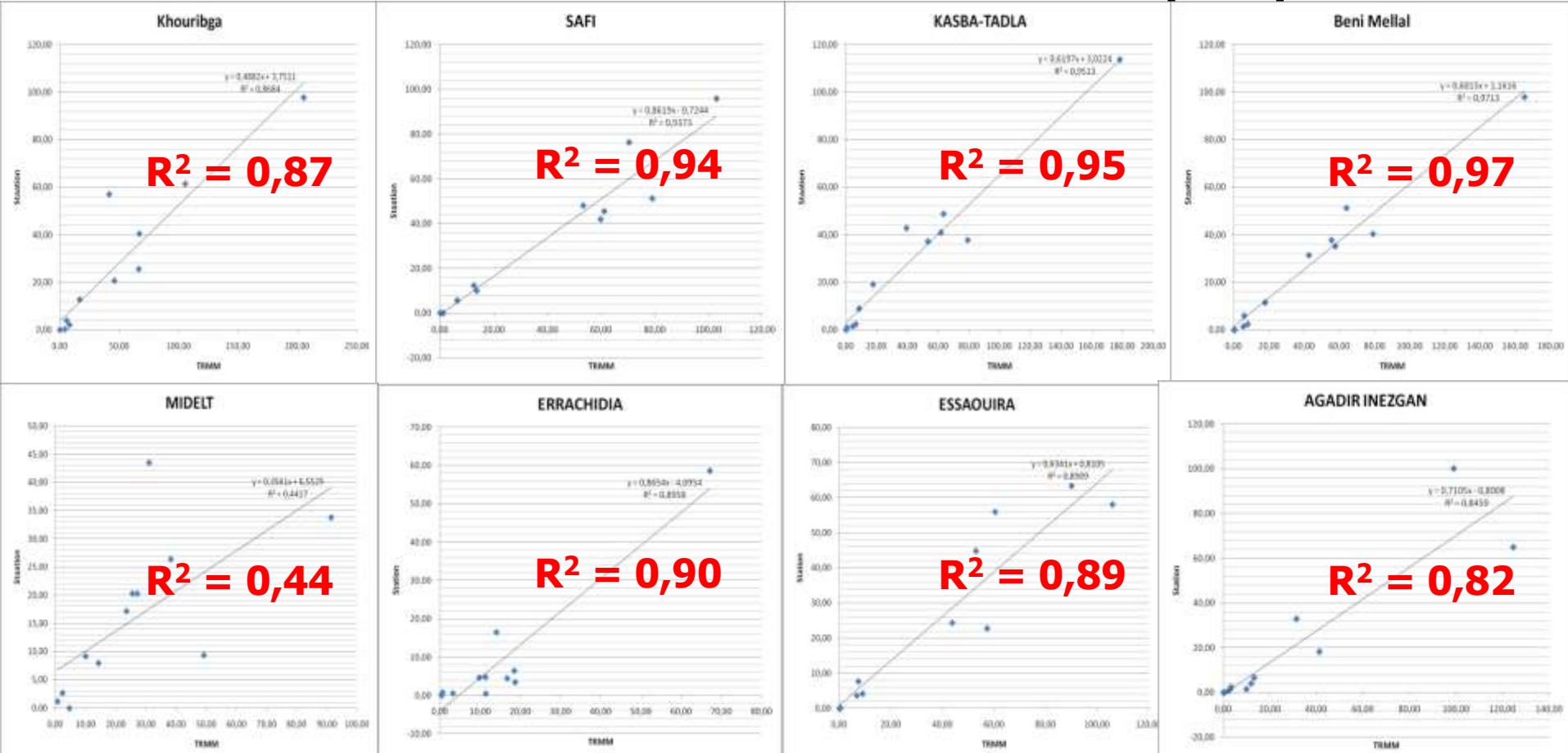


DROUGHT**Standardized Vegetation Index: Drought Monitoring**

Sea Cloud Very poor
0 - 0.05 Poor 0.05 à - 0.25 Average
0.25 à 0.75 Good 0.75 à 0.95 Very good
0.95 à 1 Very poor or
no vegetation

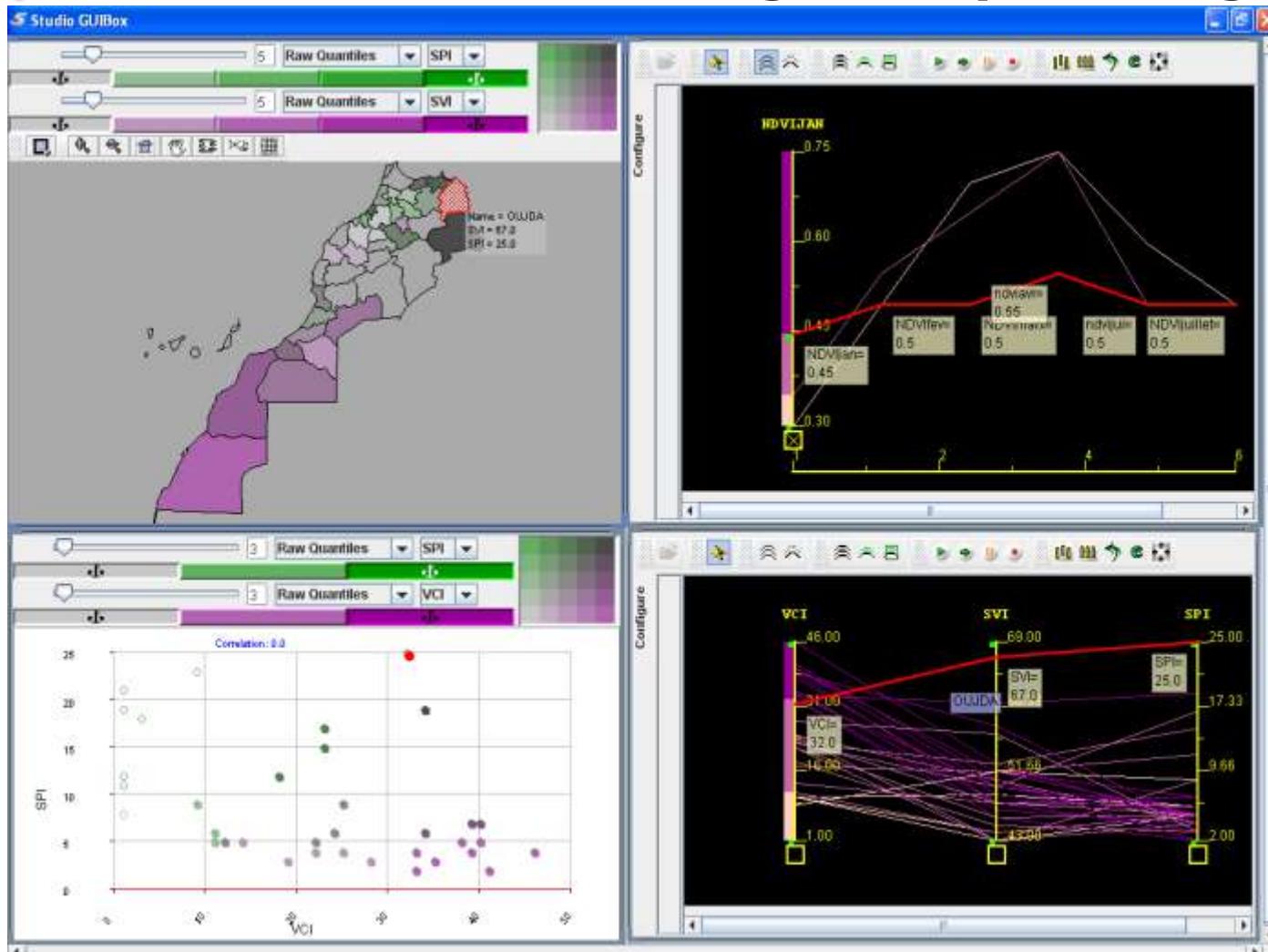
DROUGHT**Standardized Vegetation Index: Drought Monitoring**



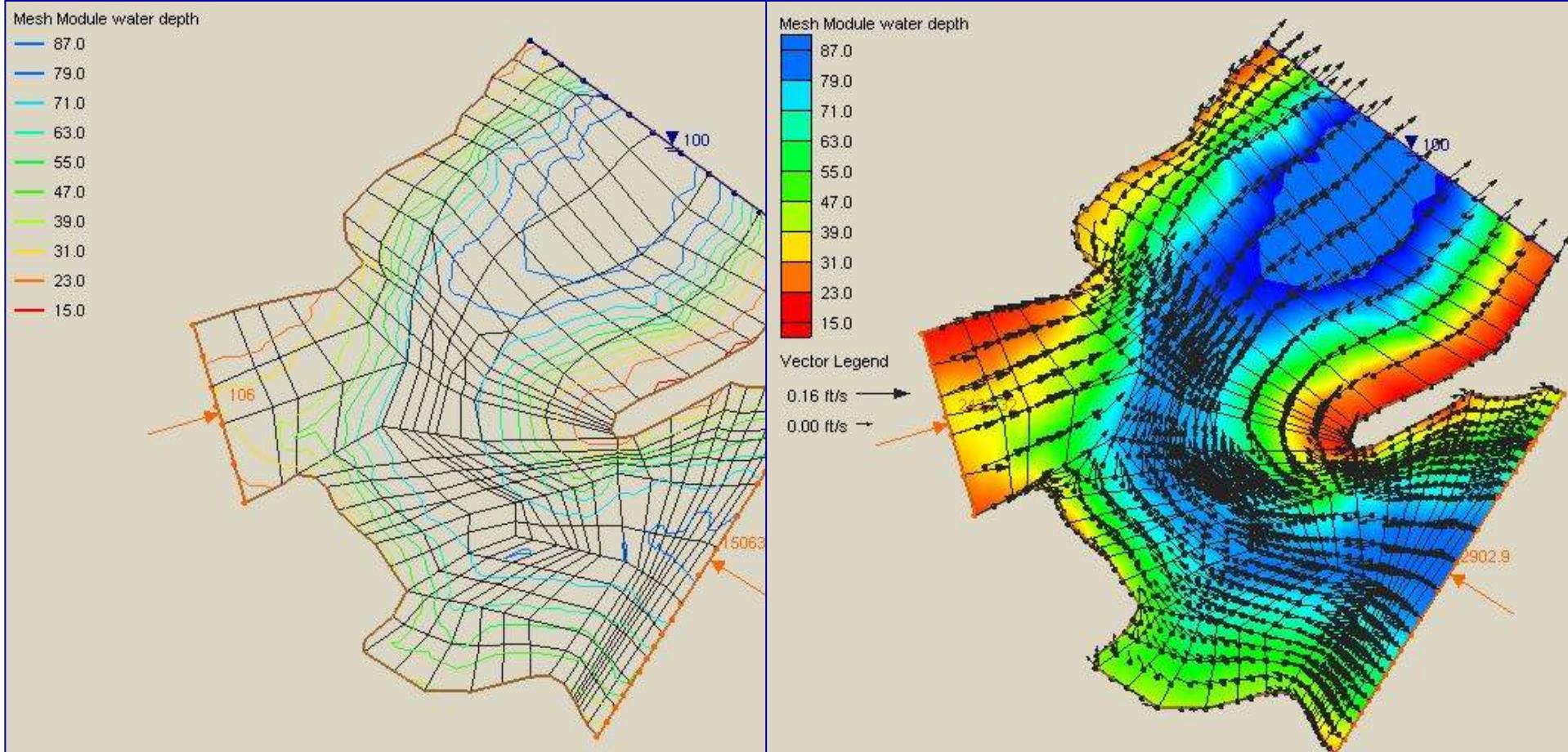
Correlation between TRMM and Ground station precipitation

DROUGHT

Drought Early Warning System



2012 UR Forum Mapping Global Risk

Pre-Disaster: Hazard Assessment

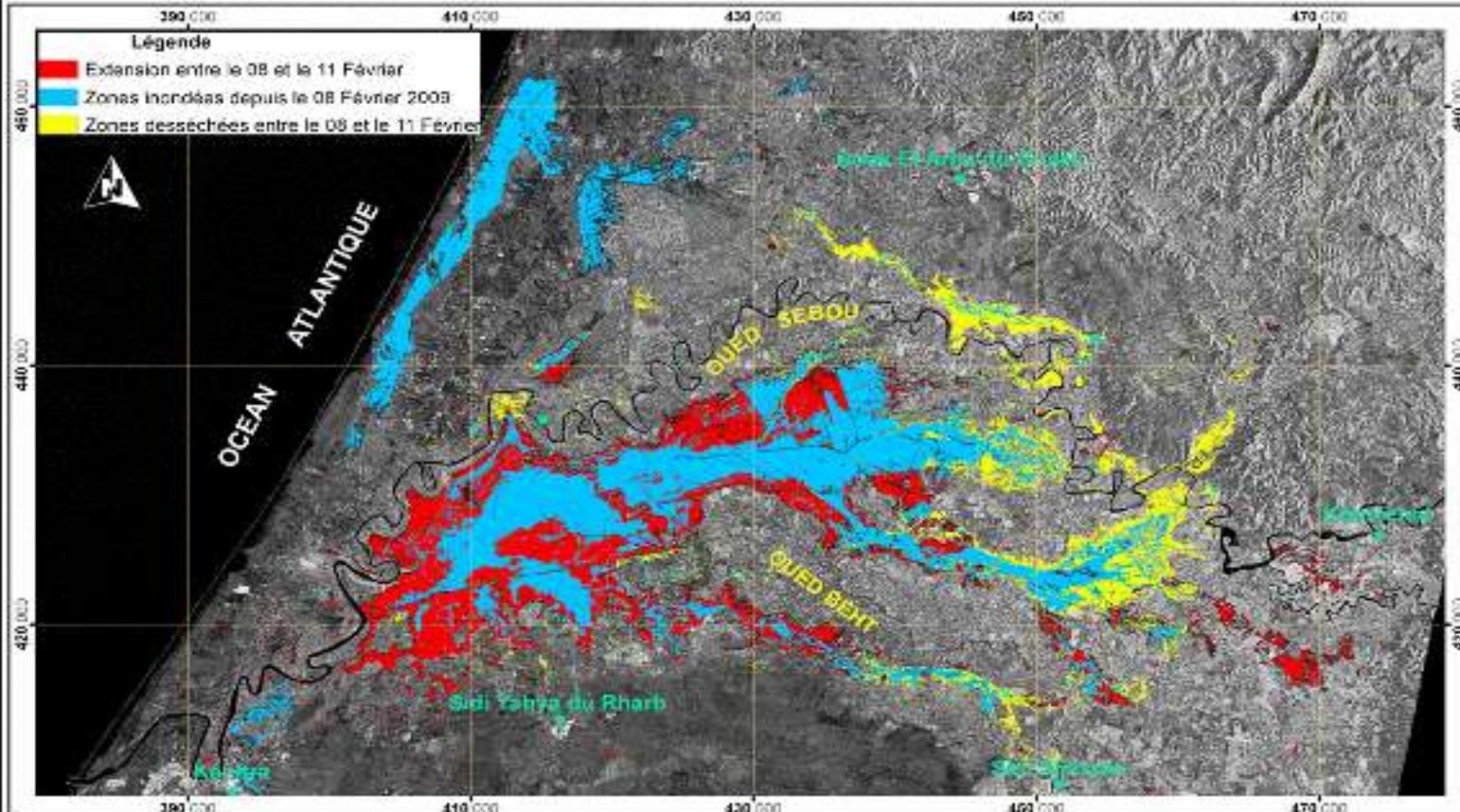
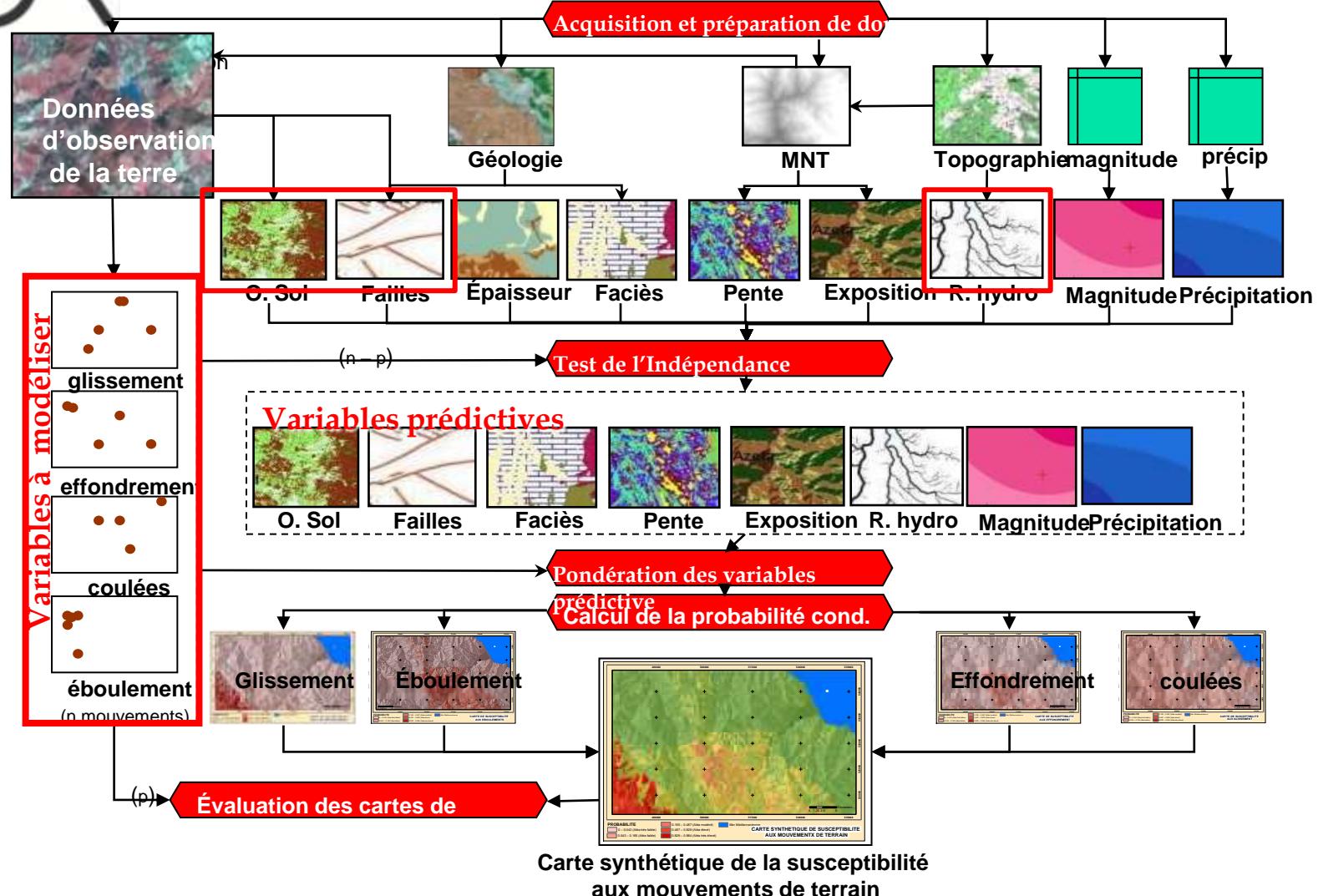
**ROYAUME DU MAROC - LA REGION DU GHARB- LES INONDATIONS DE FEVRIER 2009
EVOLUTION DES INONDATIONS ENTRE LE 08 ET LE 11 FEVRIER 2009****PRODUIT:**

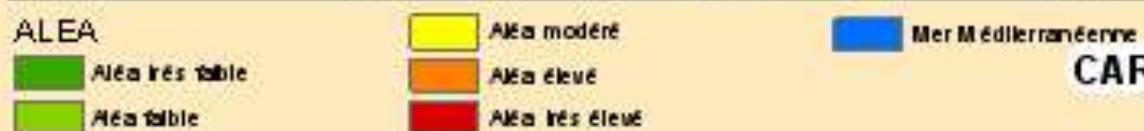
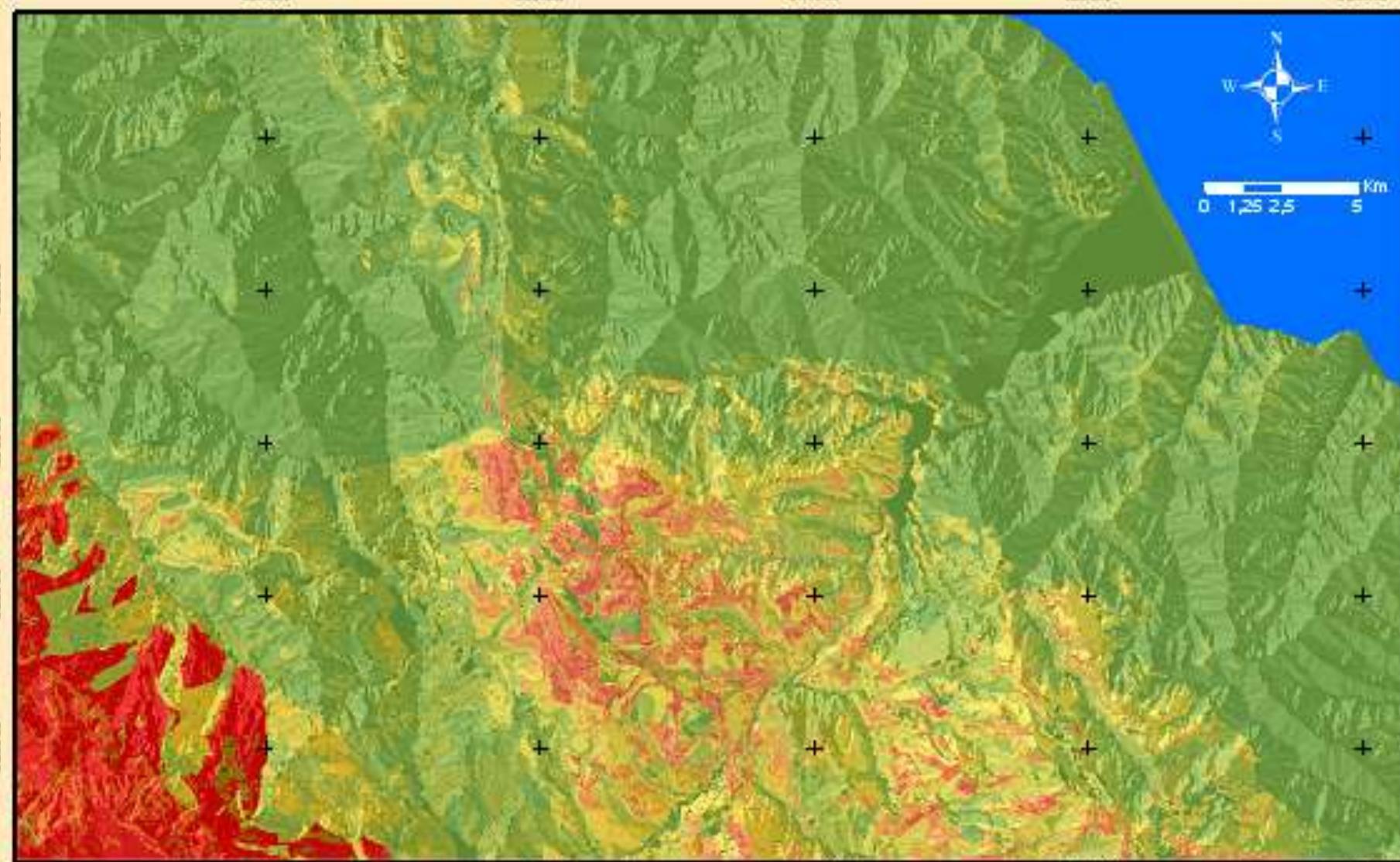
Image TerraSAR-X, mode ScanSar
Image Spot, 2.5 m de résolution
Acquisitions du 08 et 11 Février 2009
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Elaboré par le CRTS, Maroc le 12.02.2009



Charte Internationale: Espace
et catastrophes majeures
Call id: 242







**CARTE SYNTHETIQUE DE SUSCEPTIBILITE
AUX MOUVEMENTS DE TERRAIN**

Thank you



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