NEO

For earth observation

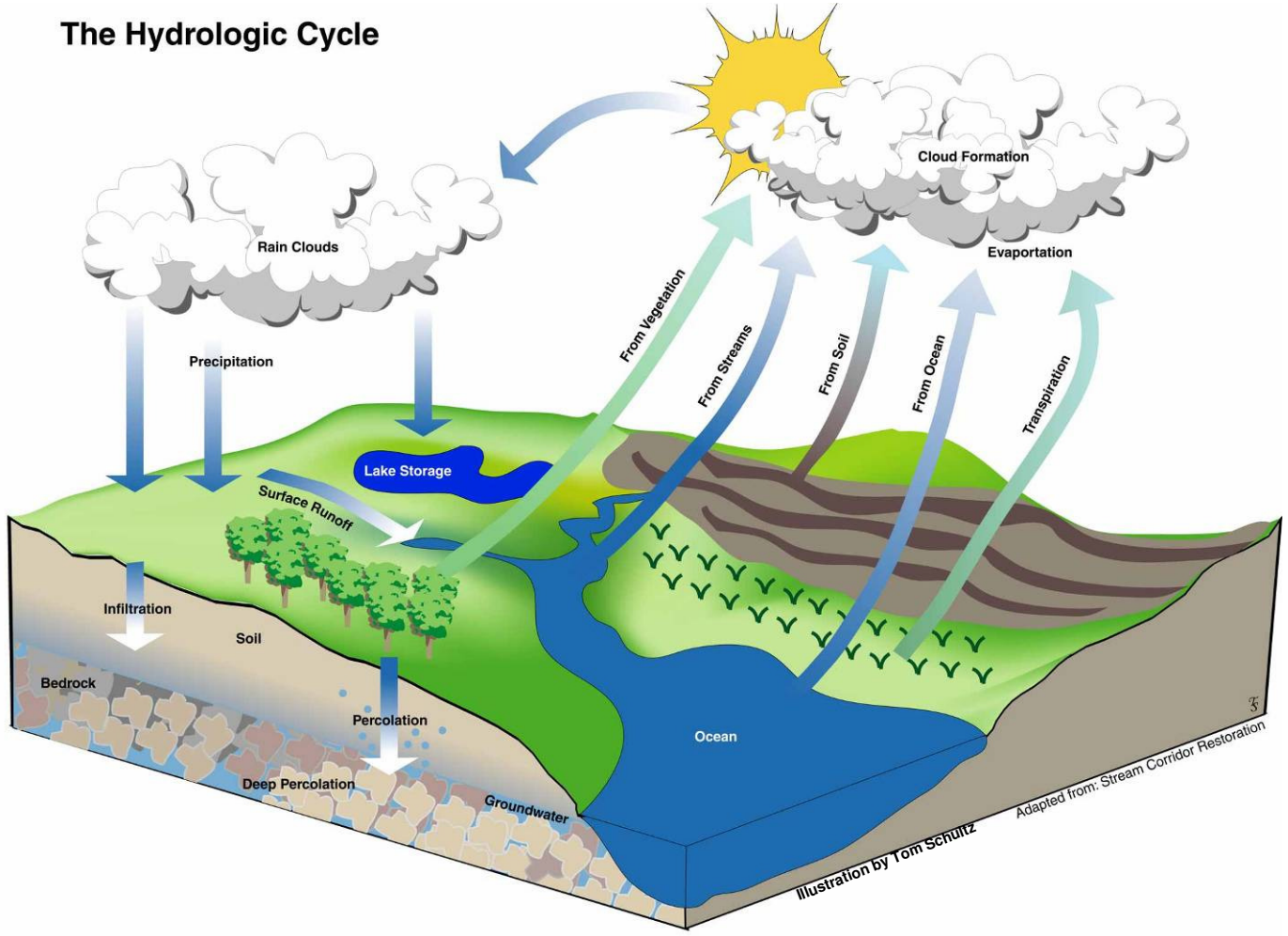
The use of operational near real time ASCAT surface soil moisture

Remko de Lange

Presentation overview :

1. Why soil moisture?
2. EUMETSAT surface soil moisture (< 5 cm)
3. DRYMON profile soil moisture (~ 100 cm)
4. Applications
5. Conclusions

1. Why soil moisture?



1. Why soil moisture?

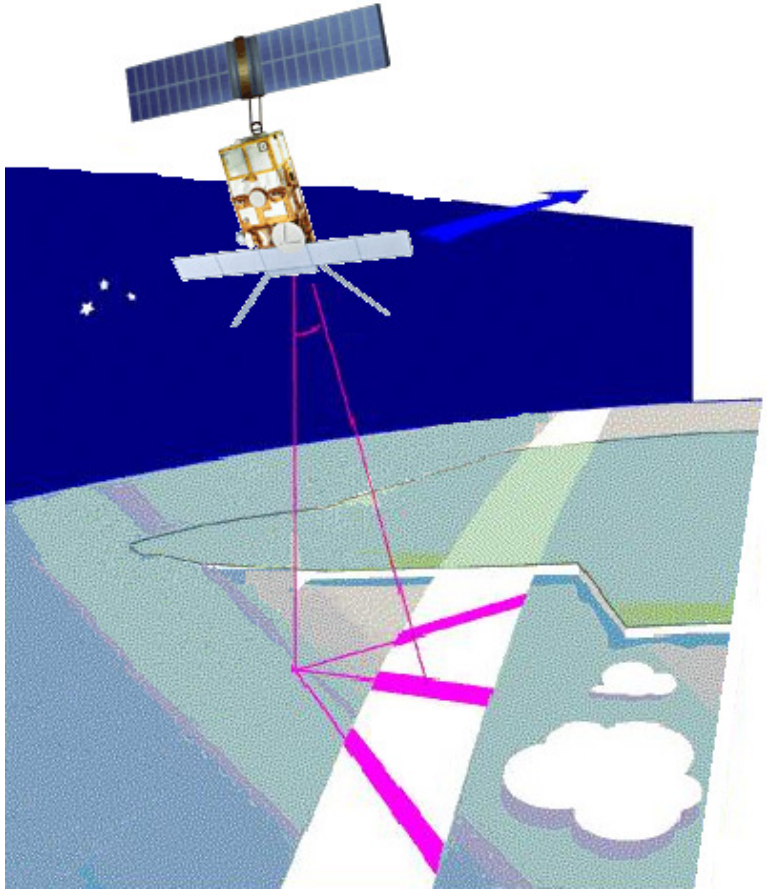
Meteorological Drought

→ Soil water Drought

→ Hydrological Drought

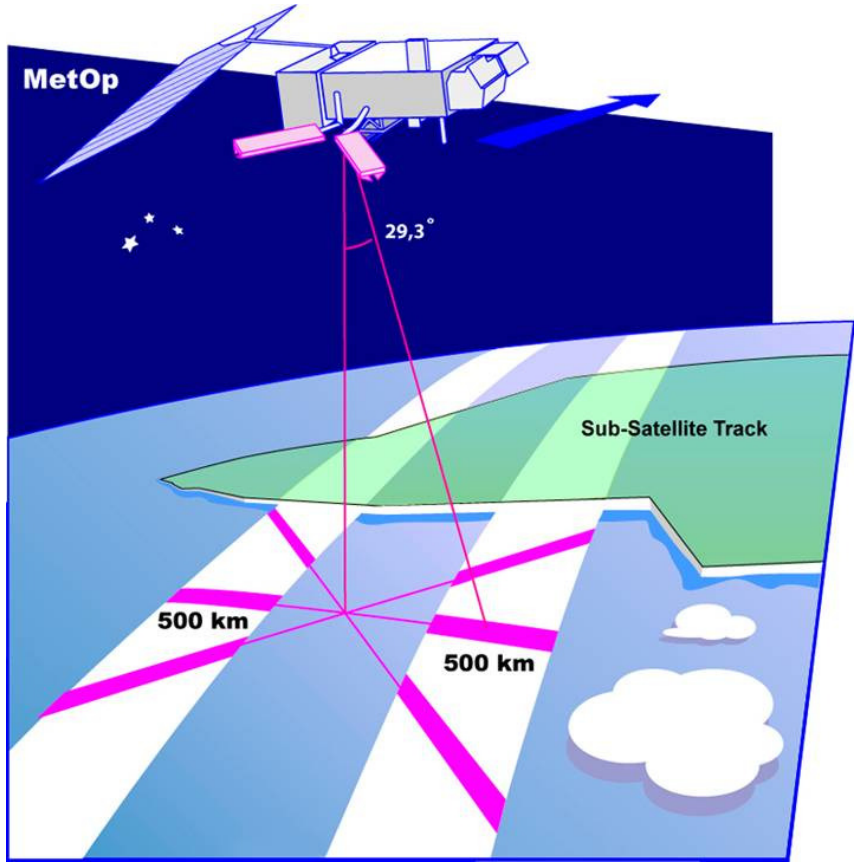
2. EUMETSAT surface soil moisture

- ERS-1: 1991 - 1996
- ERS-2: 1995 – 2009...



- Resolution 50 / (25) km
- Daily global coverage: ~ 40%

- MetOp: 2006 - 2020



- Resolution 25 km
- Daily global coverage: ~ 80%

2. EUMETSAT surface soil moisture

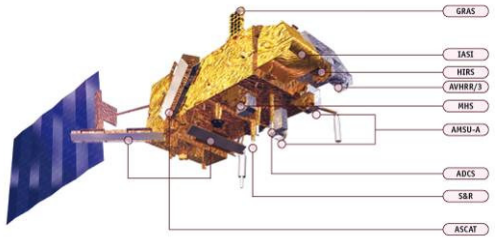
METOP/ASCAT: C-band radar
(weather & sun radiation independent)

Backscatter influenced by :

- topography (diffuse/specular scattering)
- vegetation (volume scattering)
- water (specular scattering)

Backscattering from the upper few centimeters

No soil moisture detection: rain forest, desert, snow, mountains



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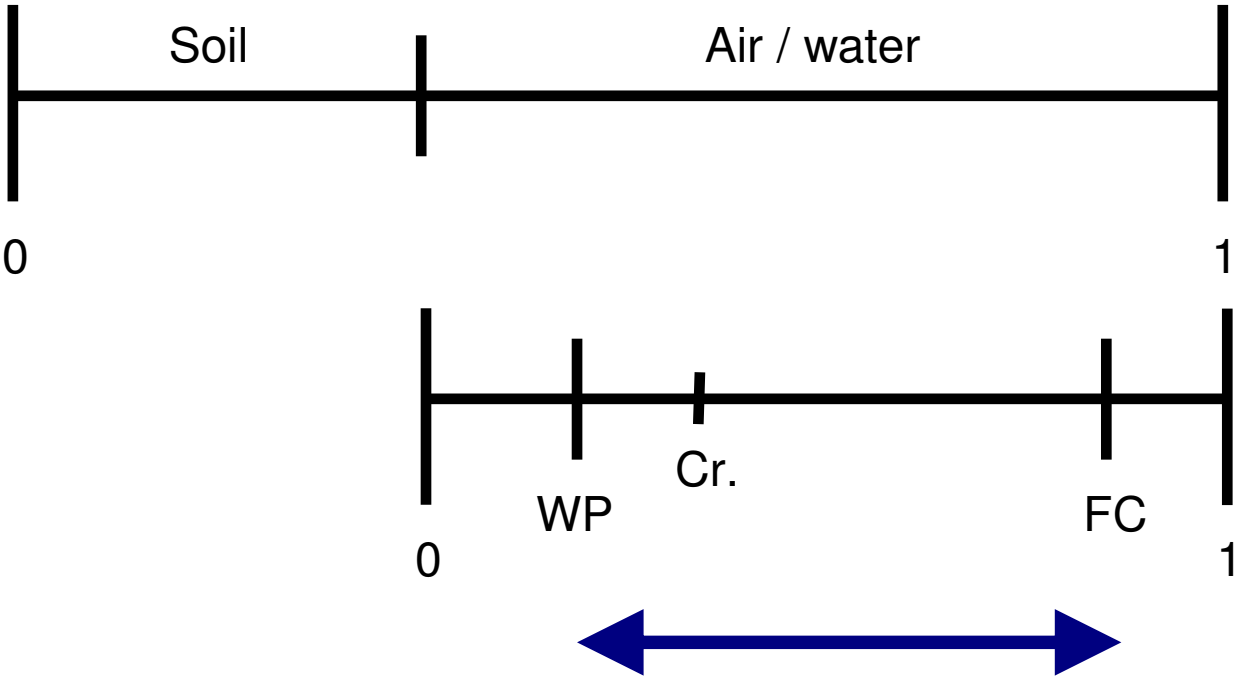

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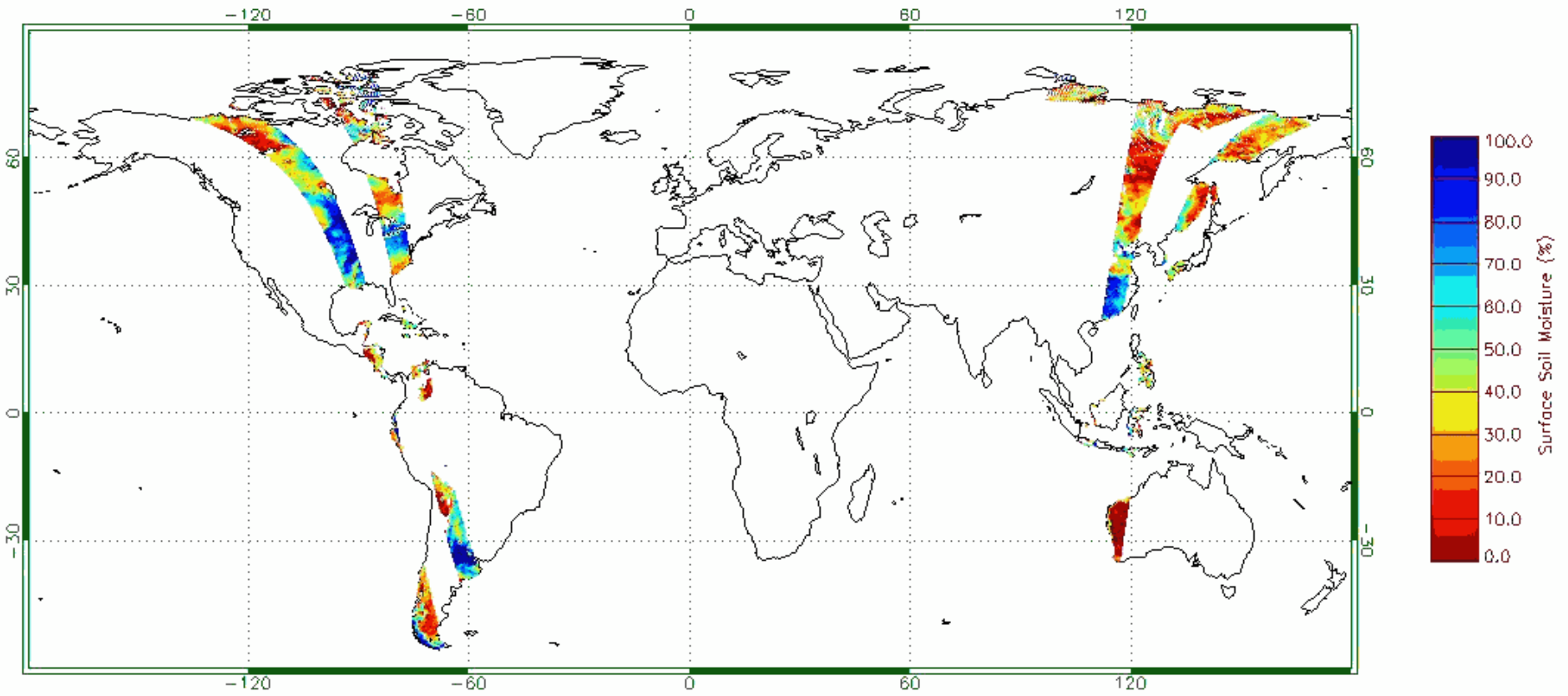


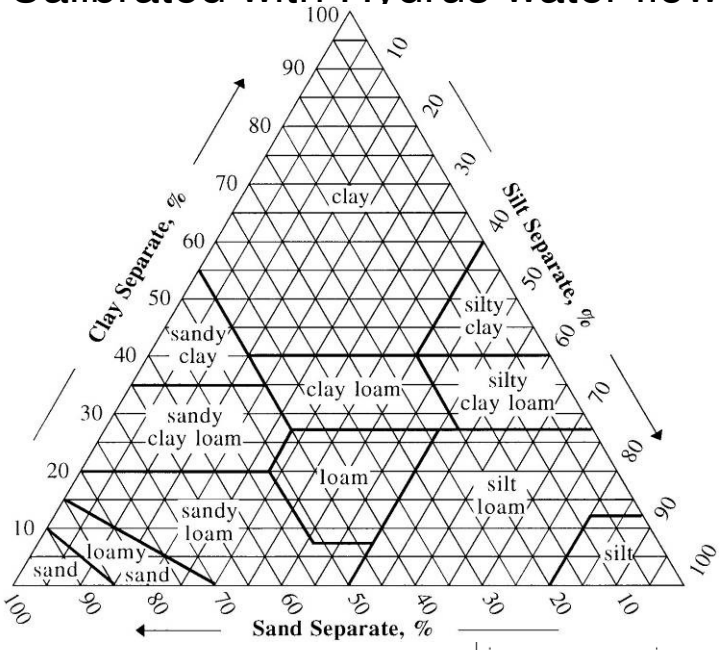
28 March 2007: 12 orbits

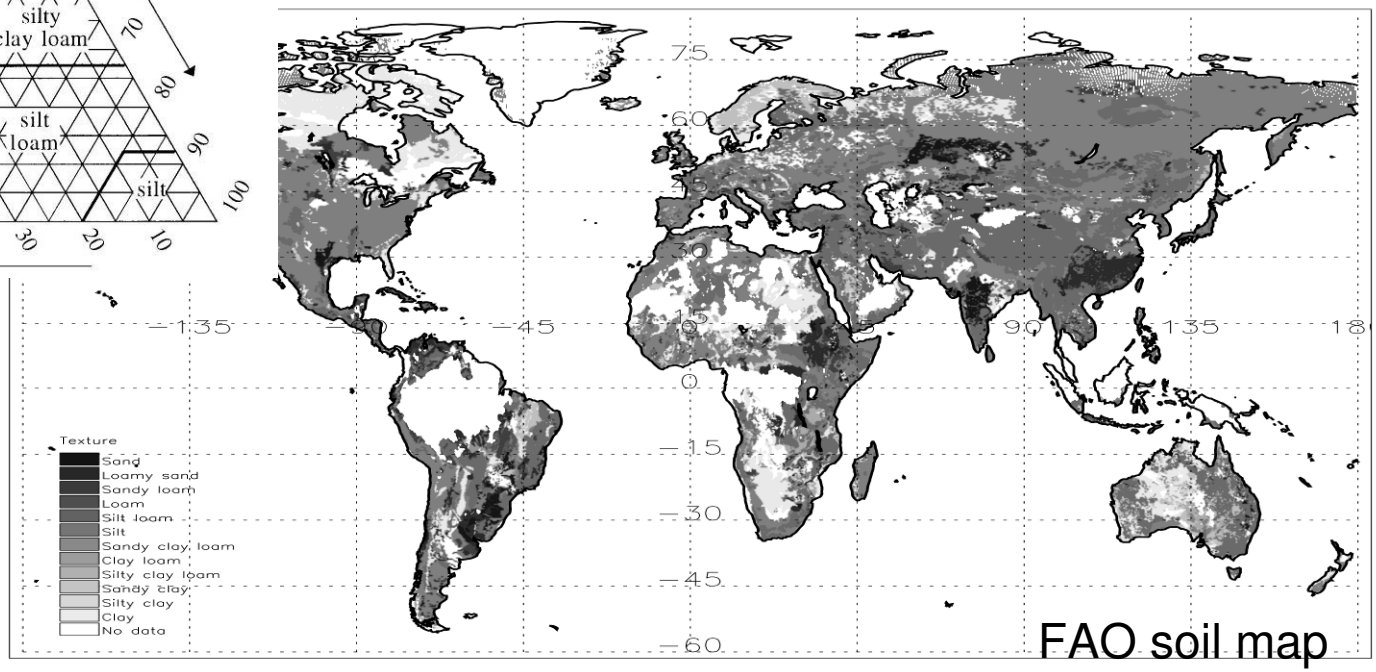
3. DRYMON profile soil moisture

From <u>surface</u> soil moisture to <u>profile</u> soil moisture:

DRYMON Soil Water Index:

Geographical differentiation on soil characteristics Texture
Calibrated with Hydrus water flow model

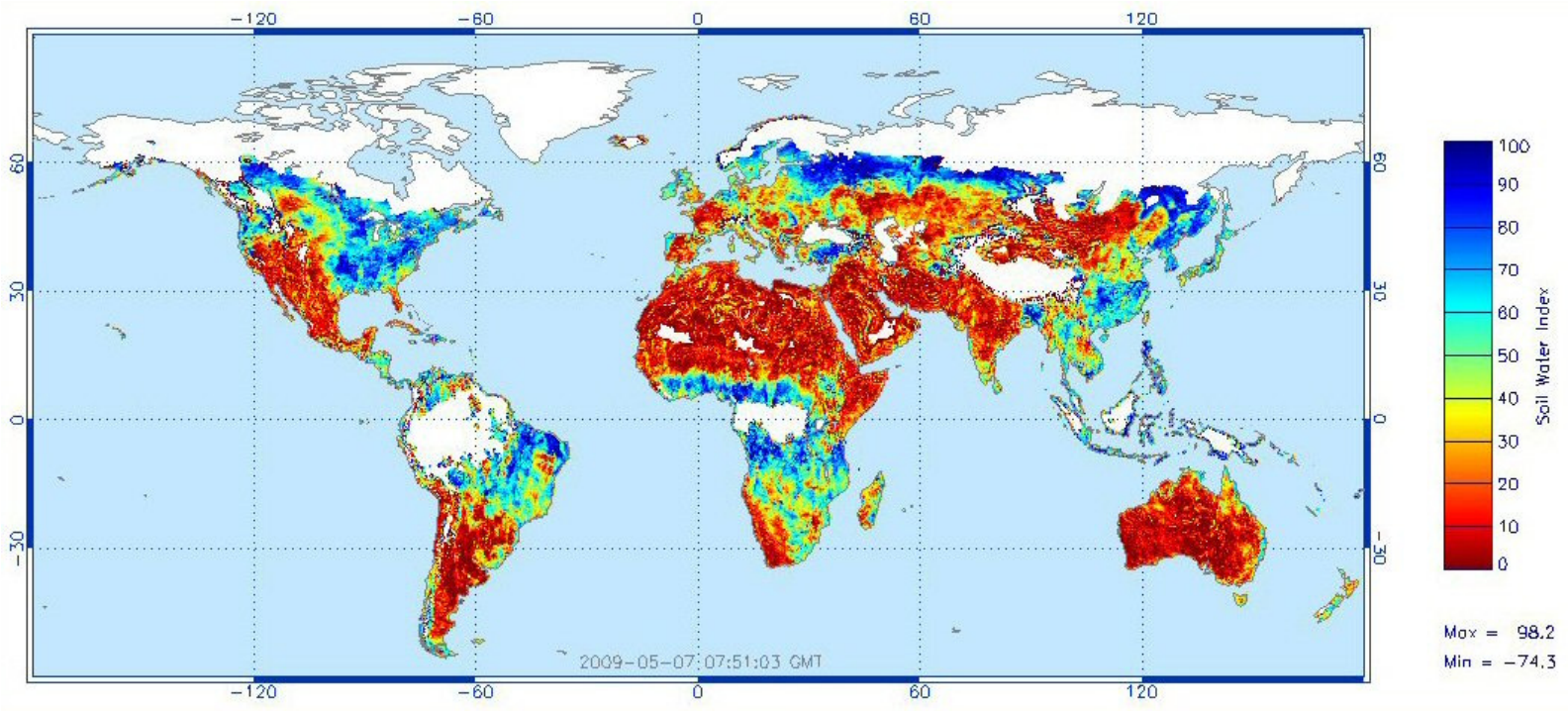




FAO soil map

3. DRYMON profile soil moisture

DRYMON profile soil moisture

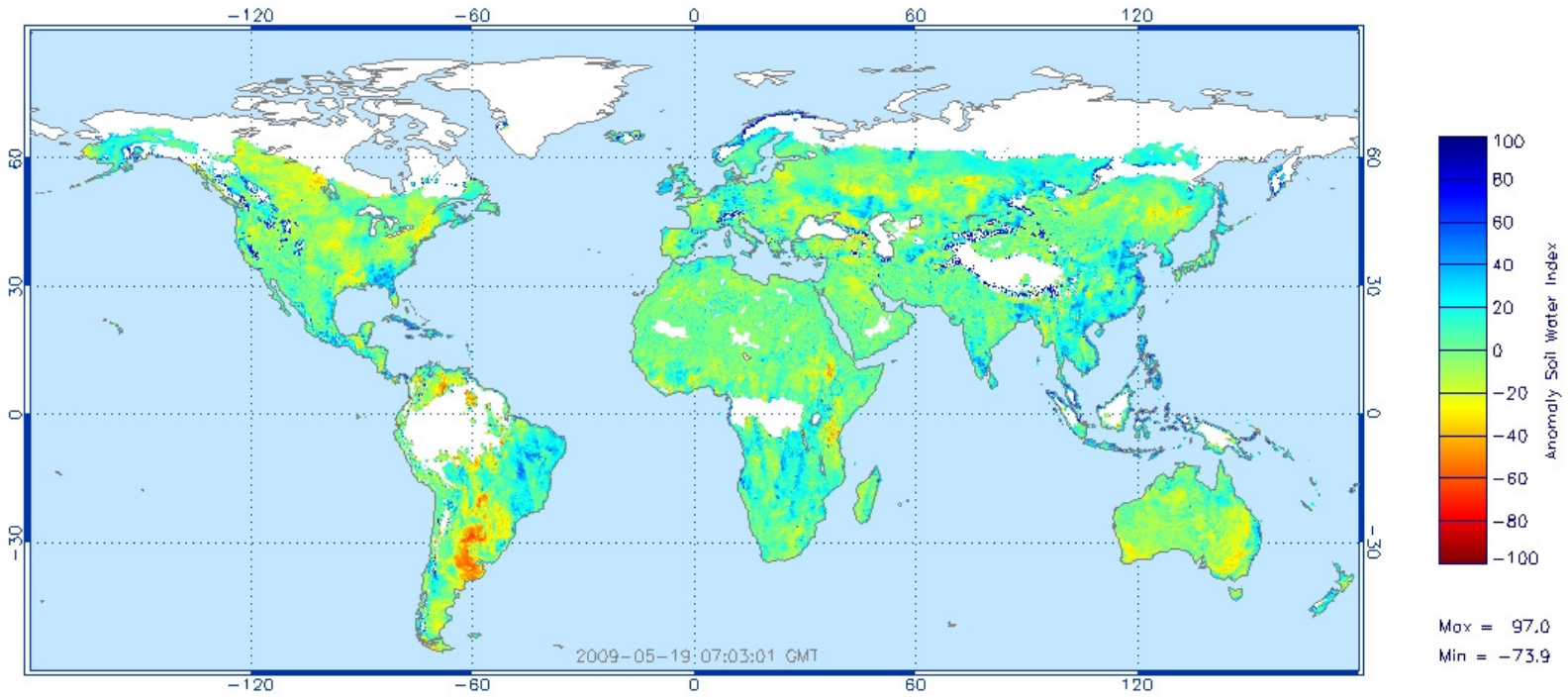


7 May 2009

Daily produced
Fixed grid: 12.5 km spacing
Differentiated on soil characteristics
Adapted for snow conditions

3. DRYMON profile soil moisture

DRYMON profile soil moisture anomaly – difference with 15 yr average

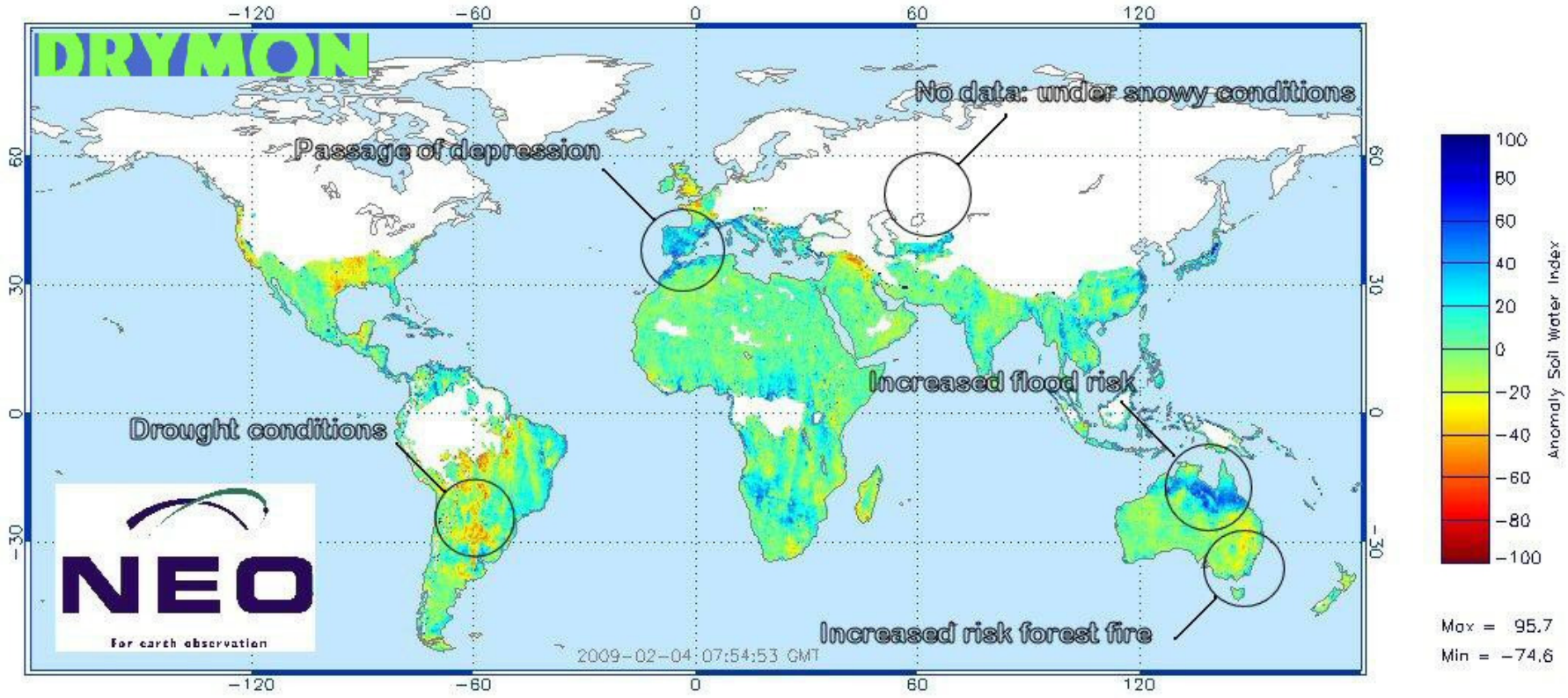


19 May 2009

Fixed grid: 12.5 km specing
Anomaly from 15 yr average

Soil moisture for Water Resource Management

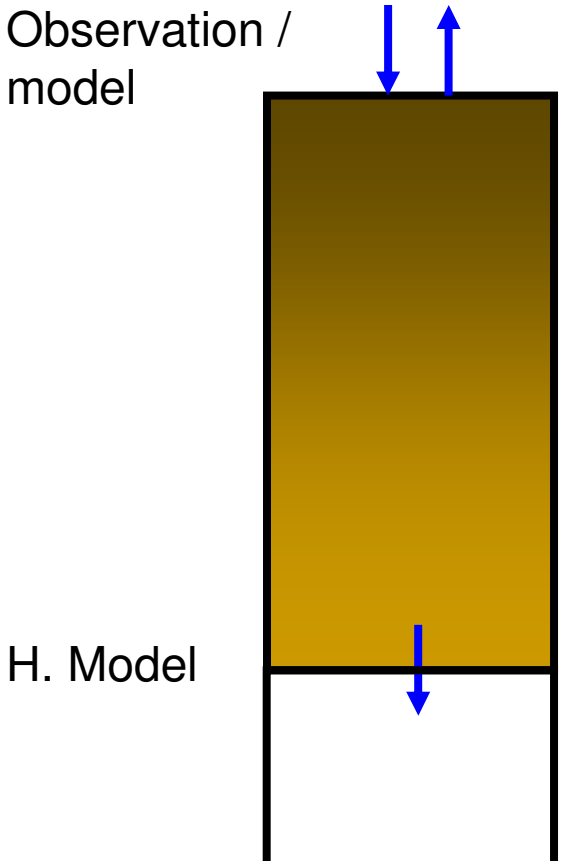
- **Visual impact**



4 February 2009

Soil moisture for Water Resource Management

- **Connect with hydrological models:** input data over the upper layer (1 meter)



Soil moisture for Water Resource Management

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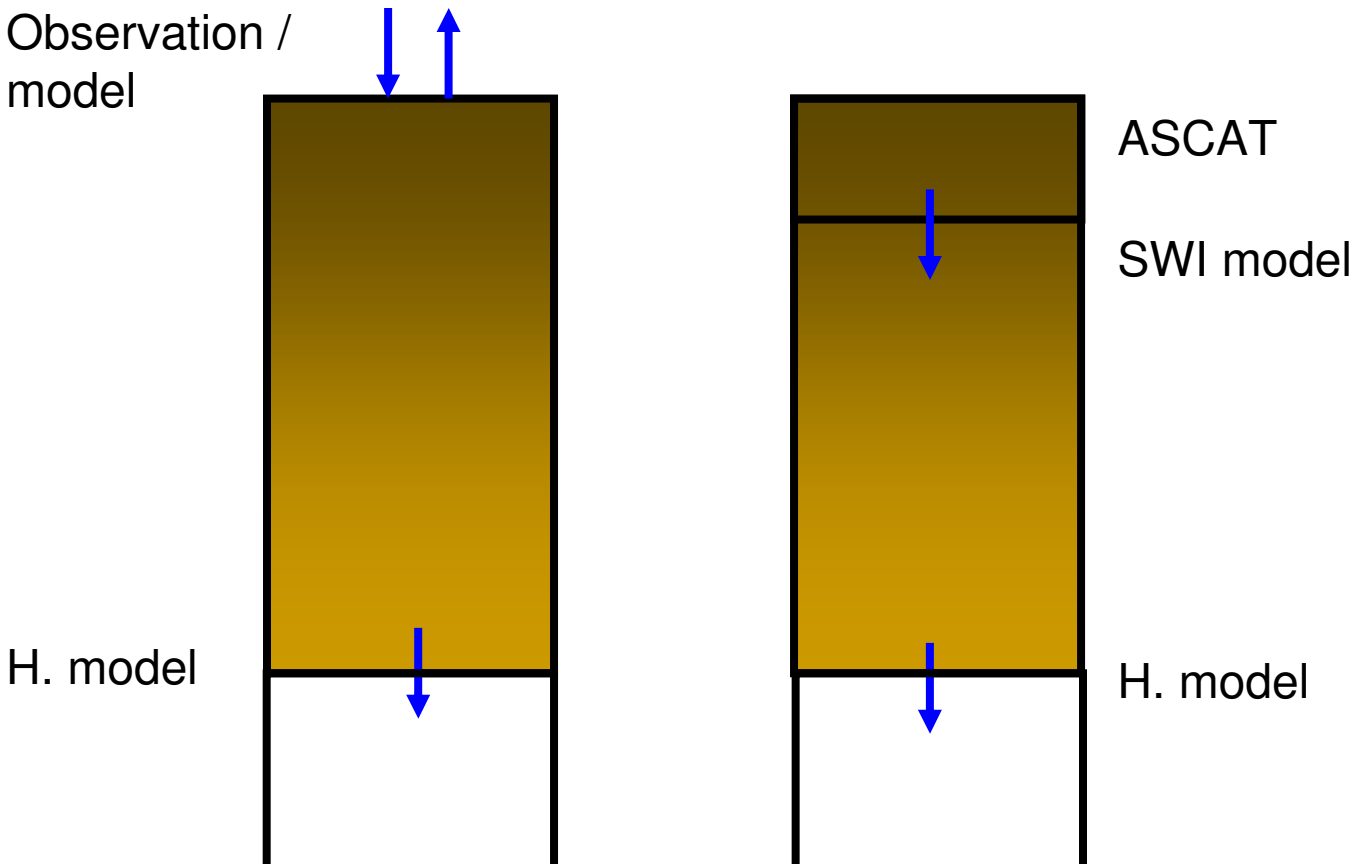

Soil moisture for Water Resource Management

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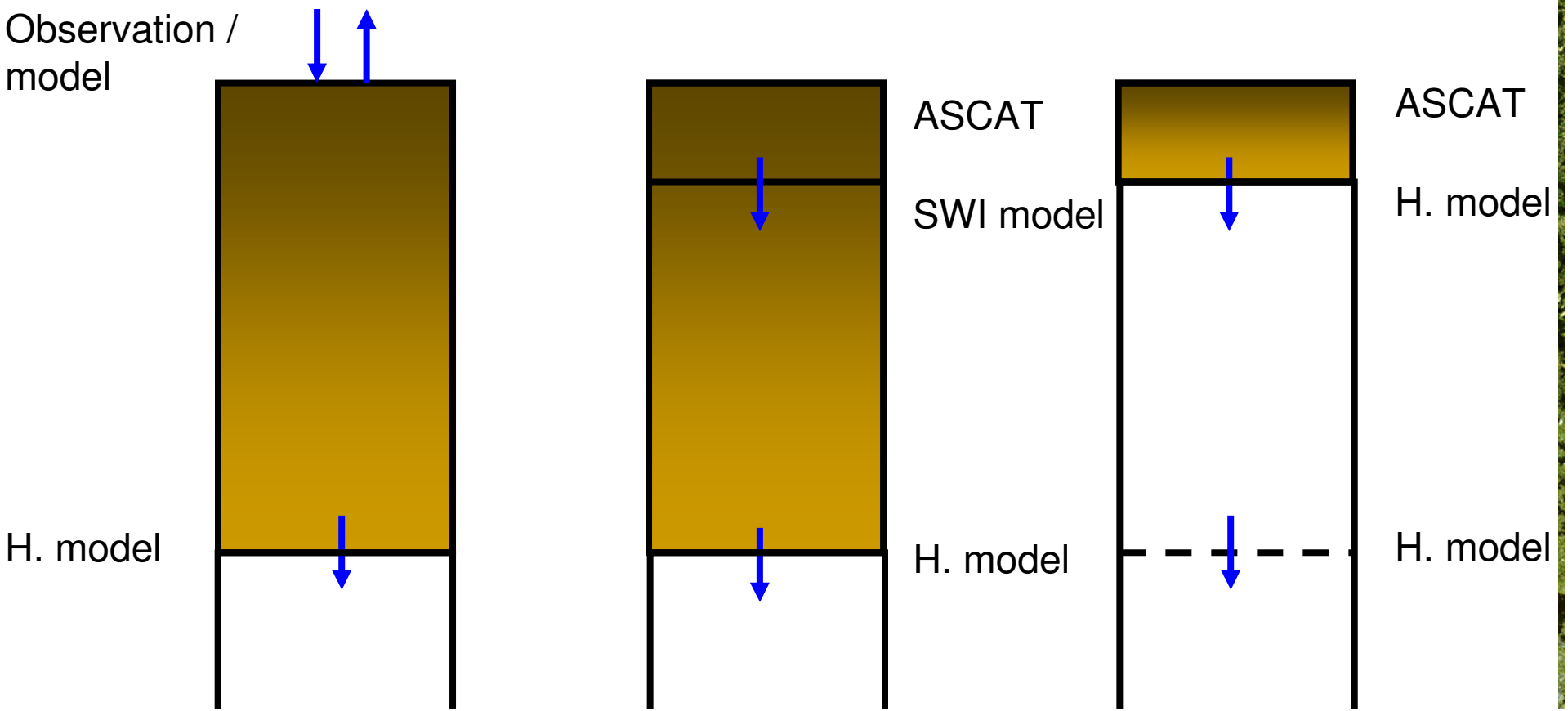

Soil moisture for Water Resource Management

• Model approach and Empirical relation with river discharge (West Africa)

1. ERS data contains valuable information on soil moisture, and can improve our knowledge of hydrological states in West Africa.

2. For a simple impulse response model, ERS-soil moisture estimates improve runoff predictions in West Africa.

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Technische Universiteit Delft

M. Rutten
N. Van de Giesen

DRYMON

Soil moisture for Water Resource Management

- **In The Netherlands**

Water boards:

- temporal resolution: OK
- spatial resolution: not OK

How to improve spatial resolution?

Soil moisture for Water Resource Management

- **In The Netherlands**

How to improve spatial resolution? By:

1. Combining ASCAT soil moisture with ASAR -> 1 km product

2. Redistribute soil moisture, index based: by means of relationships with: e.g. altitude (AHN2), evaporation, temperature

Conclusions

- Soil moisture products guaranteed for coming 15 years, with MetOp

- (Multi) daily soil moisture products available:
  - Daily profile soil moisture, fixed grid
  - Daily anomalous profile soil moisture, fixed grid
  - Daily profile soil moisture error, fixed grid
  - Surface soil moisture, fixed grid

- Many possible fields that can benefit from direct soil moisture observations:
  - water management & drought monitoring
  - crop yield forecast & early warnings
  - meteorology, weather forecasting
  - ..

Thank you !

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