Studio Anne Holtrop

ETH Zürich

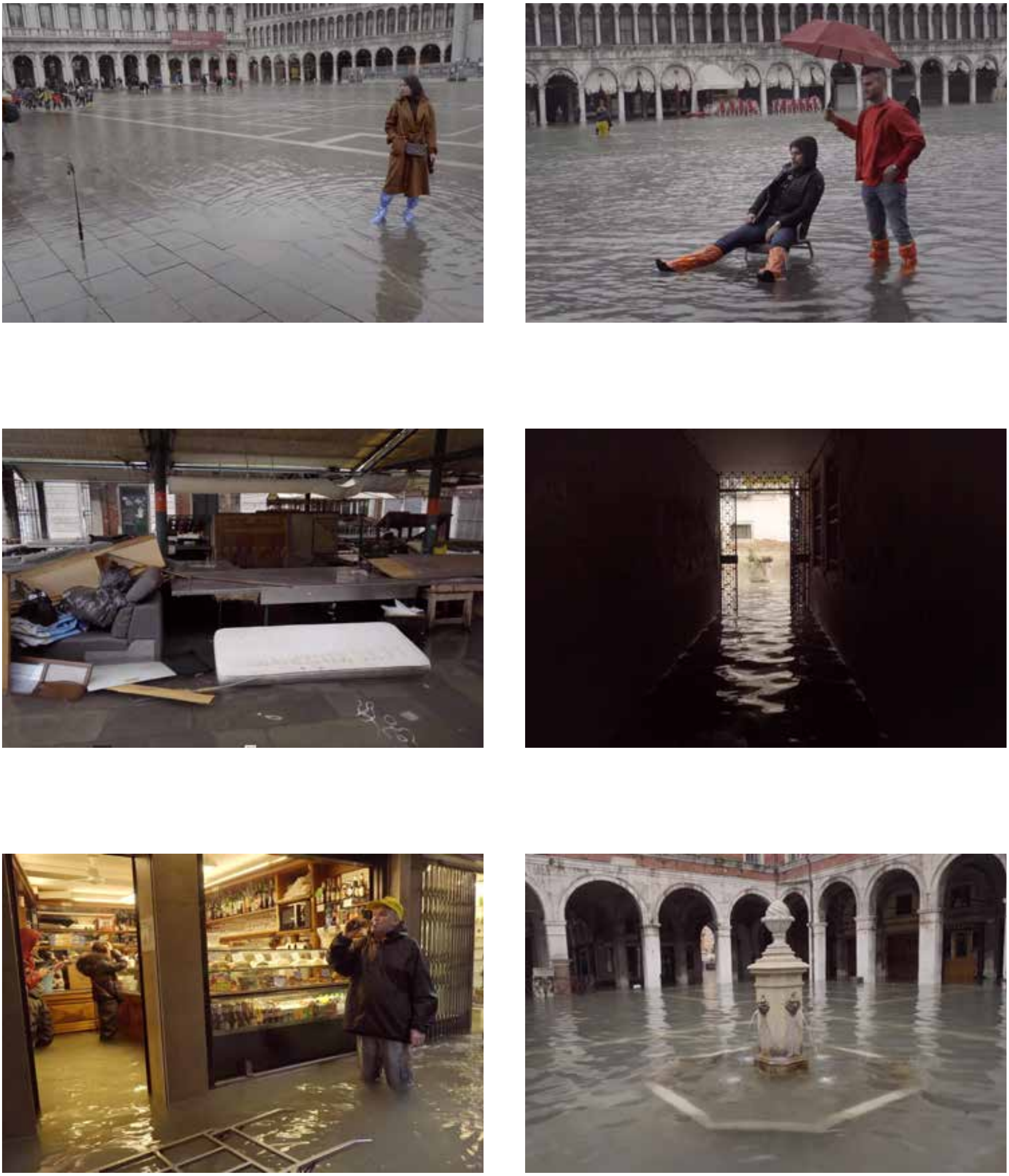
MATERIAL GESTURE:

CHANGE

design studio **HS21**

Towards Hydroscopic Design

Olafur Eliasson, Riverbed, 2014. Water, blue basalt, basalt, lava, stone, wood, steel, foil, hose, pumps, cooling unit. Installation view: Louisiana Museum of Modern Art, Humlebæk, Denmark, 2014. Photo: Anders Sune Berg. Courtesy of the artist; neugerriemschneider, Berlin; Tanya Bonakdar Gallery, New York / Los Angeles. © 2014 Olafur Eliasson



Beka & Lemoine, HOMO URBANUS VENETIANUS, Venice, Italy, 1 hr, 2020

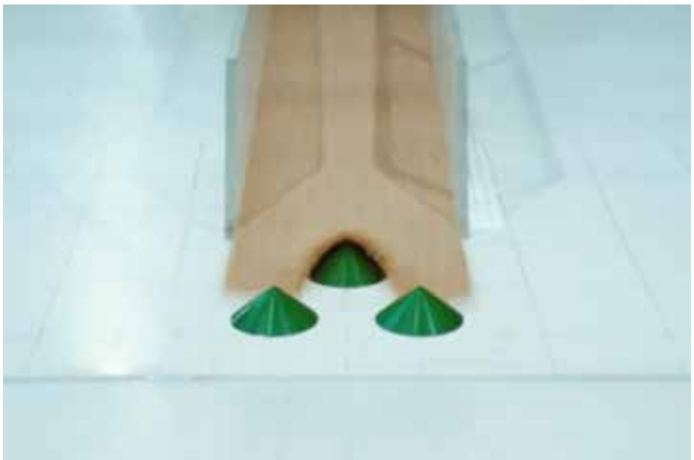





Aurelio Galfetti, RENOVATION OF CASTELGRANDE, Bellinzona,

Switzerland, 1981

Peter Zumthor, 7132 THERMAL BATHS (Water Source), Vals, Switzerland, 1996




University Center for Hydrogeological Risks in Mountain Areas, Trento, Italy


Meteorological Alps model, EPFL, Switzerland

Covering the Pitztaler Glacier, Austria, in this scene workers cover the glacier with a white fleece to protect it from melting.

Transhumance, Similaun Glacier, Austria

Switzerland aims to replace the existing nuclear generation capacity with predominantly renewable resources by the year 2050.
Wind power could play a significant role in this transition, yet the wind resource in the mountainous terrain that makes up most of the country is poorly understood. Therefore the EPFL created an Alps model to assess and simulate wind speeds over the Alps. This same model is then used to calculate the wind turbine capacity that is required to produce significant amounts of wind power.
Transhumance is a type of pastoralism or nomadism, a seasonal movement of livestock between fixed summer and winter pastures. The traditional farmer or shepherd is seen here to have a generational rootedness and knowledge in the landscape, their hands and herding movements work to gently engineer the earth. These ancient practices are now adapting to climate change.

Armin Linke, ALPI, 60 mins, 2011, Editor Giuseppe Lelasi

Studio Mumbai, COPPER HOUSE II, Chondi, India, 2014

vimeo.com/53087257

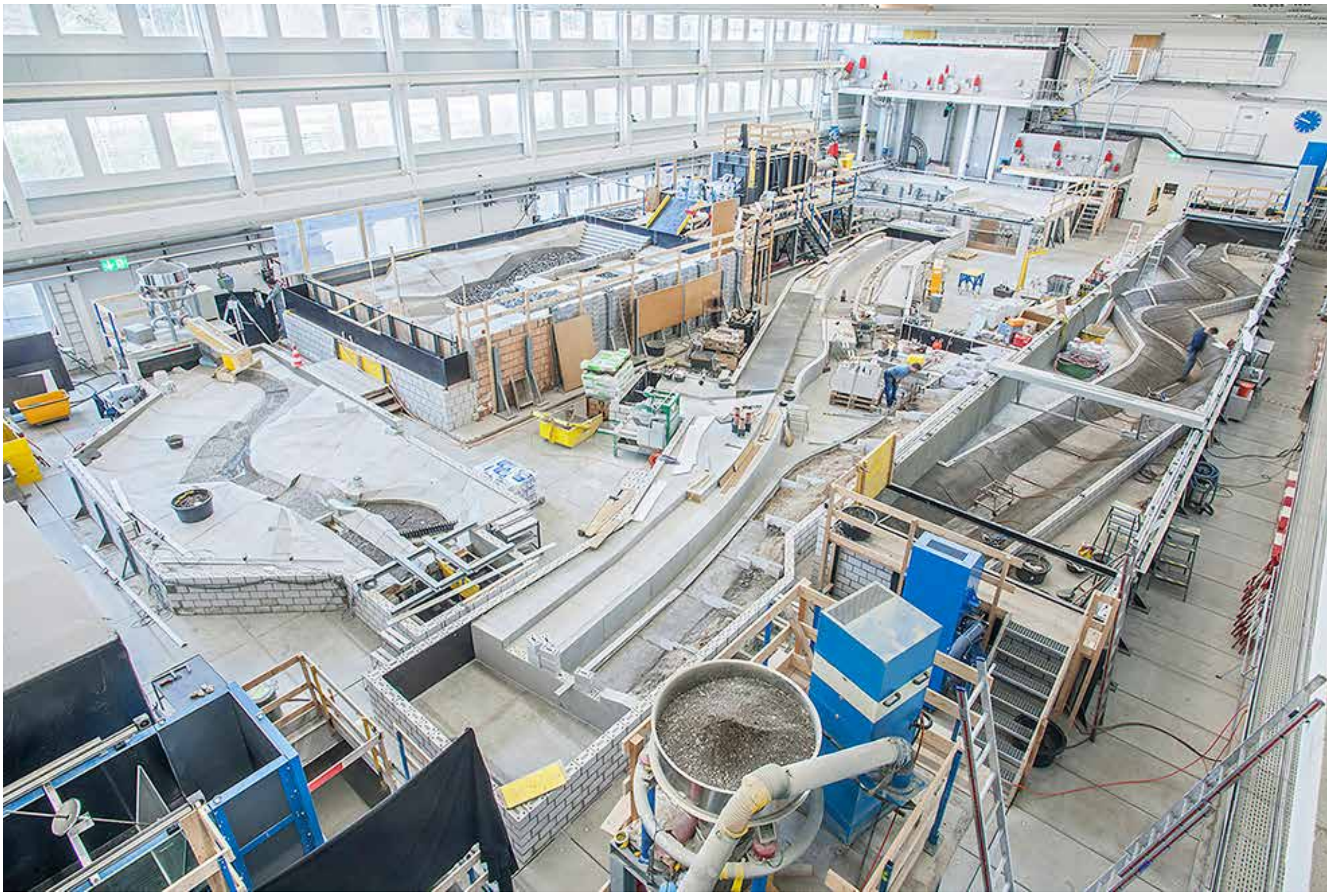
The last (architectural move) is the inclusion of the element of water, whether in the form of the monsoon rain which is relentless in its action on material and mood, or in the form of the well, the stream and the pool beyond the house. The seasonal 'anxiety' of the ground is addressed in the manner in which the paving is worked out within the courtyard in a continuous linear fashion and in a loose ring around the house, with undulations registering the flow of rainwater as it reaches for the nearest point of exit. The entrance portal of the building is a non-place. Sitting beneath the first upper copper-wrapped container, it becomes a space of pause. In this house, with its hortus conclusus acting both as container and sieve, the exploration of the rites of retreat, passage and exclusion are tested again. The final gesture was housing the massive rock which came as a gift from the owner's mother, leaving it for time to take over, as time inevitably will.
archdaily.com/225365/copper-house-ii-studio-mumbai

Ludwig Mies van der Rohe, FARNSWORTH HOUSE, Plano, Illinois, 1951.

The Farnsworth House in the Fox River flood in 2007

Studio Ólafur Elíasson in collaboration with VOGT, LIFE, Fondation Beyeler, Switzerland, 2021

Materials:
Water,
Uranine,
UV lights,
wood,
plastic sheet,
cameras,
kaleidoscopes,
common duckweed (Lemnar minor),
dwarf waterlilies (Nymphaea tetragona, Nymphaea ‘Pygmaea Rubra’, Nymphaea ‘Ellisiana’),
European frog bit (Hydrocharis morsus-rana),
European water clover (Marsilea quadrifolia),
floating fern (Salvinia natans),
red root floater (Phyllanthus fluitans),
shellflower (Pistia stratiodes),
South-American frog bit (Limnobium laevigatum),
and water caltrop (Trapa natans).
olafureliasson.net



Laboratory of Hydraulics, Hydrology and Glaciology (VAW), ETH, Zürich

(Top Image) Research projects include topics surrounding flood protection, Morphodynamics, Large wood and bed stabilisation.

(Bottom Image) Laboratory experiment on the morphological development of one-sided dynamic river widenings in gravel-bed rivers at VAW.

Many rivers in Switzerland and worldwide are heavily impacted by human interference, for example, by channelisation (i.e, artificial confinement to a narrow riverbed designed for efficient water and sediment conveyance). In addition, the sediment continuum of rivers is interrupted by transversal structures such as weirs or sediment retention basins. The combined effect of sediment deficit and channelisation transformed dynamic alluvial river systems with extensive floodplains into incised, straight rivers with a flat riverbed and little morphodynamic activity. The resulting uniform and static river systems cannot adequately sustain riverine flora and fauna adapted to the high spatiotemporal dynamics of natural river systems. Instead, the flow field is homogeneous, the riverbed is coarse and armored, and connectivity between aquatic and terrestrial habitats is interrupted. Modern river restoration works towards reestablishing dynamic riverine processes such as sediment transport and the associated morphodynamic activity...
The development of dynamic river widenings may be determined by many factors, for example, floodplain erodibility, vegetation growth, or the hydrological regime. Large-scale mobile-bed laboratory experiments representing a one-sided dynamic river widening in a gravel-bed river are conducted at VAW (bottom image). The laboratory results are complemented with numerical modeling using BASEMENT. The numerical model provides data on the hydraulic conditions in high spatial resolution, which allows us to draw more detailed conclusions about habitat availability within river widenings. We interpret our findings regarding both ecological benefits and potential conflicts with other management goals such as flood protection.
vaw.ethz.ch

KONKORDIA HUT (2850 m ASL)

VIEWPOINT to observe Konkordia Hut, ogive and medial moraine features

CON-NECT-ED-NESS, Danish pavilion, Venice Biennale, 2021

All life depends on water. Water exists everywhere on the planet in a dynamic system that the exhibition in the Danish Pavilion connects to. Water is invited in stages, sensed, and then flows out of the pavilion again. Through living bodies, evaporation, photosynthesis, and percolation, people and water engage in a mutual process of becoming; we meet and influence each other. The water in the pavilion is collected rainwater – who knows where it has been before and where it will go next? Who knows what other bodies, countries, and centuries it has passed through? For far too long we have understood development to mean linear processes, hierarchical structures, and the liberation from attachment. The cyclical flow and immanent boundlessness of water tie past, present, and future together and preclude any possibility of isolating ourselves from each other. The water carries time, disaster, life, the others. It flows through our shared spaces.
labiennale.org/en/architecture/2021/denmark

Hans Haacke, CONDENSATION CUBE, Los Angeles, USA, 1963–1965

Hans Haacke's Condensation Cube (1963-65) is a hermetically sealed, clear acrylic plexiglass box, thirty centimeters on the side that holds about one centimeter or so of water.[2] Condensation collects against the inner surface of the plexiglass forming vertical streaks on the inside. How the condensation is created can be explained in the following way: Air can hold only a limited amount of water vapor and when that limit or dew point—a law of nature, which applies to all bodies of air all over the world—is reached, condensation occurs. In almost all art museums, the temperature is set at a cool 65 degrees Fahrenheit, which means that at a relative humidity of about 45 percent (the standard in most museums), the dew point is at 42 degrees. Because plexiglass is a bad thermal insulator, the air temperature inside the Cube is the same as the temperature on the outside, namely 65 degrees. But since the humidity is close to 100 percent, the dew point is much higher, and is, in fact, about 65 degrees, precisely the temperature of the plexiglass.

I will argue that the Cube sets in play a rather complex game of illusions between the museum and the architecture that defines its space. This revolves not only around the word "cube," but also around the status of condensation as a cultural construct.

The story begins in the mid-nineteenth century when, with the advent of mechanized, ducted heating systems in multi-floor apartment buildings, it was discovered that condensation appeared neither on the outside nor on the inside surfaces of the building, but within the wall itself. There it would lurk, creating mold and rot. Condensation endangered the life span of these new buildings and thus, of course, the capital investment that they represented. Though the problem was first noticed and studied by the French who were building thousands of apartments in Hausmann's Paris, it was in the northern climate of Berlin where condensation proved to be particularly vexing. It was thus natural that among the first scientists to address the problem was Adolf Wilhelm Keim (1851-1913), whose family name, by the way, means 'germ.'[3] He argued that though dampness is brought into architecture because of the capillary nature of stone and brick, that in itself is not the problem. Stones and bricks had survived relatively well even in damp climates. What happens is that the dry heat on the inside sucks the moisture deeper into the building where it no longer dries out in the summer. In the lingering encounter with lime and cement, moisture creates corrosive chemical discharges that lead to what Keim called Mauerfrass, literally a "wall-eating" disease that was, in Keim's mind's eye, similar to cancer eating at the tissue of a living body.

To protect against Mauerfrass, Keim argued that the wall needed to be ventilated from within; in other words a flow of air, the positive, would offset the flow of water, the negative. The wall, therefore, needed to be separated into two component layers, a structural wall and a type of skin or internal surface, composed of thin brick tiles separated from the structural wall by about an inch, in which space air could flow. To keep moisture in that air corridor from entering through the bricks, Keim added that it was "beneficial to give the inner surface of the tiles a coat of asphalt."[4] This would leave the surface facing the room permanently dry so that it could be coated with plaster, which can then be painted or papered. Wall paper, which had become common in bourgeois houses, and which had also become quite costly, was now safe from the damp. Needless to say, Keim's solution has been used in architecture ever since, except that by the early twentieth century, tar paper was preferred and by the mid twentieth century special types of plastic sheathing like Tyvek, known to every home-builder in the United States, became the norm.

In Keim's world, architecture, in facing the crisis of industrialization, needed to be rethought from the inside out without having to give up its unity. His metaphor was thus appropriately biological. Structure had to be separated from skin by a type of two-dimensional lung. The structure could then do the heavy lifting, the interior wall could work as backdrop for the decorative embellishments in the room, and the lungs of the newly devised body could guarantee the whole a long and healthy life. And yet, if there was a moment where we see the first true separation of interior design from architecture, and architecture from environmental engineering, it was

Jarzombek, Mark. HAACKE'S CONDENSATION CUBE: THE MACHINE IN THE BOX AND THE TRAVAILS OF ARCHITECTURE. Thresholds, vol. 30, 2005, pp. 98–105., doi:10.1162/thld_a_00292

MONCHSJOCH HUT

A crevasse feature near the Monchsjoch Hut.

FIRN

An example of firn layering visible in the wall of a large crevasse on

Weissmiesgletscher, Switzerland.

A rock fragmented via Freeze-thaw weathering

A valley floor post glacial plucking

Glacial striations formed via abrasion

A glacier dirt cone

A glacier table

Blue veins of rotated crevasse traces

Post glacier moraine

MOREL HYDROPOWER PLANT

(FORMER) BISSE DE RIEDERI (water channels)


Calcite, Gypsum


Quartz, Hematite


Iron Rose, Molybdenite

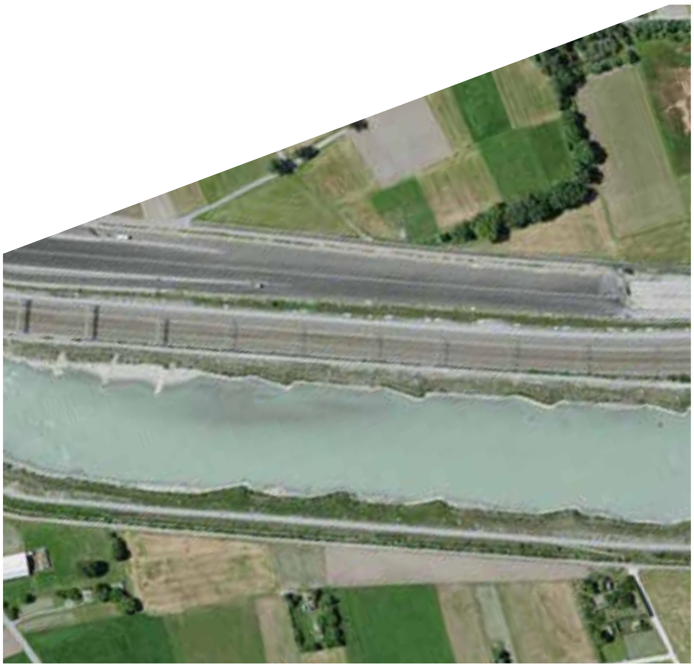
MOREL HYDROPOWER PLANT
The water shortage in the alpine region of Ried-Mörel, combined with the boom in industry after the Second World War, led to the building of the Morel power plant in the 1940s. Situated on the Massa River above the Stausee Gibidum Reservoir, it is a small run-of-river power station with a 2.7 km gravity tunnel that leads to a hydropower plant in Morel called Laufkraftwerk Morel Aletsch. The plant has an average energy production of around 138 GWh per year.

BISSE DE RIEDERI
The Valais region lies within a ring of high alpine mountains and thus is partially in a rain shadow, so areas of the canton can be defined as semi-arid. The traditional response was to construct irrigation systems to compensate for the periodic water deficit during the summer months. The Bisse de Riederi is an ex-irrigation channel first mentioned in documents dating from the year 1385. This has been further confirmed by a recent discovery of an old bisse structure preserved under the Aletsch Glacier, uncovered due to glacier melt. The meltwater at the Massa River was partially siphoned off and channelled via gravitational flow through dug earth channels or wooden structures installed around rock walls. This water was mainly used for cereal and hay production, as well as for washing and drinking water. The Bisse de Riederi is mostly wooden and remained active until the 1940s, since which time a hiking trail called the Massaweg has been created that follows the former bisse. From Blatten, it takes you across the Massa River, following the water trail towards the Rhône Valley, finishing at Ried-Morel. Traditionally, these channels were made with local wood and sealed with moss and sediments which form naturally with the flow of water. Sediment-rich water has recently been recognised as aiding a recent rewilding effort at other active bisse sites. For farmers in the past, sediment saturation was a problem when it came to watering crops and was removed before use by collecting the water in a pit, thus allowing the sediments to settle, before siphoning off the top layer for irrigation. At the turn of the 20th century, many bisses were replaced with galvanized metal, masonry and concrete, and in some cases PVC. There are many bisses in the Rhône Valley that are still active today, all of which you can find at www.les-bisses-du-valais.ch. Two that are close to our site are Bisses de Stigwasser, Wyssa & Oberschta and Bisses de Niwarch & Gorperi.

RHÔNE RIVER SECTIONS

Brig (left): The water from the Massa River joins the Rhône where the river is channeled.

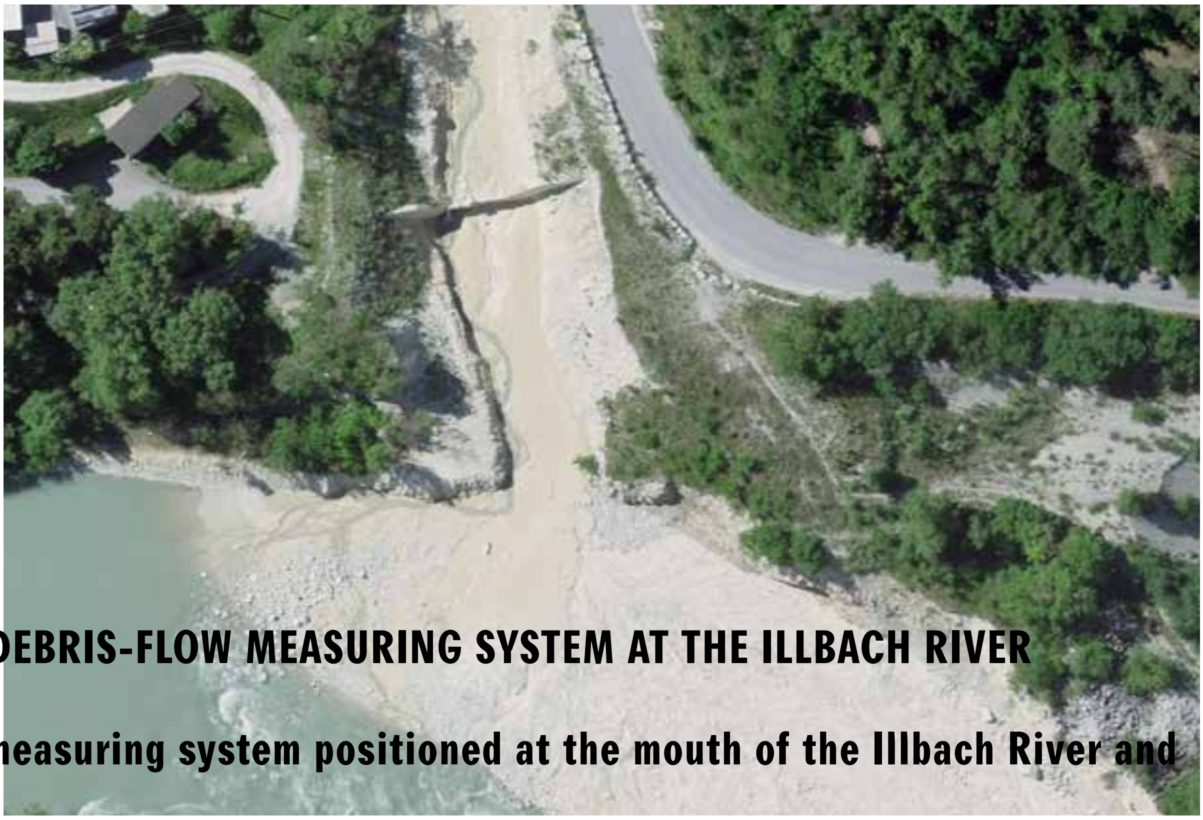
Brigerbad (right): Note the use of spur dikes along the river edge building an island of sediment deposit.



Baltschieder (left): Note the fish farm situated in the circular pool on the bottom right; the use of spur dikes along the river edge; the water from the Vispa river merging with the Rhône; the Vispa containing far fewer sediments.

Baltschieder (right): Note the channeled banks with small spur dikes.

(Left) Surface waves due to an anti-dunes regime during sedimentation in the flushing channel. (Right) High sediment load leading to the channel overtopping in 1999. (Below) Stausee Gibidum after the flushing process.



THE DEBRIS-FLOW MEASURING SYSTEM AT THE ILLBACH RIVER

The measuring system positioned at the mouth of the Illbach River and the large amount of sediment transported into the Rhône River.

MUD FLOW AT THE ILLBACH RIVER

YouTube 1:11 mins, 2016

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Introduction Lectures 21-22nd September 2021

21st September

9:00
Anne introduces Material Gesture and his own practice

10:15
Grace presents topic and research collected in Change: Towards Hydroscopic Design Book

11:00
Stephan on the type of work we make in DS, with past works of students and working method

11:45
Yuiko on the specific tools of the studio and workshops related to the topic

14:00 - IN PRESENCE
Sebastian Behmann: Studio Olafur Eliasson

15:30 - ONLINE
Ila Beka & Louise Lemoine: A lecture starting from Koolhaas Houselife as a filmic matrix that fed their on-going research about representation of architecture

17:00
Evening Screening of Alpi Film by Armin Linke

22nd September

9:00 - IN PRESENCE
Giuseppe Ielasi: Proposed a lecture that starts from the various approaches of capturing water's acoustic properties, and of filtering/transforming those through materials or different recording techniques, but also towards a recreation of those properties via different means of sound production

10:30 - IN PRESENCE
Nicole De Lalouviere and Sarem Sunderland on their findings at the same water trail as ours, and their individual phd researches

14:00 - IN PRESENCE
Ena Lloret-Fritschi: On the experiments at Gramazio Kohler and the Flatt Research Group of the controlled hydration of concrete

15:30 - ONLINE / MAYBE IN PRESENCE
Bijoy Jain

17:00 - ONLINE
Dr. Shantena Augusto Sabbadini: Lecture on Change and the I Ching

The introductory tour of the VAW lab is scheduled at 10.15 on Wednesday the 29th of September.

The introductory tour of the ICST Lab is scheduled at 18.15 on Thursday the 7th of October.